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| Jurisdiction: Davis County | Title of Plan: Davis County 2013 Multi-Jurisdictional Hazard Mitigation Plan | Date of Plan: June 2013 |
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| Funding Source: | | |
| State Reviewer: | Title: | Date: |
| FEMA Reviewer: Carol Kanter Lynn Jameson | Title: Community Planner HM Community Planner | Date: September 24, 2013 September 26, 2013, Nov. 4, 2013 |
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| Plan Approvable Pending Adoption | | |
| Plan Approved | November 5, 2013 | |

| Jurisdiction: | NFIP Status* | |
|--|---------------------|-----------|
| | Y | NP |
| Davis County (unincorporated) | | X |
| Bloomfield, City of | | X |
| Drakesville, City of | | X |
| Floris, City of | | X |
| Pulaski, City of | | X |
| Davis County Community School District | | X |
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* Notes: Y = Participating NP = Not Participating in NFIP S- Sanctioned R-Rescinded

SECTION 1: REGULATION CHECKLIST

| 1. REGULATION CHECKLIST | | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|------------|----------------|
| Regulation (44 CFR 201.6 Local Mitigation Plans) | | | | |
| ELEMENT A. PLANNING PROCESS | | | | |
| A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1)) | Section 1, p.4-9 Section 5, p. 101, 107, 113, 119, 125 | X | | |
| A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2)) | Section 1, p.8 | X | | |
| A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) | Section 1, p.4-9 Section 5, p. 101, 107, 113, 119, 125 | X | | |
| A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) | Section 1, p.9 Section 5, p. 102, 108, 114, 120 | X | | |
| A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii)) | Section 4, p.96-97 | X | | |
| A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i)) | Section 4, p.96-97 | X | | |
| <u>ELEMENT A: REQUIRED REVISIONS</u> | | | | |
| A1. The plan must identify who represented each jurisdiction. The Plan must provide, at a minimum, the jurisdiction represented and the person’s position or title and agency within the jurisdiction. | | | | |

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)

Location in Plan
 (section and/or
 page number)

Met **Not Met**

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

| | | | |
|---|--|---|--|
| B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i)) | Section 3, p.31-85 | X | |
| B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i)) | Section 1, p.10-11 Section 3, p.31-85 | X | |
| B3. Is there a description of each identified hazard’s impact on the community as well as an overall summary of the community’s vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii)) | Section 3, p.31-85 | X | |
| B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii)) | Section 3, p.40 | X | |

ELEMENT B: REQUIRED REVISIONS

ELEMENT C. MITIGATION STRATEGY

| | | | |
|--|--|---|--|
| C1. Does the plan document each jurisdiction’s existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3)) | Section 2, p.26-30 Section 4, p.86-98 | X | |
| C2. Does the Plan address each jurisdiction’s participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii)) | Section 3, p.40 | X | |
| C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i)) | Section 4, p.86 | X | |
| C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii)) | Section 4, p.92-94 | X | |
| C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii)) | Section 4, p.92-94,96 | X | |
| C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii)) | Section 4, p.96 | X | |

ELEMENT C: REQUIRED REVISIONS

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)

Location in Plan
 (section and/or
 page number)

Met Not
 Met Met

ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)

| | | | |
|--|--|---|--|
| D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3)) | Section 2, p.24 Section 3, p.38-85 Section 5, p.102, 108, 114, 120 | X | |
| D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3)) | Section 1, p.11 Section 4, p.89-94 | X | |
| D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3)) | Section 4, p.89-96 Appendix C, p.133-134 | X | |

ELEMENT D: REQUIRED REVISIONS

ELEMENT E. PLAN ADOPTION

| | | | |
|---|-------------------|---|--|
| E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5)) | Appendix D, p.135 | X | |
| E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5)) | Appendix D, p.135 | X | |

SECTION 2: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

This is a very substantively strong and well-written plan, providing easy reading for a complicated subject matter. The “Background” section beginning on page four includes a broad overview of how the Davis County Plan came about, and why it was developed. The paragraph differentiating between hazard mitigation and emergency preparedness is especially insightful.

Listing previous disaster declarations is an excellent practice, and is not always seen in local mitigation plans. A brief summary paragraph describing what, if any, changes occurred as the result of those declarations would be even better. The plan includes a valuable listing with informative descriptions of implemented actions since the 2008 Mitigation Plan (page 11).

The community profile is very inclusive. A good analysis of critical facilities and demographics is included.

Beginning on page 100 is an inclusive and informative summary of the planning process for the individual participating communities. It is clear that plan developers actively solicited public input, and were rewarded with excellent participation from their communities and the school district.

The “Record of Review” section in each of the individual participating jurisdiction’s profile is an excellent way to respond to the regulatory requirements.

Opportunities for Improvement

The first paragraph of the plan states that mitigation is the prevention of losses from hazard events. Rather than prevention of losses, mitigation emphasizes the reduction of losses. Even though a very good definition is included in the next paragraph in the plan, it is recommended that the wording be changed in the first paragraph, if only for the sake of clarity.

Define acronyms, such as “ADLM Emergency Management” on page six and “EDA” on page nine, when they are first mentioned.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

This is a strong risk assessment, and includes a number of good practices. Excellent research has been conducted, and application of the data to the individual jurisdictions is well done. Some of the highlights include the following elements.

- The first paragraph on page 32 describes changes in guidance since the 2008 Plan.
- The list of human-caused disaster concerns on page 33 is a terrific idea, and includes area-specific information often neglected in local hazard mitigation plans. A similar summary for natural hazards would be an excellent addition.
- Excellent discussion of NFIP participation present and future on page 40. The Hazus discussion was well done, and the data limitations language was valuable.

- Information on pages 40 through 43 reveals a thorough understanding of what is happening in the planning area. This kind of information should be in all local mitigation plans.
- Planning area data on mobile homes in the tornado analysis was invaluable information in the Davis County Plan, and should be included in all mitigation plans. Even better would be pinpointing the jurisdictions with their higher percentages of mobile homes for housing units.
- Outstanding maps.
- Especially outstanding dam analysis.
- Inclusion of the “Vulnerable Jurisdictions” chart early in the discussion of hazards is helpful.

Opportunities for Improvement

The analysis described on page 34 of the Plan is valid, but may reveal an underlying confusion regarding the differences between the terms “vulnerability” and “severity.” It is stated on page 34 that “. . . the vulnerability was determined as a function of both potential severity and the probability of the hazard occurring in a given time period.” Perhaps the word “vulnerability” in that sentence should be replaced with “risk.” The Local Mitigation Planning Handbook includes a good analysis of the differences between vulnerability and severity. Severity can be equated with magnitude, strength, or extent, and is generally expressed in terms unique to each hazard, such as the Enhanced Fujita Scale for tornadoes (see page 5-3 of the Handbook). On the other hand, page 5.1 of the Handbook defines vulnerability as the characteristics of community assets that make them susceptible to damage from a given hazard. Vulnerability is associated with “Impact” and is generally expressed in terms of dollar losses or percentage of a given community that is damaged. Section 4 on page 5-19 of the Handbook includes a discussion of how to conduct a vulnerability analysis.

Additional information on the exclusion of levees from the list of hazards is recommended. A statement of how it was determined that there “there [were] no significant levees located in the County” is needed (see page 32 of the Plan). For example, the USACE’s National Levee Database shows nothing for Davis County. While there is a possibility that levees may exist, such as low-head agricultural levees, no records indicated that the breach or overtopping of these levees should impact any other property other than that of the levee owner. Damage to residential structures is unlikely.

The hazard profiles include very good explanations of the NCDL data limitations. In addition, a blanket statement at the beginning of the risk assessment might be a good idea. The following language is based on information on the NCDL Website.

NCDL data is from NWS Storm Data. The NWS receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, “skywarn” spotters, NWS damage surveys, newspaper clipping services, the insurance industry, and the general public. The data documents only those storms and other significant weather phenomena that are serious enough to cause loss of life, injuries, significant property damage, and/or disruption to commerce. Some information appearing in NWS Storm Data may be provided by or gathered from sources outside the NWS, such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. The reliability of the data is highly dependent on the data sources. In addition, it represents only the information that was reported, as opposed to what actually happened. The decision whether or not to report is made subjectively, based on the opinion of the reporter rather than parameters defined by the NWS.

Other NCDL data limitations include the fact that at this time, the only lightning data contained in the NCDL Website are lightning events that resulted in fatality, injury, or property and crop damage. County-specific tornado data is skewed by the fact that a tornado may contain multiple segments. A tornado that crosses a county line or state line is considered a separate segment for NCDL reporting purposes. Also, a

tornado that lifts off the ground for less than five minutes or 2.5 miles is considered a separate segment. If the tornado lifts off the ground for greater than five minutes or 2.5 miles, it is considered a separate tornado. The tornadoes reported in NCDC Storm Events Database are in segments, and are not necessarily separate tornadoes.

The NCDC tries to use the best available information, but because of time and resource constraints, information from these sources may be unverifiable. For this reason, the accuracy or validity of the information is not guaranteed by the NCDC. The damage amount information is received from a variety of sources, including those listed above. The NCDC Website cautions that property and crop damage information “should be considered as a broad estimate.” Note that NCDC damage estimates are in 2007 dollars.

Additional information about flash flood location is needed in the Davis County plan. A good source of information would be local or county public works departments. In addition, NCDC event narratives often include information about which roads/highways are flooded by flash flooding. It should be included in the next plan update.

NCDC event narratives can be good sources of information for damages from all hazards. For example, the description of a 7/16/2007 lightning strike in Bloomfield includes the following information: “Thunderstorms moved across Davis County during the early morning hours of the 16th. As they moved across the Bloomfield area, lightning struck the chimney of an old school. It caused minor damage to the building as the chimney was blown apart and the bricks fell on the building.” An 8/13/2006 lightning strike includes the following narrative, “Lightning struck a house northwest of Drakesville, in Davis County, setting it on fire. The house was a total loss.” This data could provide a good basis for loss estimates in the plan’s vulnerability analysis.

Although the State Plan generally is the best resource for information to use in the local plan, the next plan update should consider alternative vulnerability analysis methodology. Alternatives to NCDC data may not be possible for all hazards, but reliable information on previous event losses does exist for some hazards and should be considered.

Element C: Mitigation Strategy

Plan Strengths

The plan includes an exemplary analysis of the progress made on actions proposed in the 2008 plan, with sections at the beginning of the plan, the end of the plan, and in the sections for the individual participating jurisdictions. This is a laudable practice, and provides a clear picture of the mitigation programs in the county.

Also of note was the plan evaluation process outlined beginning on page 98. The proposed actions were clearly the result of due consideration by the various planning committees. They are substantive and address the risks and vulnerabilities detailed in the risk assessment.

Opportunities for Improvement

It is not clear from the plan narrative what the connection is between proposed actions (see the table beginning on page 92) and the goals and bulleted items (beginning on page 86). In fact, the role of the bulleted items was not apparent from the plan narrative. They appear to objectives, as they are more specific than the goals, but less specific than the actions. One way to address this problem would be to number the goals, objectives, and actions in such a way as to show how the goals led to the objectives, and the objectives led to the actions. Numbering in “outline” fashion could accomplish this.

B. Resources for Implementing Your Approved Plan

A variety of mitigation resources are available to communities. The Iowa Homeland Security & Emergency Management website: http://www.iowahomelandsecurity.org/disasters/hazard_mitigation.html provides planning and project related information as well as details on how major FEMA mitigation programs are implemented in the State.

HSEMD's training website provides information on upcoming training opportunities within the State: <http://homelandsecurity.iowa.gov/training/>.

Review of the FEMA HMA guidance (FY11 is the most current) is also encouraged as guidance provides information about application and eligibility requirements. This guidance is available from <http://www.iowahomelandsecurity.org/grants/HMA.html> or through FEMA's grant applicant resources page at http://www.fema.gov/government/grant/hma/grant_resources.shtm.

The FEMA Hazard mitigation planning site <http://www.fema.gov/plan/mitplanning/index.shtm> contains the official guidance to meet the requirements of the Stafford Act, as well as other resources and procedures for the development of hazard mitigation plans.

Various funding programs are available from several state and federal agencies to assist local jurisdictions in accomplishing their mitigation activities and goals. A detailed listing of programs, information on each program, and contact information is also available from the 2010 State Hazard Mitigation Plan.

Davis County Multi-Jurisdiction Hazard Mitigation Plan 2013

Prepared by Area 15 Regional Planning Commission

Special thanks to the Davis County Board of Supervisors, ADLM Emergency Management,
and the Davis County Hazard Mitigation Planning Team

Cover painting used by permission, courtesy of Speltz Studio of Wildlife

Plan is developed in coordination with the Federal Emergency Management Agency and
Iowa Homeland Security and Emergency Management

Contents

Section 1 - Introduction & Planning Process 4

- Background..... 4
- Purpose..... 6
- Planning Process 7
- Planning Team Meetings and Local Involvement 7
- Plan Review 9
- Previous Disaster Declarations 10
- Mitigations Actions Since 2008 Plan..... 11

Section 2 – Planning Area Profile..... 12

- Historic Overview 12
- Geography..... 13
- Infrastructure & Service Inventory 17
- Schools..... 18
- Law Enforcement..... 20
- Emergency Response Capacity..... 20
- Demographics and Development Data 24
- Critical Facilities and Valuation 26
- Countywide Structure Totals 26
- Community Assets/Critical Facilities Inventory..... 27

Section 3 – Risk Assessment 31

- Davis County Hazards 32
- Hazard Ranking and Vulnerability Assessment 34
- Hazard Profiles..... 36
 - River Flood 38
 - Severe Winter Storms 44
 - Tornadoes..... 47
 - Windstorms 52
 - Thunderstorms/Lightning 56
 - Hailstorms 59
 - Flash Flood..... 63

| | |
|--|-----|
| Drought | 66 |
| Extreme Heat | 68 |
| Grass and Woodland Fire..... | 71 |
| Dam Failure | 73 |
| Earthquakes..... | 78 |
| Expansive Soils..... | 80 |
| Landslides | 82 |
| Sinkholes..... | 84 |
| Section 4 – Mitigation Strategy | 86 |
| Mitigation Goals | 86 |
| Mitigation Measures | 87 |
| Previously Identified Mitigation Actions - Countywide..... | 89 |
| Proposed Mitigation Actions | 92 |
| STAPLEE | 95 |
| Implementation/Incorporation | 96 |
| FEMA Preparedness List..... | 99 |
| Section 5: Davis County Jurisdictions | 100 |
| City of Bloomfield | 100 |
| City of Drakesville..... | 106 |
| City of Floris..... | 112 |
| City of Pulaski..... | 118 |
| Davis County Community School District..... | 124 |
| Appendix A - Glossary | 128 |
| Appendix B - Vulnerability Chart & Ratings | 132 |
| Appendix C - STAPLEE Chart..... | 133 |
| Appendix D - Adoption Resolutions..... | 135 |

Section 1 - Introduction & Planning Process

Floods, tornados, windstorms, and severe winter storms – these are all examples of natural hazards that affect Iowans each year. These events threaten thousands, even millions of dollars of property damage annually and can sometimes be fatal to persons and animals that are in harm’s way. To protect lives and property from natural or man-made hazards, it is vital for local leaders to identify potential losses and take measures to prevent such losses; this process is known as hazard mitigation planning.

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. Potential hazards can be natural, such as those described above or man-made such as a radiological incident or transportation accidents involving hazardous materials. Mitigation planning encourages long-term reduction of vulnerability to natural and man-made hazards. The goal of mitigation is to save lives and reduce property damage. Mitigation actions should provide a cost-effective and environmentally sound method to reduce the potential financial impacts of disasters to property owners and all levels of government. Mitigation should also minimize disruption to communities by protecting critical resources and infrastructure such as water, food, shelter, energy, medical treatment, and transportation.

Many types of mitigations actions can be undertaken to help offset the potential impacts of a potential hazard. Examples of mitigation measures can include infrastructure improvements, the purchasing of emergency response equipment or the designation and outfitting of a community shelter with back-up power. Warning sirens can be installed to notify a city’s residents of an approaching weather event. NOAA radios could be utilized to inform the public of information during the storm including shelter locations. Proactive mitigation measures help to save lives and protect property.

Background

The response and mitigation of natural disasters has been a subject of increasing focus for the federal government in the past few decades.

The Federal Emergency Management Agency (FEMA) provides assistance to local governments for disaster response and recovery through the Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act). The Stafford Act amended the original Disaster Relief Act of 1974, which created a system triggering financial and physical assistance upon the issuance of a Presidential Disaster Declaration. This program was amended again with the passage of The Disaster Mitigation Act of 2000 (DMA2K). This legislation established a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). DMA2K increases the amount of funds available to states, and requires the state and local governments to have adopted an approved Hazard Mitigation Plan in order to qualify for post-disaster HMGP funding. This plan was developed in accordance

with FEMA's plan requirements, which are outlined under Code of Federal Regulations (CFR), Title 44, Part 201.6, *Local Mitigation Plans*.

The Hazard Mitigation Grant Program is one of several mitigation-related programs offered by FEMA. Each of these programs provides funding opportunities for pre-and post-disaster mitigation.

- **Hazard Mitigation Grant Program (HMGP):** HMGP assists in implementing long-term hazard mitigation measures following Presidential disaster declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities
- **Pre-Disaster Mitigation (PDM):** PDM provides funds on an annual basis for hazard mitigation planning and the implementation of mitigation projects prior to a disaster. The goal of the PDM program is to reduce overall risk to the population and structures, while at the same time, also reducing reliance on Federal funding from actual disaster declarations.
- **Flood Mitigation Assistance (FMA):** FMA provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP)
- **Repetitive Flood Claims (RFC):** RFC provides funds on an annual basis to reduce the risk of flood damage to individual properties insured under the NFIP that have had one or more claim payments for flood damages. RFC provides up to 100% federal funding for projects in communities that meet the reduced capacity requirements.
- **Severe Repetitive Loss (SRL):** SRL provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that are qualified as severe repetitive loss structures. SRL provides up to 90% federal funding for eligible projects.¹

Under 44 CFR §201.6, local governments must have a FEMA-approved Local Mitigation Plan in order to apply for and/or receive project grants under the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Program (PDM), the Flood Mitigation Assistance Program (FMA), and Severe Repetitive Losses (SRL).² Projects eligible for grant funding changes annually, based on recent Presidential Disaster Declarations and priorities determined at the state level.

A Hazard Mitigation plan is intended to accomplish several goals and objectives. Most importantly, the planning process provides a platform for the community to address some of the main hazards that affect them. First in the process, hazards that pose a risk to the community are identified. Next, a risk assessment is undertaken which evaluates the likelihood and potential impact of each hazard. Once this assessment is completed, past and present mitigation efforts are evaluated. The plan will outline future hazard mitigation strategies, identify city/county

¹ (FEMA Hazard Mitigation Assistance, 2010)

² (FEMA Local Multi-Hazard Mitigation Planning Guidance, 2008)

departments responsible for implementation, and identify potential funding sources. In addition, the plan identifies approaches to involve the public, and what steps should be taken by local government to ensure that the concept of hazard mitigation is always a priority.

When implemented appropriately, mitigation projects can save lives, reduce property damage, save public money, and protect the environment. Mitigation can reduce the potential cost of disasters to property owners and all levels of government. In addition, mitigation can protect critical community facilities, reduce exposure to liability, and minimize community disruption.

In 2012, the Davis County Board of Supervisors and ADLM Emergency Management initiated this project with assistance provided by the Area 15 Regional Planning Commission. The County wished to pursue a new 5-year Plan, as their first plan, completed in 2008, was set to expire in 2013. Upon award of the planning grant, Davis County enlisted the services of Area 15 Regional Planning Commission as a consultant to facilitate the planning process, and compile the hazard mitigation plan.

Purpose

The purpose of this plan is to engage public officials, citizens, and local leaders in a planning process that will formulate strategies to address the hazards affecting Davis County. This plan comprises an update of the previously adopted Hazard Mitigation Plan, which was completed in 2008. Data collected during the process will be used to identify ways to reduce the effects of disasters upon residents, property, and resources. There are three parts of this particular plan that will accomplish the purpose:

- Identify and rank hazards that affect Davis County.
- Develop a mitigation plan that will assess local capabilities, develop goals, and identify mitigation measures to reduce vulnerability to future hazards
- Implement the plan and associated mitigation actions; monitor, evaluate and update the plan.

This plan is not to be confused with the Davis County Emergency Management Plan. The major difference between this plan and the Emergency Management Plan is that the hazard mitigation plan addresses hazards before they occur. The Management Plan is designed to be a guide on how to respond in case of a disaster or emergency

Planning Process

The hazard mitigation planning process is portrayed by FEMA as following a series of somewhat sequential steps or phases. These four basic phases are shown below:

- 1. Organize Resources**
 - a. Coordination among agencies
 - b. Integration with other planning efforts
 - c. Involve the public throughout the planning process
 - d. State coordination of local mitigation planning
- 2. Assess Risks**
 - a. Identify all hazards
 - b. Profile hazard events
 - c. Assess vulnerability
 - d. Estimate potential losses
- 3. Develop the mitigation plan**
 - a. Documentation of planning process
 - b. Capability assessment
 - c. Develop hazard mitigation goals
 - d. Identification and analysis of mitigation measures
 - e. Funding sources
- 4. Implement and Monitor Progress**
 - a. Adoption
 - b. Implementation of mitigation measures
 - c. Implementation through existing programs
 - d. Monitoring, evaluation, and updating the plan
 - e. Continued public involvement³

The approach taken to develop the Davis County Hazard Mitigation Plan follows this outline, though not on a strict basis.

Planning Team Meetings and Local Involvement

After the planning grant had been secured, the groundwork began to involve each of the local jurisdictions in the process for developing the plan and begin forming a planning team. The jurisdictions participating in this plan and planning process include Bloomfield, Drakesville, Floris, Pulaski, Davis County, and the Davis County Community School District. To provide a starting point for the formation of the planning team, it was decided to utilize the Davis County Local Emergency Planning Committee (LEPC), as it is comprised of firefighters, emergency management personnel, local elected officials and leaders, and school officials.

³ (FEMA 386-1, 2002)

From the beginning of the planning process, Area 15 staff worked with Davis County and ADLM Emergency Management to determine the appropriate course of action. Upon identifying the members of the planning team, a work schedule was established. A community survey/inventory was undertaken for each jurisdiction within the planning area, which aided in identifying the critical facilities and the hazards which posed the greatest threat.

In the meetings with Planning Team members and each local jurisdiction, all potential hazards were identified and reexamined to determine the hazards that are the biggest threat for each jurisdiction. The Planning Team was able to help develop the risk assessment by analyzing these hazards using various resources and local knowledge. The Planning Team then discussed and identified vulnerable areas, community goals, and mitigation strategies, which were eventually prioritized.

The Davis County Hazard Mitigation Planning Team, comprised of emergency management staff, elected officials, City and County personnel, emergency responders (fire/police/sheriff) and school representatives, met regularly throughout the planning process for the development of the plan. The following people served on the countywide planning team:

| | | |
|------------------------|-------------------------|-----------------------|
| Mike Lamb* | Ross Hunter | Dan Roberts |
| Dave Davis | Jeff McClure | Ryan Schock |
| Lynn Fellingner | Rhonda Northup | Vicki Sullivan |
| Dean Graham | Josh O'Dell | Dale Taylor |
| Teri Hanna | Steve Park | Brian Thomas |
| Robert Hasz | Edward Reese Jr. | Tanner Vitko |

***Denotes Team Lead**

In an effort to ensure participation by each jurisdictions, a minimum attendance requirement was instituted by the planning team. Representatives from each jurisdiction were expected to attend two county-wide planning team meetings to be an official member of the Planning Team. While a good portion of the discussions affecting the entire county took place in the county-wide meetings, many of the issues confronting each of the individual jurisdictions was discussed at the jurisdiction-wide meetings as well. Additional assistance from outside volunteers also contributed to the development of this plan, including data gathering from the City Clerks, County Auditor's Office, and the County Assessor's Office.

Perspectives other than those affiliated with governmental bodies can be very useful in the planning process as well. When the planning process began, Area 15 Regional Planning Commission staff identified and contacted several public, private, and nonprofit groups that would be useful additions to the planning team. All agencies, businesses, academia, non-profits and other interested parties were solicited for participation through mail and email. Those that were contacted were:

- Alliant Energy
- Southern Iowa Electric Cooperative
- Citizens Mutual Telephone Cooperative
- Davis County-Iowa State Extension
- Pathfinders RC&D
- Wapello Rural Water Association
- Rathbun Rural Water Association
- The Bloomfield Democrat

A total of eight countywide meetings were held. In addition, two meetings with each participating jurisdiction were held to address the more localized needs and concerns of the individual communities. Throughout the planning process, neighboring communities and the general public were provided the opportunity to give input and feedback for the plan. Notices were published in the Bloomfield Democrat for each meeting, which has circulation throughout Davis County and the surrounding communities. Any interested citizen could attend local and county mitigation planning meetings throughout the planning process as well as comment during the review period.

Plan Review

Upon the completion of the plan, the document was made available to participating jurisdictions. Prior to the approval and adoption of the plan by each of these jurisdictions, the plan was then made available for public review and comment for a period of 30 days at the Davis County Auditor's Office. Area 15 Regional Planning Commission compiled this finished document and completed the associated plan review crosswalk. The plan was then submitted to Iowa Homeland Security, and then FEMA for review. Each of the participating jurisdictions adopted the plan during the review process.

During the plan development process, existing plans, studies, reports, and technical information were reviewed by Area 15 Regional Planning Commission and their respective jurisdictions. This was done in an effort to be consistent with the goals and priorities previously identified by the County and each jurisdiction. Currently in Davis County, there are only a limited amount of mechanisms which help guide development and strategies to help mitigate disasters. A few jurisdictions enforce certain building codes through permitting. Additionally, Area 15 Regional Planning Commission helped spearhead the EDA Disaster Recovery Strategy, which helped to outline certain mitigation strategies.

Once this plan is adopted and approved, it is intended that the Davis County Hazard Mitigation Plan be incorporated, where appropriate, into the existing and future plans of jurisdictions within and including Davis County. Many of the actions identified in the plan can then be incorporated into Comprehensive Plans, Capital Improvements Plans, the County's Emergency Management Plan, Emergency Operations Plan, and future budgets, among other things.

Previous Disaster Declarations

The hazards addressed in this plan were ultimately determined by the Planning Team. The Planning Team initially identified the hazards most likely to affect the county based on the 2010 Iowa Hazard Mitigation Plan, past disaster declarations in Iowa and Davis County, research, and personal knowledge of the area.

FEMA maintains a database of Declared Disasters and Emergencies at <http://www.fema.gov/disasters>. Iowa has experienced 26 (as of May 2013) presidential declared disasters in the last 20 years, which are listed below:

Table 1: Disaster Declarations in Iowa, 1993-2013

| Number | Date Declared | Description |
|--------|---------------|---|
| 4119 | 5/31/2013 | Severe Storms, Straight-line Winds, and Flooding |
| 4114 | 5/6/2013 | Severe Winter Storm |
| 4018 | 8/30/2011 | Severe Storms and Flooding |
| 4016 | 8/24/2011 | Severe Storms, Straight-Line Winds, and Flooding |
| 1998 | 6/27/2011 | Flooding |
| 1977 | 5/5/2011 | Severe Storms, Tornadoes, and Straight-line Winds |
| 1930 | 7/29/2010 | Severe Storms, Flooding, & Tornadoes |
| 1928 | 7/27/2010 | Severe Storms & Flooding |
| 1880 | 3/2/2010 | Severe Winter Storms |
| 1877 | 2/25/2010 | Severe Winter Storms & Snowstorm |
| 1854 | 8/13/2009 | Severe Storm |
| 1763 | 5/27/2008 | Severe Storms, Tornadoes, & Flooding |
| 1737 | 1/4/2008 | Severe Winter Storm |
| 1727 | 9/14/2007 | Severe Storms & Flooding |
| 1705 | 5/25/2007 | Severe Storms, Flooding, & Tornadoes |
| 1688 | 3/14/2007 | Severe Winter Storms |
| 1518 | 5/25/2004 | Severe Storms, Tornadoes, and Flooding |
| 1420 | 6/19/2002 | Severe Storms & Flooding |
| 1367 | 5/2/2001 | Severe Storms & Flooding |
| 1282 | 7/22/1999 | Severe Storms & Flooding |
| 1277 | 5/21/1999 | Severe Storms, Flooding, & Tornadoes |
| 1230 | 7/2/1998 | Severe Weather, Tornadoes, & Flooding |
| 1191 | 11/20/1997 | Severe Snow Storms |
| 1133 | 8/21/1996 | Flooding |
| 1121 | 6/24/1996 | Flooding |
| 996 | 7/9/1993 | Flooding, Severe Storm |
| 986 | 4/26/1993 | Flooding, Severe Storm |

Of the above-reference disasters, the following affected Davis County, Iowa:

Table 2: Disaster Declarations in Davis County, 1990-2011

| Number | Incident Period | Description | Assistance |
|--------|---------------------|--|--|
| 4119 | 4/17/13 - 4/30/13 | Severe Storms, Straight-line Winds, & Flooding | County qualified for individual and public assistance |
| 1763 | 5/25/08 - 8/13/08 | Severe Storms, Tornadoes, & Flooding | County qualified for individual and public assistance. |
| 1737 | 12/10/07 - 12/11/07 | Severe Winter Storms | County qualified for public assistance. |

| | | | |
|------|-------------------|---------------------------------------|--|
| 1727 | 8/17/07 - 9/5/07 | Severe Storms & Flooding | County qualified for public assistance. |
| 1518 | 5/19/04 - 6/24/04 | Severe Storms, Tornadoes, & Flooding | County qualified for individual and public assistance. |
| 1230 | 6/14/98 - 7/15/98 | Severe Weather, Tornadoes, & Flooding | County qualified for individual and public assistance. |
| 1121 | 5/8/96 - 5/28/96 | Flooding | County qualified for public assistance. |
| 996 | 4/13/93 - 10/1/93 | Flooding, Severe Storm | County qualified for individual and public assistance. |

Source: FEMA, 2013

Mitigations Actions Since 2008 Plan

The previous County Hazard Mitigation Plan, adopted in 2008, identified a number of mitigation actions that were undertaken prior to adoption of the 2008 Plan. Additionally, the plan highlighted certain mitigation actions to pursue moving forward (a comprehensive list can be seen on page 89). Many of these recommendations were carried out. Others were not. Some actions were carried out that weren't even identified in the 2008 plan. These types of projects came about when certain unforeseen opportunities and demands surfaced. Below is a list of mitigation actions that have been carried out since the adoption of the 2008 mitigation plan.

- Host annual severe weather spotter classes led by the National Weather Service
- Purchase of a new pumper truck for the Bloomfield Fire Department
- Purchase of a new brush truck, jaws of life, and rescue air bags for the Drakesville Fire Department
- Acquisition of two new fire trucks for Pulaski Fire Department
- Acquisition and installation of a generator at the Davis County Law Center
- Acquisition of radios for all Davis County Community School District buses
- Acquisition of new handheld portable radios for the hospitals, police departments, and fire departments
- Implementation of CodeRed, which is an emergency alert notification system
- Implementation of Call-Em-All for the School District, which another emergency alert notification system

Section 2 – Planning Area Profile

Davis is located in southeastern Iowa, along the Iowa-Missouri border. It is bordered by Wapello County on the north, Van Buren County on the east, and Appanoose County on the west. Davis County has an area of approximately 505 square miles.

Historic Overview

The territory that now comprises Davis County was acquired by the United States from France in 1803 as part of the Louisiana Purchase, yet the first settlers didn't arrive until about 1837, who settled along the southern border of the county near the North and South Wyaconda Rivers⁴. Up until this time, the area was inhabited primarily by the Sac & Fox Indian Nation, whose lands were ceded to the US government in 1838.

The boundary and name of Davis County was defined by the Territorial Legislature of Iowa, which was approved in 1844. The Territorial Legislature affected how the county was organized, and resulted in the appointment of a sheriff, clerk of courts, and judge among others. The County was named after Garrett Davis, a Congressman from Kentucky.



Davis County Courthouse

The first courthouse was built in 1844 out of logs, yet was deemed unsuitable for use by 1851 where operations were transferred to the Methodist church. An 1875 election authorized the construction of a new courthouse at its current location⁵.

According to the first census, the population of Davis County was 2,522 in 1844, and increased steadily until around 1900, when it had a population of 15,620⁶. According to the most recent 2010 census, Davis County now has a population of about 8,753 residents, which is primarily comprised of residents in and around Bloomfield and the other three incorporated municipalities - Drakesville, Floris, and Pulaski.

⁴ (USDA, 1991)

⁵ (Davis County Tourism Corporation, 2013)

⁶ (USDA, 1991)

Geography

Davis County is located approximately 103 miles southeast of Des Moines and encompasses an area of approximately 326,400 acres, or about 505 square miles. The land surface in Davis County is characterized by a topography of rolling hills consisting of mixed farmland, depending on location within the County. It has excellent soil for a number of agricultural uses. In 1991, approximately 46% of the acreage in the County is used for crop production, and about 29% of the land area is used for pasture. Timbered areas make up about 4% of the land area⁷.

Surface Water and Floodplains

The primary water features in the County include four major rivers, which receive almost all of the runoff in Davis County. Comprising the largest watershed, the Des Moines River is the most significant body of water in the, followed then by the Fox River, the North Fabius River, and the North and South Wyaconda Rivers. In the northern portion of the County, Chequest and Soap Creeks flow west to east and link directly with the Des Moines River. The county does not contain any large natural lakes, and the majority of water bodies are primarily soil conservation structures, farm ponds, reservoirs, wetlands, and old quarries. The largest body of water is Lake Wapello, located in the northwest part of the County, about 5 miles west of Drakesville. Water travel within the county is limited to recreational uses for the most part.

Below is a list of all of the rivers and creeks that are in Davis County.

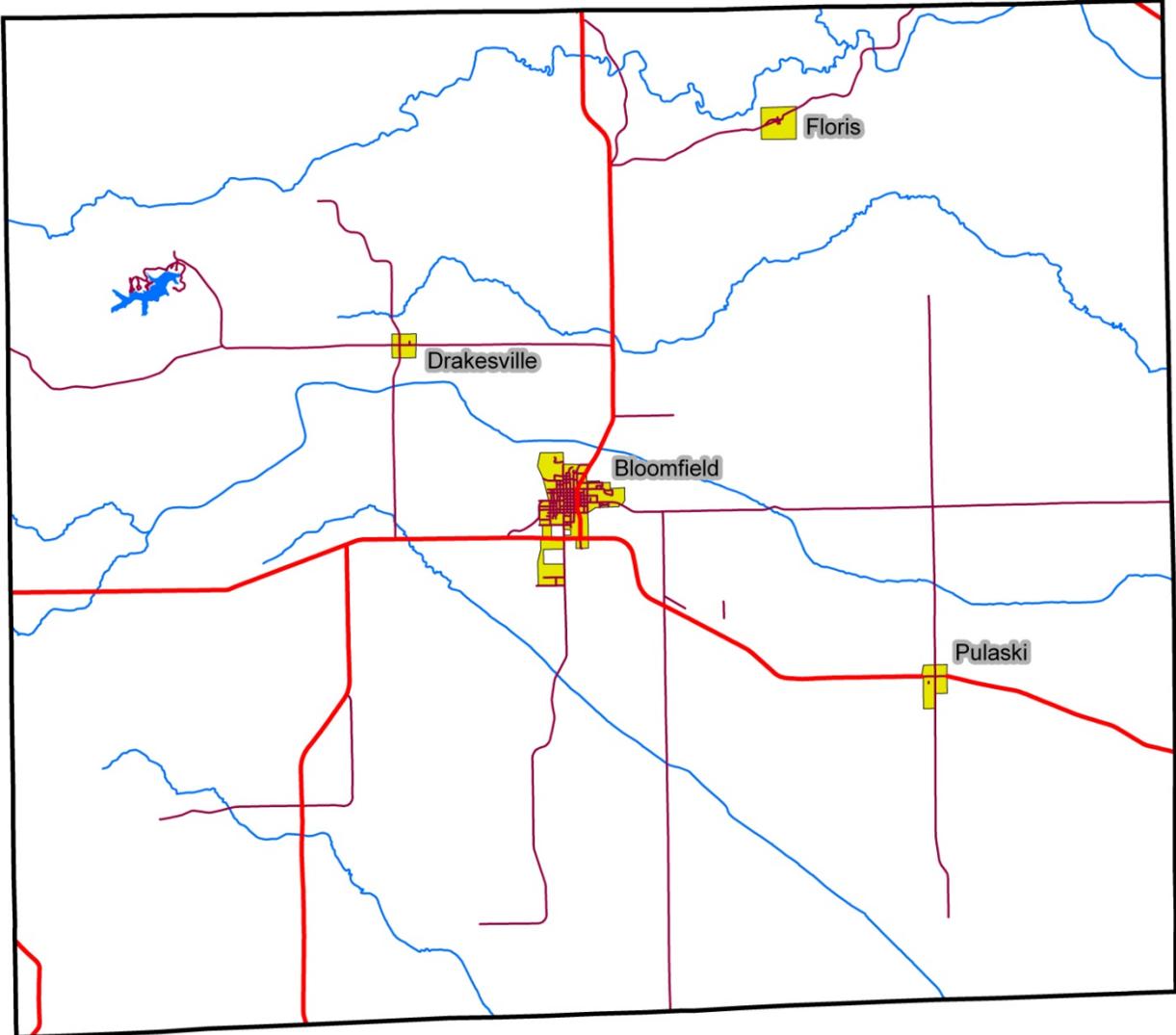
Rivers in Davis County: *Des Moines River, Fox River, North Fabius River, North Wyaconda River, South Wyaconda River*

Creeks in Davis County: *Bear Creek, Burr Oak Creek, Butter Creek, Carter Creek, Chequest Creek, Coon Creek, Fox Creek, Hickory Creek, Holcomb Creek, Lick Creek, Pee Dee Creek, Pepper Creek, Salt Creek, Soap Creek, Vesser Creek, Washington Creek, Wisdom Creek*

When compared to many other areas around the State, Davis County has fewer issues with river flooding. Due to the topography of the County, the floodplains in Davis County are relatively narrow. When river flooding does occur, it does not typically affect the more populated areas. Also, none of the County's four incorporated City's harbor any one of Davis County's major creeks or rivers. At the time this plan was written, FEMA had not yet completed FIRM maps for Davis County, therefore the floodplain data shown in this plan (see page 43) come from FEMA's HAZUS software, yet are not officially special flood hazard areas.

⁷ (USDA, 1991)

Davis County Cities



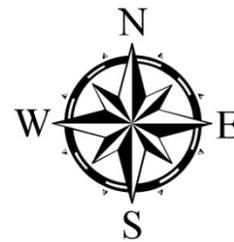
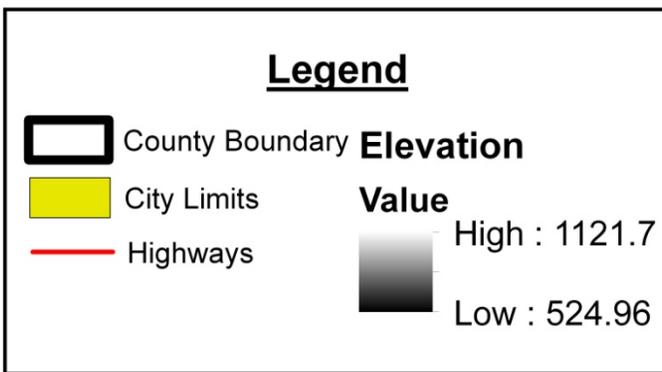
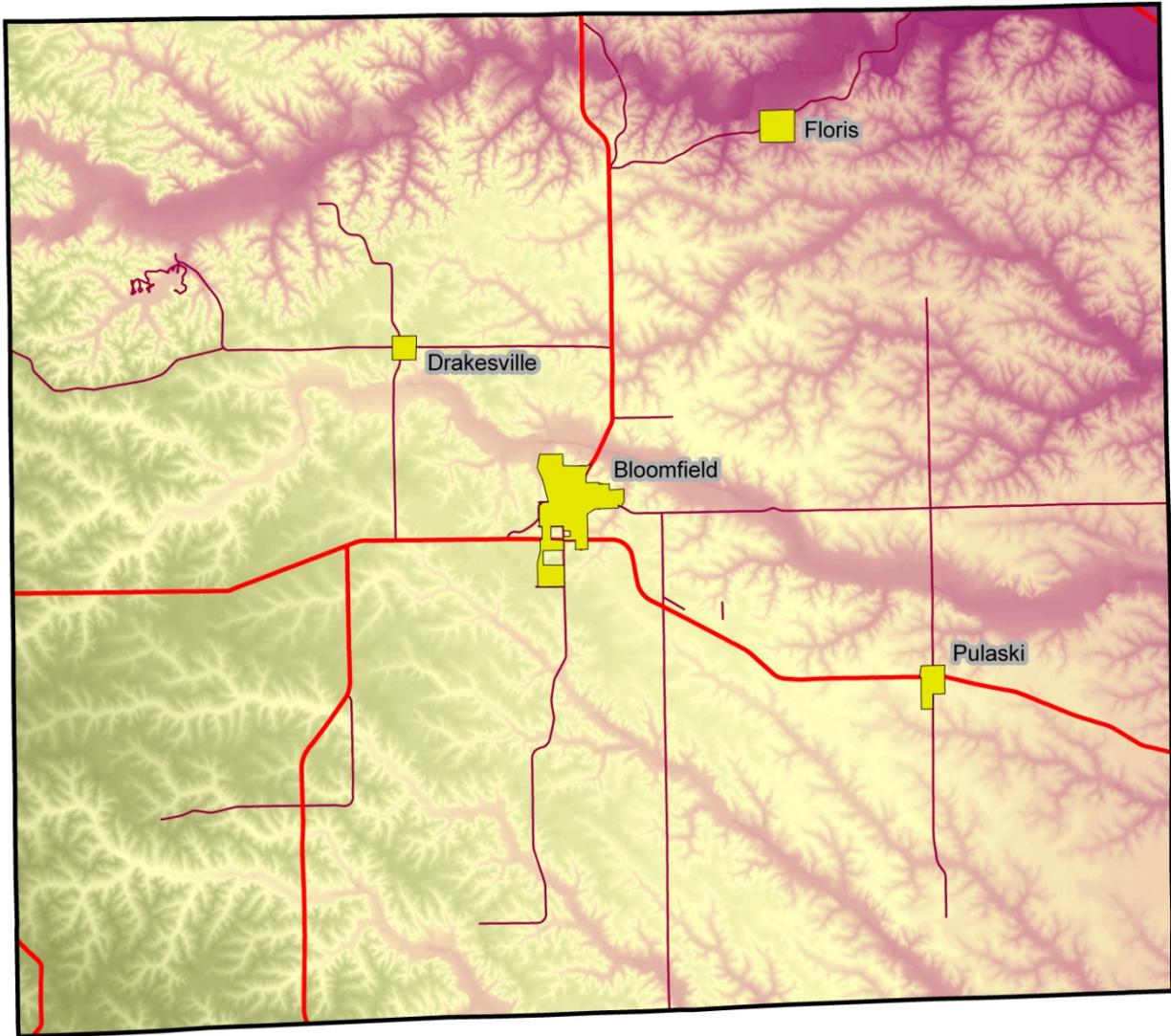
Legend

- County Boundary
- City Limits
- Highways
- Paved Roads
- Major Rivers



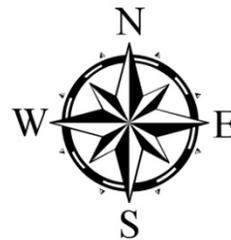
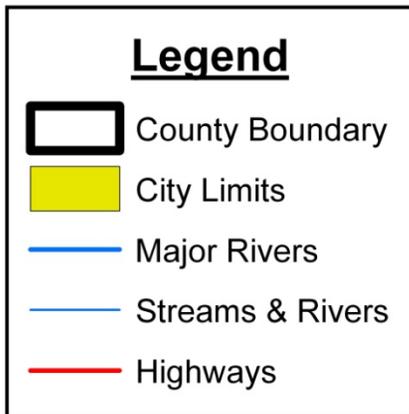
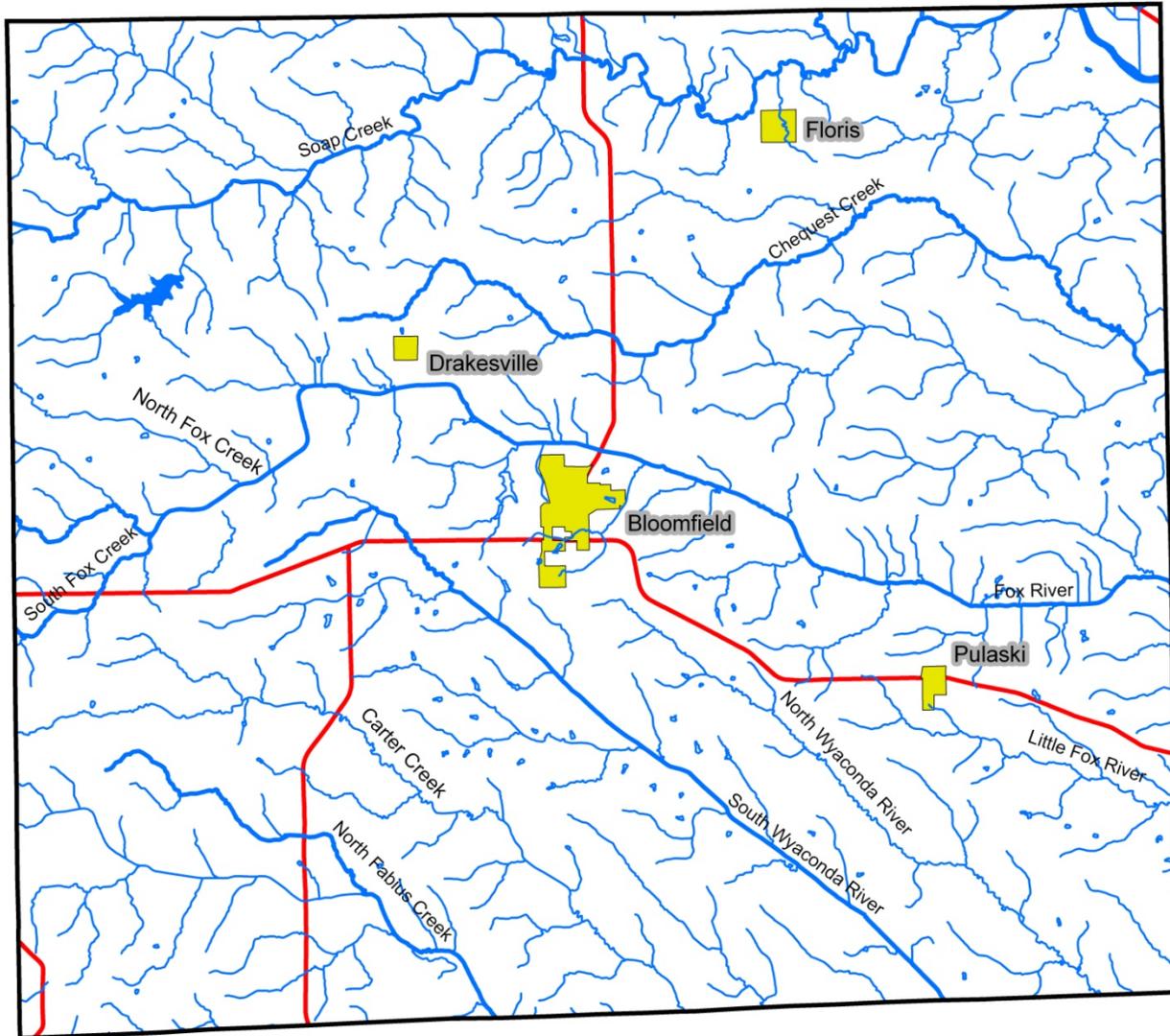
Created By:
Area 15 Regional Planning Commission

Davis County Elevation



Created By:
Area 15 Regional Planning Commission

Davis County Surface Water



Created By:
Area 15 Regional Planning Commission

Infrastructure & Service Inventory

Lifeline Utility Systems

- Pipelines: Pipelines owners within the county include Alliant Energy, ANR Pipeline Company, Atmos Energy Corporation, and Buckeye Partners, LP. , Northern Border, Amoco Oil Company, Koch Pipeline Company, and the Natural Gas Pipeline Company of America.
- Electric: The three electrical providers who service Davis County include Alliant Energy, Southern Iowa Electric Cooperative, and Northeast Missouri Electrical Power Cooperative.
- Natural Gas: Alliant Energy is the primary provider of natural gas, as well as the City of Bloomfield
- Radio towers: The County operates one emergency communications tower, which is located at the Davis County Law Center in Bloomfield.
- Water: Bloomfield has their own municipal water system. Drakesville and Pulaski are serviced by Rathbun Rural Water Association, and Floris is serviced by Wapello Rural Water Association.
- Sewer: Bloomfield owns and provides sewer service for their own city. Sewage treatment in Floris is handled by Wapello Rural Water Association, and by Rathbun Rural Water Association in Drakesville and Pulaski.

Streets

All cities maintain the streets within their own boundaries. In the county and unincorporated area, the Secondary Road Department takes care of the maintenance. Iowa DOT is in charge of maintenance for State or US Highways.

The following roadways are the main transportation routes in Davis County:

- US Highway 63
- Iowa Highway 2
- Iowa Highway 202
- Highway 273
- Old State Highway 2
- Timber Avenue
- Floris Road
- 215th Street

Transportation

In Davis County, transportation exists primarily through on-road road travel. There are no active railroads present in Davis County.

Public transportation is available through 10-15 Transit, which is a federally-funded public transportation system that provides on-demand service to the citizens of Davis County, as well as Appanoose, Jefferson, Keokuk, Lucas, Mahaska, Monroe, Van Buren, Wapello, and Wayne. Service is available to anyone needing transportation for any purpose.

There is one public airport in the County, located just south of Bloomfield.

Schools

Table 3 provides a list of all school districts which service portions of Davis County. The Davis County Community School District County is the only district headquartered in Davis County. The Moulton-Udell, Moravia, Eddyville-Blakesburg-Fremont, and Cardinal School Districts are headquartered outside of, but service at least some portion of Davis County.

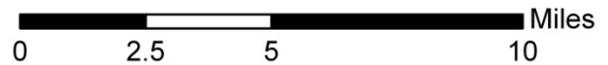
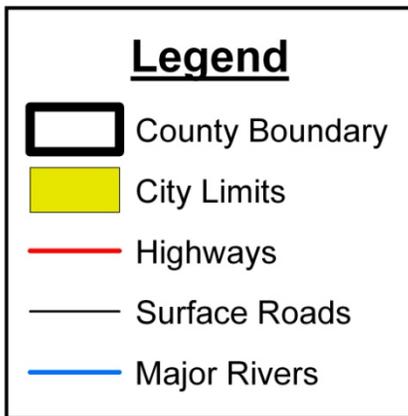
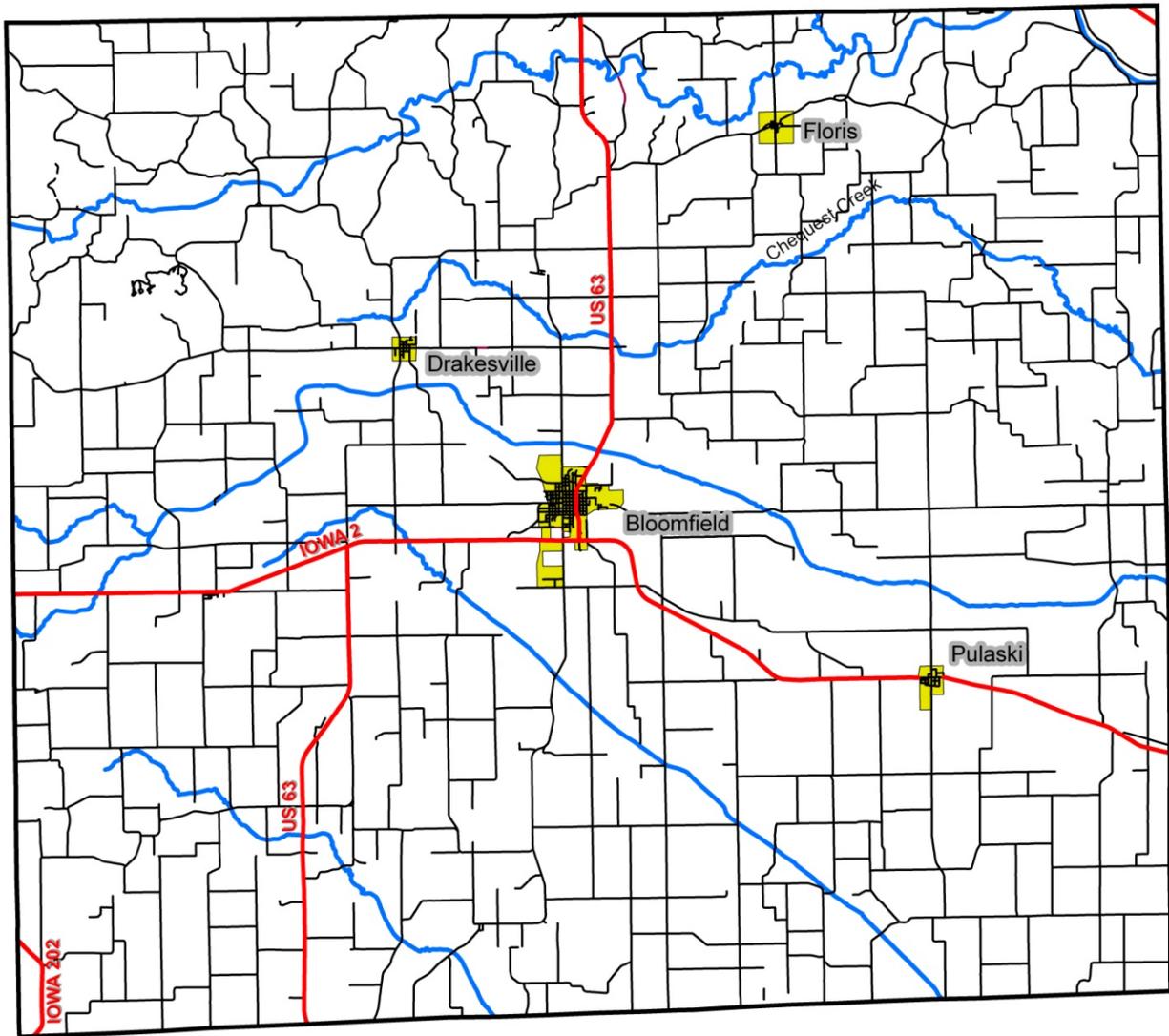
Table 3: Davis County Education

| School District | Enrollment ('12-'13) |
|---|-----------------------------|
| Davis Coutny School District Bloomfield, Iowa | 1,196 |
| Cardinal School District* Eldon, Iowa | 590 |
| Moulton-Udell School District* Moulton, Iowa | 224 |
| Moravia School District* Moravia, Iowa | 341 |
| Eddyville, Blakesburg, & Fremont School District* Eddyville, Iowa | 886 |

***Districts which do not have schools within Davis County**

Source: Iowa Department of Education, 2012

Davis County Transportation



Created By:
Area 15 Regional Planning Commission

Law Enforcement

The Davis County Sheriff is the principal peace officer of the county. The Sheriff's Office serves as the primary law enforcement for the unincorporated Davis County, as well as the cities of Drakesville, Floris, Pulaski, and the Davis County Courthouse. The city of Bloomfield has their own police department.

Emergency Response Capacity

A number of support agencies exist to respond to any of the many hazards that could occur within the County. These agencies include the Davis County Emergency Dispatch Office, Davis County Hospital, the Davis County Sheriff's Office, the Bloomfield Police Department, the Southern Iowa Response Group, ADLM Environmental Health, ADLM Emergency Management, and the four fire departments located in the County.

The Southern Iowa Response Group is a regionally supported emergency response team that handles incidents involving hazardous materials.

ADLM is a cooperative organization that supports public health and emergency management responsibilities throughout a four-county area - Appanoose, Davis, Lucas, and Monroe Counties.

Fire Departments

Each of the fire departments have mutual aid agreements with other nearby departments to assist in response efforts. The Moulton, Blakesburg, and Milton Fire Departments provide service for portions of Davis County, though their operations centers are located outside of the County boundaries. A map of the fire department locations and associated districts can be seen on page 22.

The Bloomfield Fire Department currently has a staff of 15 volunteer firefighters. The department also has mutual aid with all other fire departments in Davis County, as well as Milton, Moulton, Douds, Eldon, Centerville, Ottumwa, and Wapello Rural Fire Departments. The fire department has the following equipment:

- 2 pumpers
- 1 tanker
- 1 brush truck
- 1 mini pumper
- 1 grass rig
- 1 special response trailer
- 1 rescue trailer
- 1 Haz-Mat trailer
- 3 thermal imagers
- 2 sets of jaws of life

The Drakesville Fire Department currently has a staff of 15 volunteer firefighters. The department also has mutual aid with all other fire departments in Davis County, as well as Blakesburg, Eldon, Milton, Moravia, Moulton, and Wapello Rural Fire Departments. The fire department has the following equipment:

- 1 pumper
- 1 tanker
- 1 brush truck
- 1 set of jaws of life
- Airbags
- generator

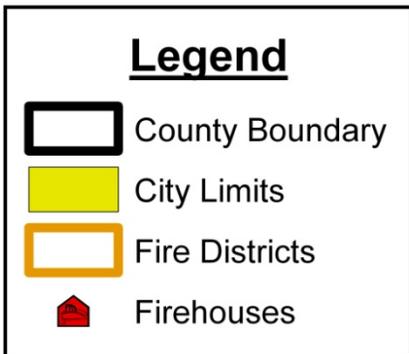
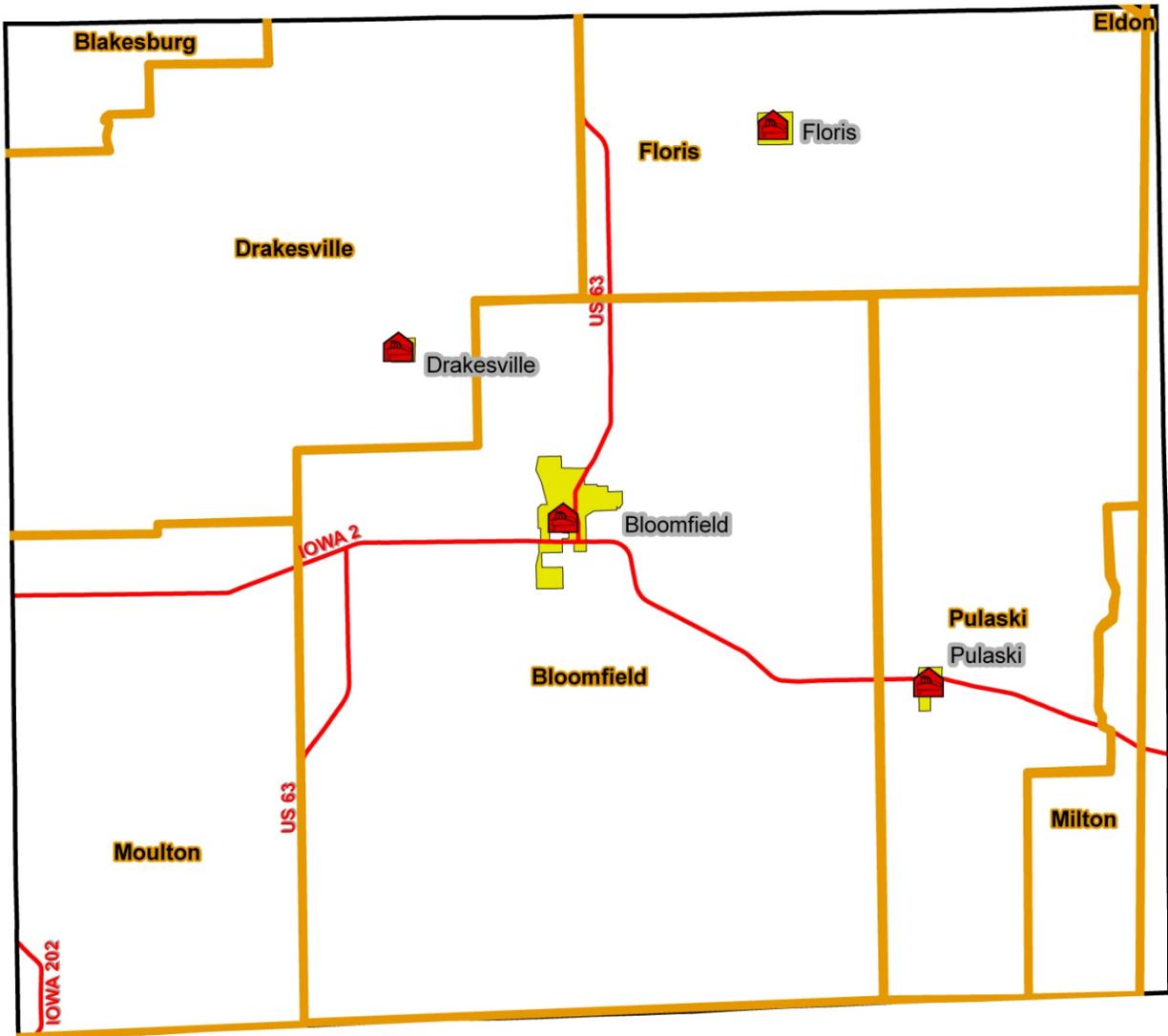
The Floris Fire Department currently has a staff of 17 volunteer firefighters. The department also has mutual aid with all other fire departments in Davis County, as well as Eldon and Wapello Rural Fire Departments. The fire department has the following equipment:

- 1 pumper
- 1 tanker
- 1 brush truck
- 1 tank refill station

The Pulaski Fire Department currently has a staff of 14 volunteer firefighters. The department also has mutual aid with all other fire departments in Davis County, as well as Blakesburg, Eldon, Milton, Moravia, Moulton, and Wapello Rural Fire Departments. The fire department has the following equipment:

- 1 pumper
- 1 tanker
- 1 brush truck
- 1 mini pumper
- ATV and trailer
- Airbags

Davis County Fire Stations



Created By:
Area 15 Regional Planning Commission

Ambulance/Hospital

The ambulance service in Davis County operates out of the Davis County Hospital, which is located in Bloomfield and services the residents of Davis County, and many of the surrounding communities.

Historic, Cultural Natural Resources Areas

One of the first significant emigrants came to Davis County Davis County once accommodated a portion of the Mormon Trail in the mid 19th century, in which followers of Joseph Smith were forced to leave Nauvoo, Illinois in search of a new home in the West. Many landmarks and remnants of their journey can still be found today. Additionally, the County harbors a very significant Amish population, which brings in a number of visitors annually as well.

National Register Listings

- Asa Williams House - Bloomfield
- Bloomfield Square Historic District - Bloomfield
- Davis County Courthouse - Bloomfield
- Henry Wishard House - Bloomfield
- James B. Weaver House - Bloomfield
- Mars Hill Church - Wapello/Davis County Line
- Stringtown House - Bloomfield
- Trimble-Parker Historic Farmstead District - SE of Bloomfield
- Troy Academy - Eastern Davis County
- West Grove United Methodist Church - Western Davis County
- William Findley House - Bloomfield

Major Recreation Areas

- Lake Fisher Park - W of Bloomfield
- Lake Wapello - W of Drakesville
- McGowen Recreation and Wildlife Area - E of Bloomfield
- Bloomfield City Park - Bloomfield
- Floris Park - Floris
- Pulaski Park and Old Depot

Media

There are number of media sources that serve the citizens of Davis County. The local newspaper is called The Bloomfield Democrat. This is published every Tuesday for residents, and is also made available online. Two local television stations operate out of Ottumwa, including KTVO, the ABC and CBS affiliate, and KYOU, the FOX affiliate. The local radio stations include KISS Classic Rock 101.5 out of Ottumwa, KLEE-KOTM 97.7/1480 out of Ottumwa, KBIZ 1240 out of Ottumwa, KIIC 96.7 out of Albia, and KXOF.

Demographics and Development Data

The 2010 US Census provided the most recent population data for Davis County, indicating that 8,753 people live in Davis County. The population of the County declined by approximately half since the population peaked in 1880, though the vast majority of this decline took place in the rural portions of the County. This phenomenon is common for many rural communities that are not within commuting distance of a major metropolitan area. However, Davis County continues to harbor a thriving agricultural sector. Agriculture is an important resource for the county and preserving those resources should always be a high priority. Potential conversion of such land should be given careful consideration, with thought as to soil types, optimal land use, and preservation of the rural environment. Additionally, sprawling development into the rural areas also has a tendency to stretch certain resources including infrastructure and emergency response capabilities.

Table 4: Davis County Population

| | 1880 | 1960 | 1970 | 1980 | 1990 | 2000 | 2010 |
|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Iowa | 1,624,615 | 2,757,537 | 2,825,368 | 2,913,808 | 2,776,831 | 2,926,324 | 3,046,355 |
| Davis County | 16,468 | 9,199 | 8,207 | 9,104 | 8,312 | 8,541 | 8,753 |
| Bloomfield | 1,531 | 2,771 | 2,718 | 2,849 | 2,580 | 2,601 | 2,640 |
| Drakesville | 300 | 197 | 163 | 212 | 172 | 185 | 184 |
| Floris | n/a | 187 | 145 | 187 | 172 | 153 | 138 |
| Pulaski | n/a | 299 | 255 | 267 | 262 | 249 | 260 |

Source: State Data Center of Iowa, 2013

Table 5: Racial Composition of Davis County

| Race | Number | Percent |
|---|--------|---------|
| White | 8,614 | 98.4% |
| Black or African American | 7 | .1% |
| American Indian and Alaska Native | 19 | .2% |
| Asian | 24 | .3% |
| Native Hawaiian and other Pacific Islander | 0 | .0% |
| Hispanic or Latino | 85 | 1.0% |
| Some other races | 21 | .2% |
| Two or more races | 68 | .8% |

Source: State Data Center of Iowa, 2013

Table 6: General Davis County Information

| Household/Income | |
|---------------------------------|----------|
| Median Household Income | \$46,651 |
| Per Capita Income | \$21,650 |
| Individuals Below Poverty Level | 12.7% |

| Workforce | |
|-------------------------------|-------|
| Total Labor Force | 4,086 |
| Employed | 3,807 |
| Travel Time to Work (minutes) | 22.9 |

| Housing | |
|---------------------------------|-------|
| Total Housing Units | 3,600 |
| Total Occupied Housing Units | 3,201 |
| Owner - Occupied Housing Units | 2,563 |
| Renter - Occupied Housing Units | 638 |

| General County Characteristics | |
|---------------------------------------|-----|
| Land Area (square miles) | 505 |
| NFIP Participant | No |
| Flood Insurance Rate Map | No |
| Historic District | No |
| Comprehensive Plan | No |
| Zoning Ordinance | No |

Source: US Census Bureau, 2013

Agricultural production is the primary driver of the economy in Davis County. The primary basic-sector businesses are in agriculture, and those associated with agricultural business. The primary non-basic (goods and services, primarily) sector employers include those associated with education, health care, construction, and government.

Major Occupations

Table 7: Major Economic Sectors

| Occupation | Number | Percent |
|---|---------------|----------------|
| Agriculture, forestry, fishing and hunting, and mining | 230 | 6.0% |
| Construction | 333 | 8.7% |
| Manufacturing | 784 | 20.6% |
| Wholesale trade | 101 | 2.7% |
| Retail trade | 391 | 10.3% |
| Transportation and warehousing, and utilities | 184 | 4.8% |
| Information | 52 | 1.4% |
| Finance and insurance, and real estate and rental and leasing | 85 | 2.2% |
| Professional, scientific, and management, and administrative and waste management services | 167 | 4.4% |
| Educational services, and health care and social assistance | 911 | 23.9% |
| Arts, entertainment, and recreation, and accommodation and food services | 206 | 5.4% |
| Public administration | 123 | 3.2% |
| Other services | 240 | 6.3% |

Source: US Census Bureau, 2013

Critical Facilities and Valuation

It benefits all communities to be prepared for all direct and indirect effects of hazards. In Section 3 (page 31), all hazards determined to be a threat by the planning team are profiled. Within the chapter, each hazard profiled includes a vulnerability section in which the potential damages within the county are highlighted. This chapter establishes an inventory of many of the primary facilities that could potentially be exposed to such risks.

It is important to have an inventory of many of the community assets which could be put at risk, in order to identify those for which further mitigation actions can be afforded. It is also important to minimize the risks to future development as it relates to hazard vulnerability. Potential hazard areas should be considered prior to approving new development. Based on the demographic trends highlighted on page 24, development is expected to be minimal.

Countywide Structure Totals

Number of Structures

Table 8: Davis County Structures

| | Residential | Commercial | Industrial | Public* |
|-----------------------------|--------------------|-------------------|-------------------|----------------|
| Davis County (uninc) | 1,350 | 147 | 5 | 34 |
| Bloomfield | 948 | 262 | 28 | 25 |
| Drakesville | 76 | 17 | 0 | 7 |
| Floris | 62 | 6 | 0 | 4 |
| Pulaski | 111 | 20 | 0 | 10 |
| Davis County CSD | 0 | 0 | 0 | 7 |

Source: Davis County Assessor, 2013

* Totals are based off of community surveys and personal interviews, and does not include utilities

Property Valuations

Table 9: Property Valuations

| | Residential | Commercial | Industrial |
|------------------------------|---------------|--------------|--------------|
| Davis County** | \$330,992,000 | \$80,475,000 | \$18,910,000 |
| Davis County (uninc)* | \$170,173,380 | \$9,236,370 | \$54,720 |
| Bloomfield* | \$69,615,720 | \$20,364,500 | \$3,580,340 |
| Drakesville* | \$3,366,080 | \$519,460 | \$0 |
| Floris* | \$2,140,090 | \$103,810 | \$0 |
| Pulaski* | \$5,239,290 | \$556,520 | \$0 |

Source: Heckethorn, 2013; FEMA Hazus Software, 2013

* Totals are based off of the 2013 State Abstract, and represent assessed values before rollback

**Totals are based off of FEMA's Hazus software, and represent total replacement value

Community Assets/Critical Facilities Inventory

It is important to be aware of community assets, as well as the critical structures, facilities, and infrastructure within Davis County. The methodology used to analyze vulnerability was undertaken by soliciting members of the planning team to identify the critical facilities in Davis County and all jurisdictions within. If any of these facilities were to be affected by a hazard, it could potentially cause a significant impact on cities and the county in various potential ways. Many of these buildings are primary hubs of community activity and have the potential to inflict significant loss of life and structural damage. In addition, many of these facilities are public works facilities, which provide the county and communities within with essential functional needs.

Table 10 identifies the critical facilities identified in each jurisdiction, and shows the replacement values of the identified critical facilities. The data was collected from community surveys, which were distributed to each of the participating jurisdictions. Each jurisdiction was responsible for identifying their critical facilities and assets. Data limitations existed where approximate values could not be determined. It is also important to consider that loss estimations extend beyond just structural. It is important to consider the values of items within a particular facility that have the potential to be lost, along with the functional losses due to breakdowns in electricity, communications, and transportation. Losses of these functions have the ability to further threaten a community, and can significantly add to the impacts a particular hazard can cause.

Table 10: Community Assets in Davis County

| Category | Structure/Facility Description | Critical Facilities | Building Size (sq. ft.) | Replacement Value* |
|-------------------------------|--|---------------------|-------------------------|--------------------|
| DAVIS COUNTY | | | | |
| Government Buildings | Courthouse | X | 11,680 | \$4,730,608 |
| | Davis Co. Law Center | X | | \$1,063,858 |
| | Ambulance Building | X | 1,916 | \$28,154 |
| | Engineering Office | | 3,198 | \$174,391 |
| | Maintenance Buildings (3) | | 10,000 | \$4,265,393 |
| | Davis Co. Welcome Center | | 1,010 | \$162,827 |
| | Davis Co. Conservation Buildings (9) | | 5,192 | \$265,049 |
| | Social Security Building | | 2,808 | \$227,535 |
| | Davis County Fairgrounds Buildings (~16) | | | |
| Health Care | Davis Center County Home | X | 16,548 | \$1,587,264 |
| Sirens/Warning Systems | No | | | |
| BLOOMFIELD | | | | |
| Government Buildings | City Hall & Power Plant | X | 2,200 | \$1,388,858 |
| | Law Center | X | 2,400 | \$164,666 |
| | Fire Station Buildings (2) | X | 12,880 | \$1,446,999 |
| | Library | | 2,236 | \$1,122,103 |
| | City Park Buildings (4) | | 4,156 | \$271,548 |
| | Warehouse & Parking Garage | | 6,900 | \$330,987 |
| | City Shop | | 2,736 | \$1,005,858 |
| | City Garage | | 648 | \$30,271 |
| | North & South Shelter Houses (2) | | 4,000 | \$54,603 |
| | Maintenance Shed | | 2,736 | \$310,749 |
| | Storage Buildings (3) | | 2,300 | \$172,784 |
| | Bell Tower | | | \$33,555 |
| Public Works | Lift Stations & Pumps | X | | \$314,226 |
| | Sewage Treatment Facility | X | 560 | \$108,016 |
| | Water Treatment Facility | X | 9,904 | \$4,164,864 |
| | Substation | X | | \$3,247,296 |
| | Water Tower | X | | \$465,150 |
| | Gas regulator station | | | \$23,433 |
| Airport | North and South Hangars (2) | | 10,260 | \$363,684 |
| | Maintenance Bldg | | 4,200 | \$145,168 |
| | Aviators Lounge | | 720 | \$64,441 |
| Health Care | Davis County Hospital | X | | |
| | Mulberry Place Asst. Living | X | | |
| | Bloomfield Comm. Housing | X | | |
| | Rescare Homecare | X | | |
| Emergency Shelters | Mutchler Center | X | | |

| | | | | |
|---|-------------------------------|----------|-------|--------------|
| Sirens/Warning Systems | Yes, at Fire Station | X | | \$16,942 |
| DRAKESVILLE | | | | |
| Government Buildings | City Hall/Library | X | 585 | \$25,885 |
| | Drakesville Fire Station | X | 2,340 | \$56,735 |
| | Maintenance Building | | | \$28,644 |
| | Boulevard Shelter & Gazebo | | | \$21,940 |
| | City Park Buildings | | | \$84,091 |
| | Post Office | | | |
| Historic Sites | Mormon Trail Cabin | | | \$3,482 |
| Health Care | Settlers Grove Senior Housing | X | | |
| Emergency Shelters | Fire Station | X | | |
| Sirens/Warning Systems | Yes, located at Fire Station | X | | |
| FLORIS | | | | |
| Government Buildings | Community Hall | X | | |
| | Fire Station | X | | |
| | Park Shelter & Cook Shack | | | |
| | Post Office | | | |
| Public Works | Lagoon Pumping Station | X | | |
| | Wastewater Lagoons | X | | |
| Emergency Shelter | Basement of Community Hall | X | | |
| Sirens/Warning Systems | Yes, in center of town | X | | |
| PULASKI | | | | |
| Government Buildings | City Hall & Fire Station | X | 3,200 | \$840,361 |
| | Old Fire Station | | 1,350 | \$76,394 |
| | Storage Garage | | 480 | \$9,676 |
| | Historical Museum Depot | | 1,200 | \$27,118 |
| | City Park Arts & Crafts Bldg | | 1,000 | \$24,263 |
| | City Park Shelter w/ Kitchen | | 2,100 | \$29,508 |
| | City Park Restroom | | 392 | \$38,885 |
| | City Park Bandstand | | 2,100 | \$29,508 |
| | Other Miscellaneous Property | | | \$116,500 |
| | Post Office | | | |
| Public Works | Water Plant | X | | |
| Utilities | Switch office for CMTEL | X | | |
| Emergency Shelter | City Hall & Fire Station | X | | |
| Sirens/Warning Systems | No | | | |
| DAVIS COUNTY COMMUNITY SCHOOL DISTRICT | | | | |
| Schools | High School (Old) | X | | \$11,750,000 |
| | High School (New) | X | | \$10,400,000 |
| | Elementary/Middle School | X | | \$15,840,000 |
| Other Structures | Central Office Building | X | | \$900,000 |
| | Transportation Office | X | | \$775,000 |
| | Greenhouse | | | \$33,000 |
| | Sports Fields/Structures | | | \$426,202 |
| | Janitorial Storage Bldg | | | \$143,376 |

Source: Davis County Hazard Mitigation Planning Team, 2012-2013

*Replacement values are estimated based on information provided by the planning team, insurance statements, formulas provided by FEMA, and other measures

Special Consideration Areas

It is important to be aware of the portions of the county where high concentrations of people live, work, learn, and gather. Schools, residential areas, primary employers, and economic/cultural centers concentrate populations and can increase the numbers of people affected by a particular hazard event.

High potential loss facilities include facilities that would have high losses associated with them, such as power plants, dams, levees, pipelines, or hazardous material storage facilities. Areas with high concentrations of people should be given extra attention when it comes to risks from hazards, particularly cities and large employers within the County. Further detail of vulnerability related to specific hazards is outlined in *Section 3: Risk Assessment*.

Section 3 – Risk Assessment

Risk Assessment is a tool utilized in mitigation planning to identify hazards to which a jurisdiction is susceptible, and then to analyze the impact those hazards may have on the jurisdiction. In order to perform a risk assessment, the planning team initially consulted the complete list of hazards identified in the *2010 State of Iowa Hazard Mitigation Plan*. This document provided a relatively exhaustive list of 23 hazards that could potentially affect the State of Iowa, grouped into natural hazards (16) and human-caused/combination hazards (7) (see table 13, pg. 32). The State Plan provides a good starting point for the analysis of these 23 hazards.

The *2010 State of Iowa Hazard Mitigation Plan* provides state-wide and county-wide annual loss estimations for a few different types of natural hazards. Analyzing vulnerability in terms of annual dollar losses provides a common framework in measuring the potential effects of the different hazards. As will be discussed, not all natural and manmade hazards can be modeled for annualized losses. However, the 2010 State Plan provides estimated losses for 12 types of events, shown in the tables below. Loss estimations were not provided for all hazards due to data limitations and available criteria.

Table 11: State-wide Annual Loss Estimates

| | | | |
|----------------------|-----------------|-----------------------|--------------|
| Flooding | \$1,054,733,588 | Extreme Cold | \$17,672,438 |
| Drought | \$177,000,000 | Snow & Ice | \$9,916,780 |
| Crop Loss | \$75,668,861 | Windstorm | \$4,249,224 |
| Tornado | \$37,230,550 | Earthquake | \$1,068,000 |
| Hail | \$32,404,938 | Lightning | \$730,118 |
| Thunderstorms | \$23,169,429 | Extreme Heat | \$390,063 |

Source: 2010 Iowa State Hazard Mitigation Plan

Table 12: Davis County Annual Loss Estimates

| | | | |
|----------------------|-------------|-----------------------|---------------|
| Flooding | \$9,583,412 | Extreme Cold | \$283,375 |
| Drought | \$2,986,434 | Snow & Ice | \$37,972 |
| Crop Loss | \$563,847 | Windstorm | \$41,767 |
| Tornado | \$487,567 | Earthquake | Not Available |
| Hail | \$183,625 | Lightning | \$3,529 |
| Thunderstorms | \$98,706 | Extreme Heat | \$3,000 |

Source: Iowa Department of Homeland Security, 2010

Davis County Hazards

Since the completion of the 2008 Davis County Hazard Mitigation Plan, FEMA released their document, *Local Multi-Hazard Mitigation Planning Guidance*, which has helped provide guidance on how to develop a community’s risk assessment section of their plan. Additionally, the State chose to consolidate and update their master list of profiled hazards in their 2010 edition of the Iowa Hazard Mitigation Plan, which is where the team initiated discussion.

The Countywide Planning Team was introduced to the 17 hazards profiled in the 2008 plan, as well as the 23 hazards that are profiled in the 2010 State Hazard Mitigation Plan (see table 13, below). The planning team chose to maintain conformity with the State plan as much as possible and decided to leave all 23 hazards profiled by the State up for discussion.

Table 13: Hazards analyzed by Planning Teams

| Hazards Identified in 2008 Davis County Hazard Mitigation Plan | Hazards Identified in 2010 Iowa Hazard Mitigation Plan | |
|--|---|----------------------------|
| Severe Winter Storms | Flash Flood | Human Disease* |
| Energy Disruption/Failure | Tornadoes | Hazardous Materials* |
| Communications Failure | Windstorms | Transportation Incident* |
| Windstorms | Extreme Heat | Infrastructure Failure* |
| Tornadoes | Hailstorms | Terrorism* |
| Thunderstorms | Grass or Wild land Fire | Radiological Incident* |
| Grass/Woodland Fire | Sink Holes | Animal/Plant/Crop Disease* |
| Structure Fire | River Flooding | |
| Human Disease Epidemic* | Severe winter storms | |
| Highway Transportation Incident* | Drought | |
| Flash Floods | Earthquakes | |
| River Floods | Landslide | |
| Drought | Expansive Soils | |
| Extreme Heat | Thunderstorm & Lightning | |
| Earthquake | Dam Failure | |
| Hailstorms | Levee Failure | |
| Dam Failure | | |

***Human-caused hazards**

The team discussed and examined each one of the State’s 23 identified hazards, and how each of those hazards affects Davis County, yet the focus remained on the 16 natural hazards that were discussed in the State plan. There are other natural hazards which FEMA recognizes, which just don’t really affect Davis County due to the geographic location, including avalanches, volcanoes, coastal erosion, coastal storms, hurricanes, and tsunamis. It was decided profile each of the natural hazards profiled in the state plan, with the exception of levee failure, since there are no significant levees located in the County.

The planning team also spent some time discussing some of the risks that human-caused disasters pose to the County, and shared information regarding many of the past incidents and concerns of the 7 man-made hazards highlighted in the State Hazard Mitigation Plan.

- **Infrastructure Failure:** Common occurrences include typical road washouts, downed power lines, power outages, and other things. The County has seen two fairly significant pipeline incidents in 2011. One took place in the northwest part of the County near Eldon, and another took place a little closer to Drakesville.
- **Hazardous Materials:** There is the potential for both fixed and transportation-related hazardous materials incidents. A facility located in Missouri commonly ships items northbound along Highway 63, which seemed to concern a few members of the planning committee. Additionally, there was a recent incident in which two haz-mat trucks were involved in an accident at the corner of Highways 63 and 2, which thankfully didn't result in any significant incidents.
- **Animal/Crop/Plant Disease:** The first case of Chronic Wasting Disease, a fatal disease that infects white-tailed deer, was reported at a facility in Davis County in 2012. The deer herd is a significant economic asset to Southern Iowa and Davis County, and steps were taken to contain and eradicate the outbreak... the success of which is yet to be seen. The County also experienced a scabies outbreak in 1988, which affected a significant portion of the sheep population at farms around the County.
- **Human Disease:** There was a whooping cough outbreak in the Amish communities in the winter of 2011-2012. A chicken pox outbreak significantly affected the local schools about 3 years ago. There was also a TB outbreak just north of Davis County in Ottumwa not too long ago. The Davis County Hospital has a plan for quarantine and containment for any significant disease outbreaks.
- **Transportation Incident:** Most significant traffic incidents occur along Highways 63 and 2.
- **Terrorism:** Agricultural terrorism is of particular concern in Davis County.
- **Radiological:** This hospital is the only known location in Davis County where a radiation incident would be a concern.

To evaluate and rank the hazards, the Davis County Planning Team and each participating jurisdiction primarily considered severity (or extent) and probability when analyzing the potential for disasters.

Hazard Ranking and Vulnerability Assessment

When analyzing the 15 hazards to be profiled in the plan, the vulnerability was determined as a function of both potential severity and the probability of the hazard occurring in a given time period. These ratings considered many factors including perceived threat, geographic location, previous incidents, and potential losses. In many cases, the potential severity of the hazard event contributes the greatest weight to the vulnerability rating.

The methodology to evaluate vulnerability differs from what was followed in the *2010 State of Iowa Hazard Mitigation Plan*, since warning time and duration are not always indicative of damages, and it's quantifying vulnerability in many cases is not so cut and dry. Table 14 (page 35) displays the composite vulnerability scores for all hazards that potentially threaten each jurisdiction. A complete chart showing measures of Probability, Severity (or extent), and Vulnerability can be found in Appendix B (page 132)

Probability: Reflects the likelihood of the hazard occurring again in the future, considering both the hazard's historical occurrence in the area, and the projected likelihood of the hazard occurring in any given year.

| Score | Description |
|--------|--|
| Low | Less than 10% probability in any given year, history of events is less than 10% likely, or the event is unlikely but there is a possibility of its occurrence |
| Medium | Between 10% and 33% probability in any given year, history of events is greater than 10% but less than 20%, or the event could possibly occur |
| High | More than 33% probability in any given year (event has up to a 1 in 1 chance of occurring), history of events is greater than 33% likely, or the event is highly likely to occur |

Magnitude/Severity: Assessment of severity in terms of potential injuries and fatalities, damage to personal property and infrastructure, and the degree and extent with which the hazard affects the county

| Score | Description |
|--------|---|
| Low | Less than 10% of property in affected area is severely damaged, shutdown of facilities and services for less than 24 hours, and/or minimal injuries/illnesses |
| Medium | 10% to 33% of property in affected area is severely damaged, shutdown of facilities and services for more than a week, and/or injuries/illnesses that do not result in permanent disability |
| High | More than 33% of property in affected area is severely damaged, shutdown of facilities and services for more than 30 days, and/or the potential for permanent disabilities or fatalities |

Hazard Ranking

Table 14: Hazard Vulnerability Assessment

| Hazard Vulnerability | | | | | | |
|---------------------------|--------------|------------|-------------|--------|---------|------------------|
| | Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| Flash Flood | M | H | M | H | M | M |
| Tornadoes | H | H | H | M | H | H |
| Windstorms | H | H | H | H | H | M |
| Extreme Heat | M | M | M | M | M | - |
| Hailstorms | H | H | H | H | H | M |
| Grass/Woodland Fire | M | L | M | L | M | H* |
| Sinkholes | L | L | - | - | L | L |
| River Flooding | H | L | - | M | - | - |
| Severe Winter Storms | H | H | H | H | H | M |
| Drought | M | L | M | M | M | L |
| Earthquakes | L | L | M | L | L | L |
| Landslides | L | - | L | - | - | L |
| Expansive Soils | L | L | L | L | L | L |
| Thunderstorms & Lightning | H | H | H | H | H | M |
| Dam Failure | L | L | - | - | - | L |

*Davis Co CSD chose to identify just “fire”, instead of specifying the type of fire

Each individual hazard is further broken down through (1) a description of the hazard, (2) historic occurrences, and (3) Probability/Severity. A (4) vulnerability overview follows each hazard profiled. This overview describes the rationale behind these ratings.

Hazard Profiles

The following hazards were determined to pose the highest risk to Davis County and are further investigated. Variables considered to determine vulnerability were probability and severity, as shown in table in Appendix B (p.132) These hazards were scored based on information presented in the *2010 State of Iowa Hazard Mitigation Plan*, past disaster declarations in Iowa (see Tables 1 & 2, pages 10 & 11, respectively), and local knowledge of the area.

Table 15: Countywide Hazard Rankings

| | |
|-----------|------------------------------------|
| 1 | River Flooding |
| 2 | Severe Winter Storm |
| 3 | Tornado |
| 4 | Windstorm |
| 5 | Thunderstorms and Lightning |
| 6 | Hailstorm |
| 7 | Flash Flood |
| 8 | Drought |
| 9 | Extreme Heat |
| 10 | Grass/Woodland Fire |
| 11 | Dam Failure |
| 12 | Earthquake |
| 13 | Expansive Soils |
| 14 | Landslide |
| 15 | Sinkholes |

The hazard profiles provide an overview of each of the hazards analyzed by the Hazard Mitigation Plan. Data is provided which provides local information of previous hazard events. When possible, maps and other tools are used to help in the analysis of each particular hazard.

For the purposes of the plan, a vulnerability assessment for each hazard must define a hazard area (when applicable), as well as probabilities and loss estimations. It is easier to quantify vulnerabilities with hazards that have certain amount of spatial limitations. Several outside, contextual factors increase the vulnerability of a particular facility to certain hazards... specifically river flooding, landslides, and dam failure. For obvious reasons, such hazards only occur in the area of the associated spatial features. Conversely, other hazards identified by the planning team can affect all properties... specifically severe winter storms, tornadoes, windstorms, thunderstorms and lightning, hailstorms, flash floods, drought, extreme heat, grass/woodland fire, earthquakes, expansive soils, and sinkholes. Defining the hazard areas for this second group of hazards is troublesome, since they can affect any area of the County.

Vulnerability assessment of certain hazard profiles offer loss estimates when reasonable structural loss estimates can be obtained. In most cases loss estimates from the State Hazard Mitigation Plan were used. Then, using exposure values provided by the County assessor, we were able to provide a rough estimate of each jurisdictions share of those estimated damages. There are no universally established means of estimating potential loss, and these estimates

should in no way be used for official agency action. More description of vulnerability is included on pages 26 through 30.

River Flood

River flooding is the rising or overflowing of a river or tributary that covers adjacent land that is not typically covered by water. River floods occur when the water exceeds the stream channel’s capacity. This can occur after intense amounts of precipitation, after rapid snowmelt, or from levee or dam failures. Many human-caused factors contribute to river flooding. Iowa has lost a significant amount of wetlands through conversion to agricultural. These wetlands detained water that is now released into streams and rivers through tiling, ditching and other means. In addition, urbanized areas have a high density of impervious surfaces, which limit the infiltration and increase runoff. Unless measures are taken to reduce the amount of runoff (or slow its movement), river floods will continue to occur and possibly increase in frequency.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | | X | | |

Historic Occurrences: Flooding is a very regular and frequent hazard in Iowa. The National Climatic Data Center identifies 14 different river flood events that have been recorded in Davis County between 2000 and 2012. These incidents resulted in property damages totaling approximately \$2,052,000 and crop damages totaling approximately \$20,603,000 for all affected counties. Even though most of the County’s more populated areas are not in or near floodplains, seven Presidential Disaster Declarations related to flooding have been issued for Davis County since 1993. The most severe flood events occurred recently in 1993, 1998, and 2010.

Probability/Severity/Extent: Based on past events, in any given year, Davis County will face an average of 1.1 river floods (14 events/13 years) per year.⁸ It is very likely that a major flooding event needing federal assistance will occur in the next five years. Floods are the most common and widespread of all natural disasters, with the exception of fire.

Floodwaters can erode the landscape, inundate buildings, and cover roads, which can make them unsafe for travel due to possible currents. River flooding will most directly affect personal property and structures located in the floodplain. Floodwaters can be extremely

⁸ (National Climatic Data Center, 2013)

dangerous; the force of six inches of swiftly moving water can knock people off their feet and two feet of water can float a car.⁹

Though loss of life occasionally occurs during river floods, the risk isn't as high as what is associated with flash flooding, due to the slower onset. Floods are a natural and regular phenomenon in which inundated areas can be predicted on a fairly accurate basis. NOAA frequently issues flood warnings when certain geographic areas are considered to be at a high risk.

The flooding can affect communication, transportation, electric service, and community facilities. Facilities and infrastructure are commonly located in floodplains, and frequently at a high risk of flooding and being taken offline. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Davis County as a result of all forms of flooding are estimated to be approximately \$9,583,412 annually.¹⁰

The National Flood Insurance Program (NFIP)

The NFIP is a federal program enabling property owners in participating communities to purchase insurance protection against flood losses. If a community chooses to adopt and enforce adequate floodplain development and management regulations, the Federal Government will make flood insurance available to property owners.

The US Congress created the NFIP in 1968 with the passage of the National Flood Insurance Act of 1968, and has further been modified with through other legislative measures. The intent was to reduce future flood damage by promoting the adoption of community floodplain management ordinances. Without community oversight of building activities in the floodplain, the best efforts of some to reduce future flood losses could be undermined or nullified by the careless building of others. Unless the community as a whole participates, the potential for loss will not be reduced sufficiently to affect disaster relief efforts. Insurance rates would then reflect the probable higher losses that would result without local floodplain management enforcement activities.¹¹

In support of the NFIP, FEMA identifies flood hazard areas through the US and its territories by producing Flood Hazard Boundary Maps (FHBM), Flood Insurance Rate Maps (FIRMs) and Flood Boundary and Floodway Maps (FBFMs). Several flood hazard zones are commonly identified on these maps. One of these areas is the Special Flood Hazard Area (SFHA) or high risk area, defined as any land that would be inundated by a flood having a 1% chance of occurring any given year (also referred to as the base flood, or 100-year flood).

⁹ (Iowa Department of Homeland Security, 2010)

¹⁰ (Iowa Department of Homeland Security, 2010)

¹¹ (FEMA F-084, 2011)

States have the freedom to require NFIP participation, and to enforce more stringent regulations. In 2009, the Iowa Legislature passed House File 759, which ties a community's eligibility for certain post-disaster state assistance to participation in the National Flood Insurance Program. This bill only affects those communities that have an existing FIRM map which identifies areas within the community that are subject to inundation by flood waters. Davis County does not currently have a current FIRM map, and there are no jurisdictions in Davis County that are active participants in the National Flood Insurance Program.

When FEMA releases the floodplain maps for Davis County, communities will have to two years from the effective date of the FIRM to join the NFIP before the community loses eligibility for state matching funds¹². To join the NFIP, communities must do the following:

- Complete the application for participation in the National Flood Insurance Program (FEMA 81-64)
 - This application includes information such as the community name, chief executive officer, person responsible for administering the community's floodplain management program, community repository for public inspection of flood maps and estimates of land area, population and number of structures in and out of the floodplain.
- Resolution of Intent
 - There must be a resolution of intent adopted, which indicates an explicit desire to participate in the NFIP and commitment to recognize flood hazards and carry out the objectives of the program.
- Floodplain Management Regulations
 - The community must adopt and submit floodplain management regulations that meet or exceed the minimum flood plain management requirements of the NFIP.

According to conversations with Iowa Homeland Security, there are no "repetitive loss properties" in Davis County. This term as defined by FEMA includes NFIP (National Flood Insurance Program) insured property that has experienced any of the following:

- Four or more paid flood losses of more than \$1,000 each; or
- Two paid flood losses within a 10-year period that, in the aggregate, equal or exceed the current value of the insured property; or
- Three or more paid losses that equal or exceed the current value of the insured property

While there are no repetitive loss properties, it is likely that there are still structures in floodplains that are repetitively affected by floods, since most structures in floodplains are not insured.

¹² (DNR, 2011)

FEMA's HAZUS Software

FEMA is in the process of mapping every County in the Country, though Davis County is yet to be surveyed. Until the more accurate FEMA FIRM maps are released for the area, FEMA's HAZUS software is the best resource for mapping floodplains in Davis County.

FEMA's HAZUS software was utilized to estimate 100-year flow rates for the area's major river networks and approximate the inundations for major flood events (see map, p.43). HAZUS is used to run flood models and determine general exposure and losses that can be caused by a hypothetical flooding event. The software is limited in its capabilities, and is not precise. However, it is useful in many situations to anticipate potential damages.

Vulnerability: Floods can be slow or fast rising, but typically develop over a period of days, weeks, or months. The incident period for the 1993 Disaster Declaration was just short of six months. Flood waters have the potential to destroy anything in their path. While most homes and businesses located in the floodplain have been removed or abandoned, many remain.

Discussions with members of the planning team had indicated that Davis County has not traditionally had too many issues with river flooding. Most of the damages due to river flooding were restricted to agricultural issues as well as certain levels of infrastructure damage including, but not limited to road washouts and closures, and as issues with ditches, culverts, and bridges. The floodplains that HAZUS mapped confirmed that there were no significant floodplains in any of the incorporated cities. However, it is important to note that the default setting in HAZUS that were utilized do not analyze some of the smaller streams that may be present in some incorporated cities, so it may be incorrect to assume that floodplains do not exist at all in Davis County's Cities. In fact, other data (see map, p.16) confirms that small streams bisect portions of Bloomfield, Floris, and part of Pulaski.

Within these plans, there is a need to identify exactly which structures are contained within a floodplain. However, without accurate flood maps, there is no way to address this. Until FEMA releases their FIRM maps for Davis County, this analysis cannot be carried out.

As mentioned above, each of the jurisdictions participating in this plan expressed a limited concern with river floods, while most had acknowledged that more associated damage was likely the result of flash floods. Floris indicated a medium vulnerability rating, as their wastewater treatment system is susceptible to significant river flooding events. Bloomfield and rural Davis County indicated a low vulnerability rating for river floods. Drakesville, Pulaski, and Davis County Schools do not have any rivers or significant streams that pose issues and elected not to profile the hazards.

Future developments should be constructed with the potential effects of river flooding in mind. Communities are very aware of which areas have a tendency to flood and have the ability to encourage development of flood-prevention infrastructure such as ditching,

culverts, tiling, and the expansion of storm sewers. Since no official floodplain maps have been released, it is difficult for Davis County to discourage development in the floodplain. Preventing landowners from doing so would be a difficult task, since no formal delineated floodplains exist. However, Iowans have come to recognize the significance dangers of river floods and most landowners know which areas are most susceptible to flooding and would be more inclined to find alternative locations for new development. Once FEMA issues official floodplain maps, communities should take the necessary steps identified above to participate in the National Flood Insurance Program. This will help to minimize any future risks associated with development in or near floodplains.

Describing vulnerability in terms of loss estimates is a difficult task. Table 16 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction’s share of this loss estimate based off of the jurisdiction’s share of the County’s total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 16: Vulnerability, River Flood

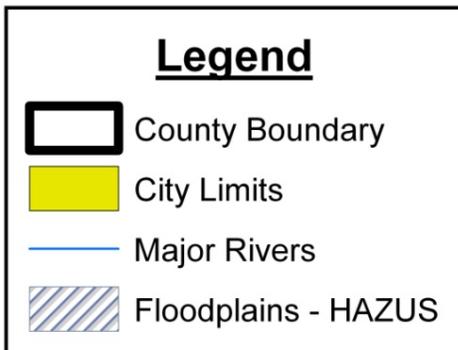
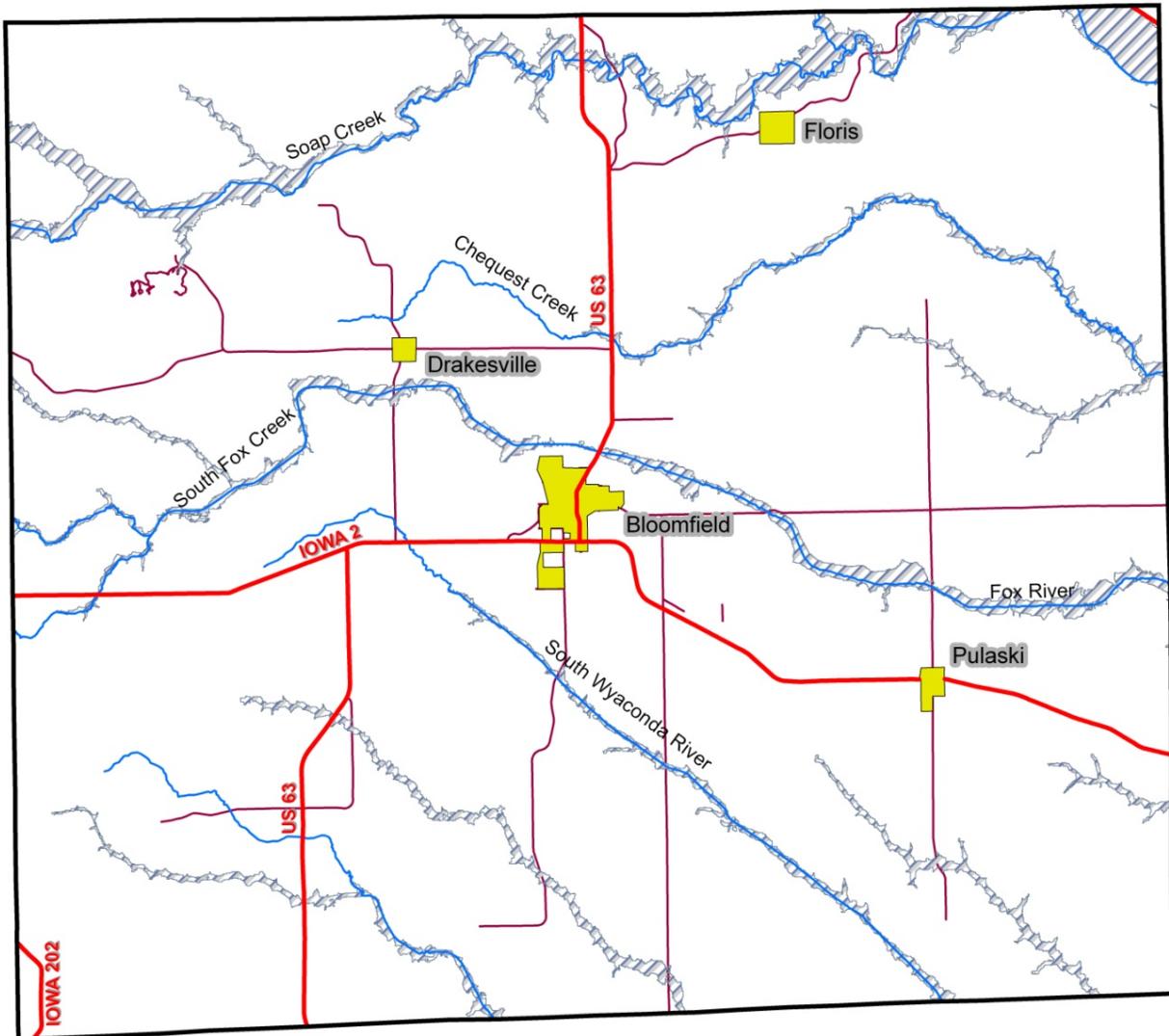
| Vulnerability for a Widespread Event Affecting Davis County River Flood | | | | | |
|--|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 5% | \$2.8M | Low |
| <i>Drakesville</i> | 100 | \$3.9M* | 5% | \$115,000 | - |
| <i>Floris</i> | 72 | \$2.2M* | 5% | \$65,000 | Moderate |
| <i>Pulaski</i> | 141 | \$5.8M* | 5% | \$171,000 | - |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 5% | \$1.2M | - |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 5% | \$5.3M | Low |
| Totals | 3,119 | \$325.2M | 5% | \$9.6M | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

**Value represented by replacement value

Davis County Floodplains



Created By:
Area 15 Regional Planning Commission
*Note: Floodplains are not official

Severe Winter Storms

Winter storms can, and typically will, occur many times per year in all jurisdictions, and can cause numerous countywide damages. Winter storms bring heavy snow ice, snow, extreme cold, snowdrifts, freezing rain, sleet, and wind; all of which have the potential to disrupt life and cause damage in a number of ways. Any given storm event has the potential to cause electrical outages, communications failures, or structural damage. Ice is probably the biggest threat from a winter storm, as certain ice-related events have the potential to threaten energy and communications availability. Snowstorms typically occur for a relatively short duration, yet can shut down schools and businesses for extended periods.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: Between 1993 and 2013, five Presidential Disaster Declarations have been issued in Iowa related to winter storms, of which, one was issued for Davis County. The National Climatic Data Center’s (NCDC) Storm Events Database lists 22 winter-related events affecting Davis County from 2000 to 2012... including 1 blizzard event, 7 heavy snow events, 8 ice storms, and 6 winter storms. Total property damage from these events is estimated at around \$934,900¹³. While this data shows significant financial loss, these figures are just estimates. The exact amount of damages is difficult to measure and is not known. There were no injuries or fatalities reported as a result of those incidents.



Probability/Severity: Based on past events identified by the National Climatic Data Center, Davis County will face an average of 1.8 winter-related events per year.

¹³ (National Climatic Data Center, 2013)

Winter storms have the ability to result in transportation difficulties, infrastructure losses, power outages, property damage, and loss of livestock and crops. Impacts to infrastructure result in the majority of these costs and losses. Winter storms most predictably will necessitate snow removal and cleanup of streets, which can be prepared for to some extent. However, many storms can result in more significant losses commonly associated with ice, including downed power lines and the deterioration of water mains due to the freezing and thawing of the soil. Transportation difficulties may arise due to ice, snow and drifts on the road. These hazards can slow or stop vital supply lines, can hamper the response of emergency services, and may prevent repairs to power grid damages.

Based on information provided in the Iowa Hazard Mitigation Plan, associated annual losses for Davis County due to extreme cold, snow and ice are estimated to be approximately \$321,347 annually¹⁴. This figure is an estimate, and there is no sure way to estimate all potential costs associated with severe winter storms. There are too many different factors and situations which result in damages.

Vulnerability Overview: The most common hazard related to winter storms is traffic incidents, with leading cause of death during winter storms being transportation accidents. A power outage during a significant cold event has the potential to impact a significant amount of people, and would require significant assistance and shelter accommodations. While we are not as vulnerable as the early settlers were, multiple related deaths have occurred throughout the state in recent years. The particularly vulnerable populations are the elderly and very young. There are a number of mitigation actions identified on pages 92 to 94 which are aimed at protecting vulnerable populations. Most furnaces require electricity to operate. An estimated 29.7% of Davis County residents use utility gas as their source of heat, 12.7% use electricity, and 36.8% use LP Gas¹⁵. Other significant dangers are the risks placed on livestock and wildlife, whose needs for food, water, and shelter can often be put in jeopardy.

Each of the jurisdictions participating in this plan expressed an extreme concern about severe winter storms. With the exception of the Davis County School District, each jurisdiction indicated a high vulnerability rating for the hazard. The School District has the ability to cancel school in the event that any significant winter hazard threatens the area.

The hazard's impacts to future development will be limited... but any development is likely to increase demand for infrastructure and increase overall exposure. There is not much development occurring in the planning area, so the likely impacts are expected to be minimal.

¹⁴ (Iowa Department of Homeland Security, 2010)

¹⁵ (US Census Bureau, 2010)

Describing vulnerability in terms of loss estimates is a difficult task. Table 17 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction's share of this loss estimate based off of the jurisdiction's share of the County's total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 17: Vulnerability, Severe Winter Storms

| Vulnerability for a Widespread Event Affecting Davis County Severe Winter Storms | | | | | |
|---|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 100% | \$92,490 | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 100% | \$3,854 | High |
| <i>Floris</i> | 72 | \$2.2M* | 100% | \$2,174 | High |
| <i>Pulaski</i> | 141 | \$5.8M* | 100% | \$5,731 | High |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 100% | \$39,823 | Moderate |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 100% | \$177,274 | High |
| Totals | 3,119 | \$325.2M | 100% | \$321,347 | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

**Value represented by replacement value

Tornadoes

A tornado is a violent whirling wind characterized by a funnel-shaped cloud that progresses in a narrow and erratic path. Tornadoes are typically associated with supercell thunderstorms, and are commonly accompanied by hail as well. The damages resulting from a tornado are the result of the high winds and damages associated with them, although tornadoes can come and go in a manner of seconds. The base of a tornado can range from five feet to over one mile, however, an average tornado is a few hundred yards wide. Tornadoes can produce wind speeds exceeding 300mph, and will travel across the ground at average speeds of 10-20 mph.

Tornadoes can occur one at a time or in groups and vary in direction, velocity, distances, and width. Iowa and other Midwestern states are extremely susceptible to tornadoes due to their geographic location being where warm, moist, cold, and dry air masses meet. The collision of these air masses creates the associated weather conditions. The combination of westerly winds and warm southern air causes most tornadoes to travel in a somewhat predictable overall pattern from the southwest to the northeast.



Weather patterns typically associated with tornadoes most often occur during the spring and summer months, with April, May, and June seeing the most tornadoes. Although tornadoes can occur at any time of the day, they are most commonly seen during the late afternoon and evening hours.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: In the U.S., Iowa is ranked third in the number of tornadoes per square miles. According to data provided by the National Climatic Data Center, the State has experienced approximately 738 tornadoes since 2000, which averages about 57 tornadoes per year. Approximately 5 of these tornadoes occurred in Davis County. The National Oceanic and Atmospheric Administration (NOAA) also maintain a limited database of some of the more significant tornadoes that have been tracked since 1950 (see map, page 51), but concede that the accuracy of their tracking data is particularly limited, since tornadoes tracking only started in the mid 1990's. According to this data, the largest tornado recorded in Davis County occurred in January of 1967, when a F4 category tornado hit a rural area

south of Pulaski in January of 1967. The most costly tornado hit in May of 1988, when an F2 tornado started west of Bloomfield and terminated northeast of Floris, just barely missing both cities. Total damages from this incident were estimated to be anywhere between \$5 and \$50 million. The only tornado on record to have hit an incorporated city in Davis County was an F1 category tornado affecting the northern part of Pulaski in May 1996. No records of any fatalities were available for any of these events, but 11 injuries have been reported between four different incidents¹⁶. Since 1993, seven Presidential Disaster Declarations have been issued in Iowa related to tornadoes, none of which were reported to have affected Davis County directly¹⁷.

Probability/Severity: Based on analysis of past events, there is approximately a 38% chance that a tornado will hit Davis County in any given year (5 events/13 years).

Severe tornadoes have the potential to devastate communities, both in terms of property damage and casualties. On a short-term basis, tornadoes have the capability of hindering communication, transportation, and power supplies, which all have the potential to complicate response efforts. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Davis County as a result of tornadoes are estimated to be approximately \$487,567 annually¹⁸.

The magnitude of a tornado was determined by the Fujita-Pearson Scale, which formed the basis for tornado measurements since 1971. Since 2007, this system has been replaced with the Enhanced Fujita Scale (see table 18, p.49). Since this time, tornadoes have been categorized on a scale of EF-0 (weakest) to EF-5 (strongest). The scale is based on measurement of wind speeds and ranges from 65 to 200+ miles per hour. This measurement scale is still largely subjective, since measurements are made based on sustained damage.

¹⁶ (National Oceanic and Atmospheric Administration, 2013)

¹⁷ (FEMA, 2013)

¹⁸ (Iowa Department of Homeland Security, 2010)

Table 18: Enhance Fujita Scale

| Enhanced Fujita Scale for Tornado Intensity | | | |
|--|--------------|------------------|--|
| Category | Winds | Frequency | Type of Damage Done |
| EF0 | 65-85 mph | 53.5% | Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards |
| EF1 | 86-110 mph | 31.6% | The lower limit is the beginning of hurricane-wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed |
| EF2 | 111-135 mph | 10.7% | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated. |
| EF3 | 136-165 mph | 3.4% | Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted. |
| EF4 | 166-200 mph | 0.7% | Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated. |
| EF5 | >200 mph | >0.1% | Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged |

Source: National Climatic Data Center, 2010

Vulnerability Overview: Tornadoes are considered extremely dangerous due to their ability to form with little notice and cause great destruction. Areas without public warning systems are particularly vulnerable to tornadoes. Typically, the National Weather Service sends out warnings via radio, TV, and NOAA radios. Storm spotters notify county officials of the storms or the presence of funnel clouds, and county officials typically then handle dispatching of the appropriate response.

Tornadoes have the potential to affect all jurisdictions. While they do not always affect a large spatial area, the areas they hit have the ability to cause a very significant amount of structural damage and loss of life, making populations centers are particularly vulnerable. Certain factors make some populations centers more vulnerable than others.

Residents in areas without public warning systems are particularly vulnerable. Pulaski remains the only incorporated City in Davis County that does not have a warning siren. Residents that live in mobile homes are especially vulnerable to damage due to the structure and design of the units. They are typically not secured to any kind of permanent foundation, which makes them very susceptible to complete destruction. There are approximately 319 occupied mobile homes in Davis County. Since there are no mobile home parks located within the County, the locations of these mobile homes are somewhat scattered throughout. People who live in older homes built before 1960 are also vulnerable due to the weaker structural integrity of the structures. Forty three percent (43%) of the houses in Davis County were built before 1960.¹⁹ Additionally, campgrounds and other recreational areas are also particularly vulnerable due to a lack of shelter.

¹⁹ (US Census Bureau, 2010)

Each of the jurisdictions participating in this plan expressed a significant concern with tornadoes. With the exception of Floris, each jurisdiction indicated a high vulnerability rating for the hazard.

Future developments should be constructed with the potential effects of tornadoes in mind. The danger reaffirms the importance of structural integrity for all types of construction. Buildings must be able to withstand high winds and potentially tornadoes. It's important to consider mitigation strategies for tornadoes and high winds for any significant development projects. The inclusion of safe rooms and/or storm shelters into constructions plans helps to increase protection against such a hazard. Recently, the Davis County School District and the Davis County Fair Board has discussed the possibility of developing a safe room.

Describing vulnerability in terms of loss estimates is a difficult task. Table 19 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction's share of this loss estimate based off of the jurisdiction's share of the County's total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 19: Vulnerability, Tornadoes

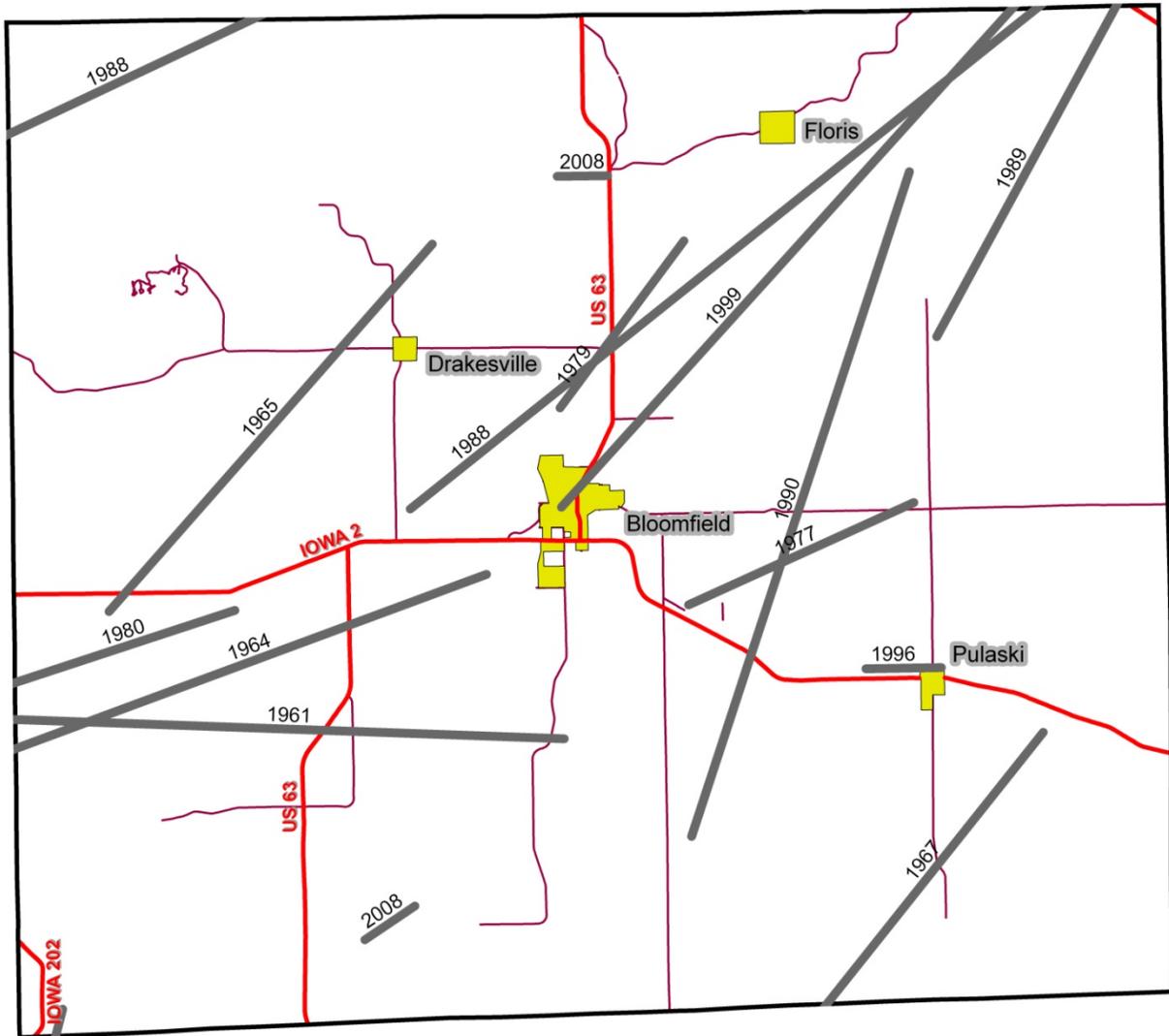
| Vulnerability for a Widespread Event Affecting Davis County Tornadoes | | | | | |
|--|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 1% | \$140,333 | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 1% | \$5,847 | High |
| <i>Floris</i> | 72 | \$2.2M* | 1% | \$3,298 | Moderate |
| <i>Pulaski</i> | 141 | \$5.8M* | 1% | \$8,696 | High |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 1% | \$60,421 | High |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 1% | \$268,971 | High |
| Totals | 3,119 | \$325.2M | 1% | \$487,567 | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

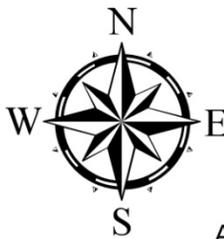
**Value represented by replacement value

Davis County Tornadoes



Legend

- County Boundary
- City Limits
- Tornado Tracks



Created By:
 Area 15 Regional Planning Commission
 *available tracking data is limited

Windstorms

Windstorms are defined as winds in excess of thirty miles per hour. Windstorms tend to occur in greater force when associated with large expanses of open land. As such, the landscape of Iowa yields particularly strong surface winds. High winds can occur in all types of weather. They can be associated with severe winter storms, severe thunderstorms, tornadoes, downbursts, and very steep pressure gradients. The most significant wind damage typically occurs during tornadoes (or near coastal areas, hurricanes). Unlike tornadoes, windstorms may have a footprint that is tens of miles wide and the duration the event is typically longer.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: The National Climatic Data Center lists 5 high wind events that have been recorded in Davis County between 2000 and 2012. It also lists 37 thunderstorm wind events recorded in this same time frame. These incidents resulted in approximately \$1,679,000 in total property damages and \$42,000 in total crop damages for all affected counties.²⁰ No records of fatalities or injuries were reported for any of these incidents. Since 1993, two Presidential Disaster Declarations have been issued in Iowa related to wind events, neither of which was reported to have affected Davis County directly.

Probability/Severity: Based on the analysis of past events, Davis County will face an average of 3.2 events (42 events/13 years) in a given year. According to data provided by the National Climatic Data Center, the highest recorded winds affecting the County was 75 knots (86 mph), which occurred on March 12, 2006.



Windstorms have the potential to cause extensive damage. It is often difficult to differentiate windstorm and tornado damage when winds get over about 64 knots (73 mph).²¹ Considering the geographic area that a windstorm has the potential to affect, damages from a severe incident can be very significant. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural

²⁰ (National Climatic Data Center, 2013)

²¹ (Iowa Department of Homeland Security, 2010)

losses for Davis County as a result of windstorms are estimated to be approximately \$41,767 annually.²²

The magnitude of a windstorm is typically just measured through wind speeds. Certain sources refer to the Beaufort Wind Scale (see table 20, below). This scale is comprised of thirteen classes (zero to twelve) of wind severity. The twelfth class is referred to as “hurricane force winds” (≥ 73 mph). For hurricanes in which all storms are above 73 mph, the Saffir-Simpson Scale is used. If the winds are associated with tornadoes, the Enhanced Fujita Scale is typically used. All of these scales are independent of one another.

Table 20: Beaufort Wind Scale

| Force | Wind Speed | Description | Sea Conditions | Land Conditions |
|-------|---------------|-------------------------------------|---|--|
| 0 | <1 mph | Calm | Sea surface smooth and mirror-like | Calm. Smoke rises vertically. |
| 1 | 1-3 mph | Light Air | Ripples without crests | Smoke drift indicates wind direction, wind vanes don't move |
| 2 | 4-7 mph | Light breeze | Small wavelets. Crests are glassy in appearance, not breaking | Wind felt on exposed skin. Leaves rustle, vanes begin to move |
| 3 | 8-12 mph | Gentle breeze | Large wavelets. Crests begin to break; scattered whitecaps | Leaves and small twigs constantly moving, light flags extended |
| 4 | 13-17 mph | Moderate breeze | 1-4 ft waves. Fairly frequent whitecaps | Dust and loose paper lifted. Small tree branches begin to move |
| 5 | 18-24 mph | Fresh breeze | Moderate 4-8 ft waves; many whitecaps; small amounts of spray | Branches of a moderate size move. Small trees and leaves begin to sway. |
| 6 | 25-30 mph | Strong breeze | Larger waves 8-13 ft; whitecaps common. Some airborne spray is present. | Large branches in motion. Whistling heard in overhead wires. Empty plastic garbage cans tip over. |
| 7 | 31-38 mph | High wind, Moderate gale, Near gale | Sea heaps up with waves 13-20 ft. Some foam streaks off breakers. Moderate amounts of airborne spray. | Whole trees in motion. Effort needed to walk against the wind. |
| 8 | 39-46 mph | Gale, fresh gale | 13-20 ft waves of greater length with breaking crests forming spindrift. Foam is blown in streaks | Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded. |
| 9 | 47-54 mph | Strong gale | 20 ft waves whose crests sometimes roll over. Dense streaks of foam. Airborne spray may reduce visibility | Some branches break off trees, and some small trees blow over. Slight structural damage |
| 10 | 55-63 mph | Storm, Whole gale | 20-30 ft waves with tumbling crests. Patches of foam give the sea a white appearance. Lowered visibility. | Trees are broken off or uprooted, saplings bent and deformed. Asphalt shingles may peel off roofs. |
| 11 | 64-72 mph | Violent storm | 30-45 ft waves. Foam patches cover much of the sea surface. Severely reduce visibility. | Widespread damage to vegetation; many roofing surfaces are damaged. |
| 12 | ≥ 73 mph | Hurricane - force | ≥ 45 ft waves. Sea and air is completely white with foam and spray; visibility greatly reduced | Some windows may break; mobile homes and many sheds/barns are damaged; debris hurled about. |

Source: NOAA Storm Prediction Center - Beaufort Scale, 2013

²² (Iowa Department of Homeland Security, 2010)

Vulnerability Overview: Though windstorms can happen quickly without notice, the National Weather Service has developed a windstorm warning system similar to other events such as tornadoes, winter storms, and thunderstorms. Watches are issued when conditions are favorable for windstorms to develop, and typically come 12 to 24 hours in advance. Advisories are issued when existing or imminent windstorms cover part or all of the area and pose a mere inconvenience. Windstorm warnings are issued when existing or imminent high winds threaten part or all of the forecast area and pose a threat to life and property²³.

Windstorms can and will happen anywhere, and will affect all jurisdictions. For obvious reasons, wooded areas can threaten life and property due falling tree limbs. Campgrounds and parks are also vulnerable due to lack of shelter. In extreme cases, certain vehicles are susceptible to being pushed off the road. Residents that live in mobile homes are especially vulnerable to damage due to the structure and design of the units. They are typically not secured to any kind of permanent foundation, which makes them very susceptible to complete destruction. There are approximately 319 occupied mobile homes in Davis County. Since there are no mobile home parks located within the County, the locations of these mobile homes are somewhat scattered throughout. People who live in older homes built before 1960 are also vulnerable due to the weaker structural integrity of the structures. Forty three percent (43%) of the houses in Davis County were built before 1960.²⁴

Windstorms have the potential to knock down power lines and disrupt the power grid, leaving citizens without power and disrupt communication capabilities, which has the potential to complicate response efforts.

Each of the jurisdictions participating in this plan expressed a significant concern with windstorms. With the exception of the Davis County Community School District, each jurisdiction indicated a high vulnerability rating for this hazard.

Future developments should be constructed with the potential effects of windstorms in mind. The danger reaffirms the importance of structural integrity for all types of construction. Buildings must be able to withstand such high winds, and most any significant construction development will be designed with this in mind. The inclusion of safe rooms and/or storm shelters into constructions plans helps to increase protection against such a hazard. Recently, the Davis County School District and the Davis County Fair Board has discussed the possibility of developing a safe room.

Describing vulnerability in terms of loss estimates is a difficult task. Table 21 describes a number of things including the value and number of existing structures in each jurisdiction,

²³ (Iowa Department of Homeland Security, 2010)

²⁴ (US Census Bureau, 2010)

as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction's share of this loss estimate based off of the jurisdiction's share of the County's total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 21: Vulnerability, Windstorms

| Vulnerability for a Widespread Event Affecting Davis County Windstorms | | | | | |
|---|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 100% | \$12,021 | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 100% | \$500.9 | High |
| <i>Floris</i> | 72 | \$2.2M* | 100% | \$283 | High |
| <i>Pulaski</i> | 141 | \$5.8M* | 100% | \$745 | High |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 100% | \$5,176 | Moderate |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 100% | \$23,041 | High |
| Totals | 3,119 | \$325.2M | 100% | \$41,767 | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

**Value represented by replacement value

Thunderstorms/Lightning

Thunderstorms are produced by cumulonimbus clouds, and are created from a combination of; moisture, rapidly rising warm air, and in most instances, the collision of warm and cold air masses. Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt”, which occurs between the clouds and the ground. Lightning bolts can reach temperatures of up to 50,000 degrees Fahrenheit.

Thunderstorms are typically characterized by thunder, lightning, rain, strong gusts of wind, and sometimes hail. Other potential hazards that may accompany a thunderstorm include flash floods, river floods, hail, windstorms, and tornadoes. Thunderstorms primarily occur during the warmer months of the year, but can occasionally occur in the winter. A thunderstorm may occur as a single isolated storm or may occur as part of a line of storms hundreds of miles long.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: Between 1955 and 2010, at least 10,090 severe thunderstorm, high wind, or lightning events have impacted Iowa²⁵. The National Climatic Data Center identifies two lightning events that have been recorded in Davis County between 2000 and 2012. These incidents resulted in approximately \$60,000 in total property damages for all affected counties.



Probability/Severity: Based on past events, in any given year, the State of Iowa will face an average of 183 severe storm events per year.²⁶ Thunderstorms and lightning can affect all jurisdictions and can happen quickly with little notice. The greatest danger to people and livestock during a thunderstorm is lightning. It can cause significant environmental and structural damages; occasionally

²⁵ (Iowa Department of Homeland Security, 2010)

²⁶ (Iowa Department of Homeland Security, 2010)

casualties as well. Lightning is the second most frequent weather-related cause of death in the U.S. with nearly 100 deaths and 500 injuries each year.²⁷

Even with the number of casualties that occur on an annual basis, the direct impact of thunderstorms and lightning to communities is limited. There is the potential for minor injuries and illnesses, minor or short term property damage with little threat to structural stability, minor short term environmental impacts, and the possible shutdown of essential facilities. Indirectly, lightning can create power outages which can cut off communication. This can affect warning systems through TV and radio, which can be dangerous if a thunderstorm is associated with tornadoes, flooding, or a severe hailstorm. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Davis County as a result of thunderstorms and lightning are estimated to be approximately \$102,235 annually²⁸.

Vulnerability Overview: Thunderstorms can typically be forecasted many days in advance. The National Weather Service will issue different warnings about thunderstorms and storms that can produce other hazards commonly associated with thunderstorms including hail, wind, tornadoes, and/or floods. The storm systems will be monitored by weather spotters and information of damaging storms will be broadcasted over local radio, television, as well as on NOAA weather radios.

With Iowa's location in the interior of the U.S., there is a very high likelihood that a few of these summer storms will occur and cause some damage. Because of the typical humid conditions in Iowa, the opportunities for a thunderstorm to occur are readily available.

People and livestock caught outside during a thunderstorm, particularly those on hills, under trees, in open areas, or in water are at risk from lightning. Those in mobile homes, older homes, or automobiles are also at risk due to the structural nature of the units.

Each of the jurisdictions participating in this plan expressed a significant concern with thunderstorms and lightning. Bloomfield, Drakesville, Floris, and Pulaski indicated a high vulnerability rating for this hazard. Rural Davis County and the Davis County Community School District indicated a medium vulnerability rating for this hazard.

Future developments should be constructed with the potential effects of thunderstorms and lightning in mind. The potential for such a hazard is important to keep in mind in the development of all structures, but particularly tall and metal structures. It is important to ensure that all buildings are adequately grounded to protect against lightning strikes. Also,

²⁷ (Iowa Department of Homeland Security, 2010), flood-related deaths are the #1 cause

²⁸ (Iowa Department of Homeland Security, 2010)

since these storm events are often associated with power outages, it is important to ensure that essential facilities and functions have the support of a backup power generator.

Describing vulnerability in terms of loss estimates is a difficult task. Table 22 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction’s share of this loss estimate based off of the jurisdiction’s share of the County’s total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 22: Vulnerability, Thunderstorms and Lightning

| Vulnerability for a Widespread Event Affecting Davis County Thunderstorms and Lightning | | | | | |
|--|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 100% | \$29,426 | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 100% | \$1,226 | High |
| <i>Floris</i> | 72 | \$2.2M* | 100% | \$692 | High |
| <i>Pulaski</i> | 141 | \$5.8M* | 100% | \$1,823 | High |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 100% | \$12,669 | Moderate |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 100% | \$56,399 | Moderate |
| Totals | 3,119 | \$325.2M | 100% | \$102,399 | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

**Value represented by replacement value

Hailstorms

Hailstorms can occur at any time of the year, though typically occur in conjunction with a severe thunderstorm in which pellets or lumps of ice fall along with rain. Hail is produced by strong rising currents of air carrying water droplets to a height where freezing occurs. While suspended, the ice particles grow in size until they are too heavy to be supported by the updraft and fall back down to earth. While hail pellets are typically small, they can reach the size of a softball. The State of Iowa Hazard Mitigation Plan considers a “hailstorm” as being one that produces hail greater than one inch in diameter. Damage to property, crops, and people are very likely in a severe hailstorm.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: According to the National Climatic Data Center, there have been 49 different hailstorms recorded in Davis County between 2000 and 2012. These incidents resulted in property damages totaling approximately \$258,000 and crop damages totaling approximately \$2,458,000 for all affected counties²⁹. Since 1950, four deaths have occurred in Iowa due to hail.³⁰



Probability/Severity: Based on past events, in any given year, Davis County will face an average of 3 hailstorms (49 events/13 years). Severe hailstorms have the potential to damage personal property, create structural damage, and potentially threaten lives. Hail may cause power outages, leaving people without a source of heating or cooling. Transportation issues may also arise due to hail, ice, and snow on the roads. This may delay response time for emergency vehicles. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Davis County as a result of hailstorms are estimated to be approximately \$183,625 annually.³¹

²⁹ (National Climatic Data Center, 2013)

³⁰ (Iowa Department of Homeland Security, 2010)

³¹ (Iowa Department of Homeland Security, 2010)

The magnitude of a hailstorm is determined by the TORRO (The Tornado and Storm Research Organization) Hailstorm Intensity Scale (see table 23, p.60). This scale categorizes storms from H0 to H10, with intensity related to hail size primarily. Hail is often described relative to other comparable-sized spherical objects. This can be seen in table 23 (p.60). Other factors besides hail size contribute to the damage potential of a storm including accompanying wind speed, texture, numbers, and fall speed. Evidence indicates that maximum hailstone size is the most important variable relating to structural damage, especially towards the more severe end of the scale.³²

Table 23: TORRO Hailstorm Intensity Scale

| Value | Intensity Category | Typical Hail Diameter (mm)* | Probable Kinetic Energy, J-m² | Typical Damage Impacts |
|--------------|---------------------------|------------------------------------|---|--|
| H0 | Hard Hail | 5 | 0-20 | No damage |
| H1 | Potentially Damaging | 5-15 | >20 | Slight general damage to plants, crops |
| H2 | Significant | 10-20 | >100 | Significant damage to fruit, crops, vegetation |
| H3 | Severe | 20-30 | >300 | Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored |
| H4 | Severe | 25-40 | >500 | Widespread glass damage, vehicle bodywork damage |
| H5 | Destructive | 30-50 | >800 | Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries |
| H6 | Destructive | 40-60 | | Bodywork of grounded aircraft dented, brick walls pitted |
| H7 | Destructive | 50-75 | | Severe roof damage, risk of serious injuries |
| H8 | Destructive | 60-90 | | (Severest recorded in the British Isles) Severe damage to aircraft bodywork |
| H9 | Super Hailstorms | 75-100 | | Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open |
| H10 | Super Hailstorms | >100 | | Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open |

Source: The Tornado and Storm Research Organization, 2013

* Approximate range (typical maximum size in bold), since other factors (e.g. number and density of hailstones, hail fall speed and surface wind speeds) affect severity.

³² (The Tornado and Storm Research Organization, 2013)

Table 24: Hail Size and Common Descriptions

| Maximum Diameter (mm) | Description |
|------------------------------|----------------------------|
| 5-9 | Pea |
| 10-15 | Mothball |
| 16-20 | Marble, Grape |
| 21-30 | Walnut |
| 31-40 | Pigeon’s egg > squash ball |
| 41-50 | Golf ball > Pullet’s egg |
| 51-60 | Hen’s egg |
| 61-75 | Tennis ball > cricket ball |
| 76-90 | Large orange > soft ball |
| 91-100 | Grapefruit |
| >100 | Melon |

Source: The Tornado and Storm Research Organization, 2013

Vulnerability Overview: Hailstorms are typically associated with thunderstorms, which can typically be forecasted many days in advance. Leading up to the storm, it is becoming increasingly common for weather services to be able to forecast the conditions that have the potential to produce hail. The National Weather Service will issue different warnings about thunderstorms and storms that can produce hail. The storm systems will be monitored by weather spotters and information of damaging storms will be broadcasted over local radio, television, as well as on NOAA weather radios.

Hailstorms can and will happen everywhere. Crops, plants, livestock, pets, and those left without shelter are the most vulnerable, but larger hail has the potential to damage personal property and cause structural damage. Residents that live in mobile homes are especially vulnerable to damage due to the structure and design of the units; there are approximately 3319 occupied mobile homes in Davis County. People who live in older homes built before 1960 are also vulnerable due to their weaker structural integrity; 43% of the houses in Davis County were built before 1960.³³ Additionally, campgrounds and other recreational areas are also particularly vulnerable due to a lack of shelter.

Each of the jurisdictions participating in this plan expressed a significant concern with thunderstorms and lightning. Bloomfield, Drakesville, Floris, and Pulaski indicated a high vulnerability rating for this hazard. Rural Davis County and the Davis County Community School District indicated a medium vulnerability rating for this hazard.

Future developments should be constructed with the potential effects of hailstorms in mind. The danger reaffirms the importance of structural integrity for all types of construction.

³³ (US Census Bureau, 2010)

Buildings must be able to withstand the impacts of large hail, and most any significant construction development will be designed with this in mind.

Describing vulnerability in terms of loss estimates is a difficult task. Table 25 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction’s share of this loss estimate based off of the jurisdiction’s share of the County’s total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 25: Vulnerability, Hailstorms

| Vulnerability for a Widespread Event Affecting Davis County Hailstorms | | | | | |
|---|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 100% | \$52,851 | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 100% | \$2,202 | High |
| <i>Floris</i> | 72 | \$2.2M* | 100% | \$1,242 | High |
| <i>Pulaski</i> | 141 | \$5.8M* | 100% | \$3,275 | High |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 100% | \$22,755 | Moderate |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 100% | \$101,299 | Moderate |
| Totals | 3,119 | \$325.2M | 100% | \$183,625 | |

Source: Davis County Assessor, 2013

*Represented by assessed value before rollback, and does not include utilities

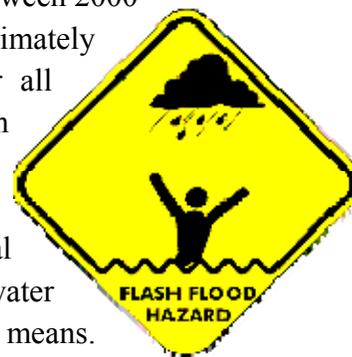
**Value represented by replacement value

Flash Flood

Flash floods can happen anywhere, and occur when water levels accumulate and rise at an extremely fast rate. Flash flooding typically results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, high water tables, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. While flash floods can occur at the same time as a river flood, they are two different types of hazards. In general, if it's not a river flood, it's a flash flood.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: Floods are the most common and widespread of all-natural disasters in the State, with the exception of fire.³⁴ The National Climatic Data Center identifies 11 different flash flood events that have been recorded in Davis County between 2000 and 2012. These incidents resulted in property damages totaling approximately \$1,525,000 and crop damages totaling approximately \$375,000 for all affected counties. Many human-caused factors contribute to flash flooding and the land's ability to absorb rainfall. Iowa has lost a significant amount of wetlands through conversion to agricultural. Iowa has lost a significant amount of wetlands through agricultural conversion, which has reduced the land's ability to detain water. This water is now released into other areas as a result of tiling, ditching and other means. In addition, urbanized areas have a high density of impervious surfaces, which limit the infiltration and increase runoff. Often, aging storm sewer systems are not designed to carry such capacities of water. Unless measures are taken to reduce the amount of runoff (or slow its movement), flash floods will continue to occur and possibly increase in frequency.



Probability/Severity: Based on the analysis of past events, there is approximately an 85% (11 events/13 years) chance that a flash flood will affect Davis County in any given year³⁵.

³⁴ (Iowa Department of Homeland Security, 2010)

Flash floods can result in loss of life, property damage, transportation/communication/utility disruption, and crop/livestock damage. Flash floods can also cause significant property and infrastructure damage as a result of erosion and undercutting. These hazards can move waters at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Based on information provided in the Iowa Hazard Mitigation Plan, associated structural losses for Davis County as a result of all forms of flooding are estimated to be approximately \$9,583,412 annually.³⁶

Vulnerability Overview: Flash flooding occurs with little or no warning. Since the flooding typically results from intense rainfall or snowmelt, weather forecasts can sometimes give an indication of incidents to come. However, flash flooding is also associated with sudden events such as the release of water during dam failure, levee failure, or from an ice jam. In most all flash flood scenarios, Emergency Management would not likely have enough time to mitigate the potential effects prior to the event. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. Local knowledge of watershed characteristics helps to lengthen the warning time of a potential hazard. The National Weather Service often issues flash flood watches and warnings, and will forecast the heights of flood crests and the expected flow to occur in many locations.

These floods can occur in very localized area, particularly near water, in low-lying areas, close to creek beds or drainage ditches, on poorly drained soils, areas with a high water table, in developed areas, or downstream from a dam, levee, or storage basin. People and places in areas with insufficient storm sewers, sump pumps, and other drainage infrastructure can also be put at risk. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

FEMA has not mapped any of the floodplain areas in Davis County, but FEMA's HAZUS software described previously confirms the areas most susceptible to river flooding are located in the unincorporated portions of the County. However, flash flooding affects all communities. In some of the planning meetings, certain members noted some of the more susceptible areas of their community and were very aware of the potential threat that exists.

Each of the jurisdictions participating in this plan expressed a significant concern with flash floods. Bloomfield, Floris, and rural Davis County indicated a high vulnerability rating for this hazard. Drakesville, Pulaski, and the Davis County Community School District indicated a medium vulnerability rating for this hazard.

³⁵ (National Climatic Data Center, 2013)

³⁶ (Iowa Department of Homeland Security, 2010)

Future developments should be constructed with the potential effects of flash floods in mind. Proper mitigation starts with infrastructure. Adequate stormwater management is essential to the prevention of flash floods. Communities are very aware of which areas have a tendency to flood and have the ability to encourage development of flood-prevention infrastructure such as ditching, culverts, tiling, and the expansion of storm sewers. New construction can mitigate potential flood damage through foundation waterproofing and installation of sump pumps. Additionally, communities should take the necessary steps to participate in the National Flood Insurance Program, through the adoption of floodplain regulations. This will help to minimize the risks associated with development in or near floodplains.

Describing vulnerability in terms of loss estimates is a difficult task. Table 26 describes a number of things including the value and number of existing structures in each jurisdiction, as well as an estimated percentage of the jurisdiction that may potentially be directly affected by the hazard. The approximate annual losses identified are derived from the estimated annual structural damage as presented in the 2010 Iowa Hazard Mitigation Plan. The table below reflects this, and identifies each jurisdiction's share of this loss estimate based off of the jurisdiction's share of the County's total building exposure. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Table 26: Vulnerability, Flash Flood

| Vulnerability for a Widespread Event Affecting Davis County Flash Flood | | | | | |
|--|-------------------------|-------------------------------------|--|--|-----------------------------|
| Jurisdiction | Structural Units | Total Building Exposure (\$) | % of Countywide Building Exposure | Average Annual Property Losses (\$) | Vulnerability Rating |
| <i>Bloomfield</i> | 1,263 | \$93.6M* | 100% | \$2.8M | High |
| <i>Drakesville</i> | 100 | \$3.9M* | 100% | \$115,000 | Moderate |
| <i>Floris</i> | 72 | \$2.2M* | 100% | \$65,000 | High |
| <i>Pulaski</i> | 141 | \$5.8M* | 100% | \$171,000 | Moderate |
| <i>Davis County CSD</i> | 7 | \$40.3M** | 100% | \$1.2M | Moderate |
| <i>Davis County (uninc)</i> | 1,536 | \$179.4M* | 100% | \$5.3M | High |
| Totals | 3,119 | \$325.2M | 100% | \$9.6M | |

Source: Davis County Assessor, 2013; Iowa Department of Homeland Security, 2010

*Represented by assessed value before rollback, and does not include utilities

**Value represented by replacement value

Drought

A drought is a prolonged period (weeks, but possibly months or years) where an area suffers a deficiency in precipitation and depletion of the water supply. Droughts can result in poor crop yields, erosion, water shortages, and increased potential for fires. According to the State of Iowa Hazard Mitigation Plan, there are four types of droughts relevant to Iowa:

- Meteorological Drought refers to a precipitation deficiency
- Hydrological drought refers to declining surface and groundwater supplies
- Agricultural drought refers to soil moisture deficiencies
- Socioeconomic drought refers to when physical water shortages begin to affect people

The highest occurrence of drought conditions with recorded events in Iowa is associated with agricultural and meteorological drought, as a result of either low soil moisture or a decline in recorded precipitation.

Drought is a part of a normal climatic cycle, causing dry conditions to impact a region sometimes years at a time. Based on historic events, August is typically the driest month in Iowa³⁷. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: The National Climatic Data Center lists 8 drought events between 2000 and 2012. These incidents resulted in property damages for totaling approximately \$12,650,000 and crop damages totaling approximately \$117,070,000 for all affected counties.

Probability/Severity: Based on the analysis of past events, there is approximately a 62% chance that Davis County will be affected by drought in any given year. Droughts can have a serious impact on a community’s water supply and economy.



³⁷ (National Climatic Data Center, 2013)

The most direct impact would be to the agricultural producers and those in supportive industries. Because of the Iowa's reliance on the agricultural industry, the effects of a drought would certainly extend to other sectors indirectly. A lowering of the water table has the potential to dry up wells. Extensive droughts can cause food shortages if agricultural production is damaged or destroyed by a loss of crops or livestock. Areas affected by drought have the potential to be more vulnerable to wildfire due to the dryness of the vegetation. Fires suppression, in these cases, can become a problem due to the lack of local access to water. Droughts would not typically cause structural damage, damage to infrastructure, or loss of life. Associated annual losses for Davis County as a result of drought are estimated to be approximately \$2,986,434³⁸.

The magnitude of a drought incident is difficult to measure with any scale, since different disciplines and geographical areas depend on different levels of moisture. The most popular scales are the Palmer Z Index, the Palmer Drought Severity Index, the Palmer Drought Severity Index, and the Standardized Precipitation Index. These scales rely on different measurements and are independent of one another.

Vulnerability Overview: Outside of a short-term weather forecast, precipitation is difficult to predict. Historically the driest months are typically July and August. Droughts do follow a rough cyclical pattern, and research into the El Nino/La Nina cycles is resulting in more predictable climatic forecasts.

Each of the jurisdictions participating in this plan expressed a certain amount concern with drought. With the exception of Bloomfield, each jurisdiction indicated a moderate vulnerability rating for this hazard. Bloomfield indicated a low vulnerability rating.

Drought remains a hazard affects the agricultural sector much more than it influences land use. Drought has relatively few land use implications in our region, and its impact on future development is expected to be negligible.

Davis County is very dependent on the agricultural industry, and the affects of a drought would indirectly affect other populations. Most farms are covered by some form of crop insurance, which helps to mitigate some of the potential losses in the event of drought, though uninsured agricultural producers would be the most vulnerable population. Outside of the agricultural industry, residents with shallow wells that do not extend deep into the water table run the risk of having a well dry up, and consumers may see food prices rise as a result of the decrease in supply of food availability. These would result in functional and financial losses. Drought doesn't affect structures, as they're limited to economic losses. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

³⁸ (Iowa Department of Homeland Security, 2010)

Extreme Heat

Extreme heat is defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year³⁹. Extreme heat refers to temperatures (including heat index) in excess of 100 degrees Fahrenheit or at least three successive days with temperatures above 90 degrees Fahrenheit. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees. Extreme heat may often occur simultaneously with droughts, which often make conditions worse. A power outage may further increase problems as that may prevent people from running air conditioners.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | |

Historic Occurrences: Between 1995 and 2009, Iowa experienced 19 extreme heat events. An incident in July of 1995 was the worst on record in recent history. This heat wave lasted two days with temperatures ranging between 98 and 108 degrees and heat indices as high as 131 degrees. The event resulted in 3 fatalities and approximately \$3.8 million in property damage. These losses were based on a combination of livestock losses and transportation infrastructure damage⁴⁰.



Probability/Severity: Based on the analysis of past events, the state of Iowa will face an average of 1.3 extreme heat events (19 events/15 years) in any given year. In an average year, Iowa will experience approximately 26 days a year with temperatures above 90 degrees.

Excessive heat can stress humans, plants, and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure and/or activity. Extreme heat can also result in the compromising of structures and surfaces such as roadways and railroad tracks. There can be economic costs from extreme heat including agricultural yields, energy,

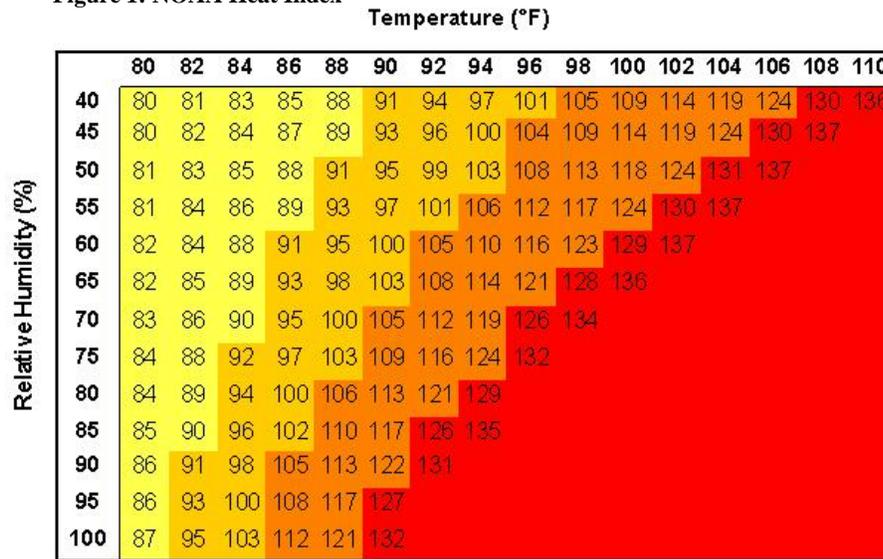
³⁹ (Iowa Department of Homeland Security, 2010)

⁴⁰ (Iowa Department of Homeland Security, 2010)

production, transportation, and infrastructure. These direct costs can impact other sectors indirectly. Associated losses for Davis County as a result of extreme heat are estimated to be approximately \$3,000 per year⁴¹.

Heat is typically measured by both temperature and heat index. Heat index is a scale that considers humidity as well, which often accompanies heat and increases the overall danger. The human body cools itself by perspiring, and the evaporation of the perspiration carries excess heat from the body. High humidity inhibits this evaporation and thus interferes with this natural cooling mechanism, making the heat index a more accurate reflection of danger. Figure 1 (below) shows how heat index is measured.

Figure 1: NOAA Heat Index



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

■ Caution
 ■ Extreme Caution
 ■ Danger
 ■ Extreme Danger

Source: NOAA Heat Safety, 2011

Vulnerability Overview: Weather forecasts can fairly accurately predict extreme heat events several days in advance. Many sources for weather forecasts exist. The National Weather Service issues heat advisories via radio, TV, and weather alert radios when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.

Each of the jurisdictions participating in this plan expressed a certain amount concern with extreme heat events. With the exception of the Davis County School District, each jurisdiction chose to identify the hazard as a potential threat. Since schools are air conditioned and are not in session during the hottest months of the year, they're concern with this heat events is limited. In some cases, certain extra-curricular sports practices are

⁴¹ (Iowa Department of Homeland Security, 2010)

canceled if such extreme temperatures pose a concern. Each of the other jurisdictions indicated a moderate vulnerability rating for this hazard.

Extreme heat remains a hazard which has relatively few land use implications in our region, and its impact on future development is expected to be negligible. However, there are ways to mitigate effects. Use of air conditioning is one direct way in which such extreme temperatures can be mitigated. Additionally, the planting of shade trees, especially on the south and west sides of buildings helps to significantly lower the inside temperatures of buildings.

Extreme heat events can and will happen everywhere. Elderly persons, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), persons with weight and alcohol problems, livestock, and pets are the most vulnerable⁴². Outside of these groups, any healthy person with prolonged exposure to the heat is susceptible to heatstroke, sunstroke, dehydration, or exhaustion. People in older homes, apartments, or those with lower budgets often do not have access to air conditioning and therefore put themselves at greater risk.

The greatest vulnerabilities to this hazard include functional losses, as well as individual risks, such as heatstroke. Extreme heat events typically do not put structures at risk, and their effect on the general population is extremely unpredictable, making loss estimates particularly challenging. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

⁴² (Iowa Department of Homeland Security, 2010)

Grass and Woodland Fire

A grass/woodland fire is an uncontrolled fire that threatens life and property. Such an incident can occur in both grassy or wooded areas. These incidents can occur with favorable conditions, particularly drought.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | |

Historic Occurrences: According to the National Interagency Fire Center, there have been 1,244 wildfires spanning 30,370 acres from 2002 to May 21, 2010 in Iowa. There are no records of any type of historically significant wildfire event in Iowa. Most have been relatively isolated events that have been able to be contained.

Probability/Severity: Although no significant wildfire events have occurred, they most likely have occurred and will continue to occur in isolated events. One significant reason Iowa has not had any major events is the fact that there are very few inaccessible areas around the state. There is a grid system of roads in the rural areas, which act as a natural firebreak.



Vulnerability Overview: Grass and woodland fires have potential to pose serious risks to structures, livestock, and human life. Certain precautionary measures should be taken by landowners at all times, but particularly during periods of drought to help mitigate potential dangers of wildfire. Many areas have fire danger ratings to help assist residents and visitors in determining whether or not to start fires in the area. Wildfires have a potential to affect just about anywhere if it's dry enough and if there's enough vegetative fuels to maintain a burn.

To help prevent the spread of fire, the County supports four fire departments in each of the four incorporated cities (see page 22). The southwest portion of the county is probably the area furthest away from any fire station and is therefore most vulnerable to a fire spreading.

All jurisdictions could potentially be vulnerable to this hazard to some extent, yet Davis County School District wasn't particularly concerned with grass and woodland fires as they were with structural fires. Drakesville, Pulaski, and rural Davis County indicated a moderate vulnerability rating for this hazard. Bloomfield and Floris indicated a low vulnerability rating.

Grass and woodland fire are a hazard that has relatively few land use implications in our region, and its impact on future development is expected to be negligible. One precautionary measure landowners could take is to mow areas close to structures to act as a firebreak in case of potential fires.

A lack of available data limits the opportunity to assess potential losses from wildfires. Local fire stations keep a limited amount of records for past incidents and there are no future plans to expand such recordkeeping. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Dam Failure

Dams are used to regulate the flow of water, and may contain a reservoir upstream. The National Dam Safety Act defines dams as an artificial barrier which impounds or diverts water and : (1) is more than 6 feet high and stores 50 acre feet or more, or (2) is 25 feet or higher and stores more than 15 acre feet. A dam failure occurs when the structural integrity is compromised and large volumes of water are sent downstream. They can result from flooding, poor construction, poor maintenance, earthquakes, terrorism, vandalism, or burrowing animals. There are approximately 74 dams in Davis County large enough to meet the DNR criteria for official tracking.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | | | | X |

Historic Occurrences: According to the Iowa Department of Natural Resources, there have been no dams in Davis County to have ever been reported to have failed. Two major dam failures have occurred in Iowa; one failure occurred in 1968 in Waterloo, when the Virden Creek Dam failed, which resulted in one fatality. The biggest dam failure in Iowa occurred in July of 2010, when the Lake Delhi Dam was breached. The



Lake Delhi Dam, July 2010 (courtesy of thegazette.com)

Saylorville Reservoir Dam was almost breached during the floods of 1993, when the outfall was flowing at full capacity yet waters were continuing to rise. In this case, the reservoir did not overtop the dam, which would have affected a large portion of Des Moines.

Probability/Extent: The severity of damage from dam failure could range from limited crop and property damage to multiple deaths, injuries, and extensive property damage if a dam failure event was to affect a more populated area.

The chances of a devastating dam failure in Davis County are relatively slim. The Iowa DNR tracks all dams that are greater than 25 feet high or can store at least 50 acre feet of water. Most of these are relatively small and not typically monitored or inspected regularly. The Department categorizes dams into 3 categories based on the potential risk to people and property, should a failure occur:

- High Hazard Dam: those located in an area where dam failure may create a serious threat of loss of human life;
- Moderate Hazard Dam: those dams whose failure may damage isolated homes or cabins, industrial or commercial buildings, moderately traveled roads, interrupt major utility services, but are without substantial risk of loss of human life. Also categorizes those dams that are of public importance, such as dams associated with public water supply systems, industrial water supply, or public recreation, or which are an integral feature of a private development complex;
- Low Hazard Dam: those where dam failure would result in loss of the dam, livestock, farm outbuildings, agricultural lands and lesser used roads and where loss of human life is considerably unlikely.

Dams in Iowa are not evaluated based on current structural condition. The Lake Wapello, Lake Fisher, and Kincart Farm dams are only dams categorized as a “moderate” hazard according to the Iowa Department of Natural Resources. There are no high hazard dams located in Davis County. The remaining dams are considered low risk. The DNR has inventoried 135 dams in Davis County, most of which can be seen in the map on page 77.

Vulnerability: A dam failure can give little or no warning time prior to failure. During periods of heavy rains, dams should be monitored for weak areas or potential breaching to warn people located downstream in the potential inundation areas. During the Lake Delhi Dam failure, residents downstream were notified in advance as water levels began to rise, and nobody was killed or injured as a result. People and property downstream of dams along streams are most vulnerable, particularly in the dam’s inundation area. Depending on the volume of the reservoir, as well as channel characteristics, a flash flood related to a dam failure can travel a long distance.

Dam owners have the primary responsibility for the safe design, operation and maintenance of dams. The federal, state, and local governments own a significant number of dams, but private citizens also own a significant number as well. The Iowa DNR has a permitting process required of anyone interested in constructing a dam. All dams that meet any of the following criteria are required to obtain a permit⁴³:

- Any dam designed to provide a sum of permanent and temporary storage exceeding 50 acre-feet at the top of dam elevation, or 25 acre-feet if the dam does not have an emergency spillway, and which has a height of 5 feet or more;
- Any dam designed to provide permanent storage in excess of 18 acre-feet and which has a height of 5 feet or more;
- Any dam across a stream draining more than 10 square miles;

⁴³ (Iowa DNR Dam Safety Program, 2013)

- Any dam located within 1 mile of an incorporated municipality, if the dam has a height of 10 feet or more, stores 10 acre-feet or more at the top of dam elevation, and is situated such that the discharge from the dam will flow through the incorporated area.

The Iowa DNR gives guidance for proper operations and maintenance, inspections, and tips for developing emergency action plans. There are currently 321 dams in the state that require formal inspections every 2 or 5 years, depending on classification⁴⁴. Both the Lake Fisher and Lake Wapello dams require monitoring every 5 years⁴⁵. It is important to note that there is no system in place to routinely evaluate any of the other 133 dams that the DNR has inventoried. Due to this fact, one must use caution when assuming the classification of unregulated dams is accurate. Due to the lack of inspections, the downstream development may have been altered since the initial inventory to create greater risks.

There are no significant dams in Davis County that are located upstream of any major settlement. The biggest local concern which was discussed among the planning team would be a failure of the Lake Fisher Dam, as this body of water provides the backup water supply for the City of Bloomfield. The Iowa DNR dam report for the Lake Wapello dam identifies downstream risks including the local DNR offices and maintenance buildings, Highway 273, a gravel county road, and a few state park roads (see zoomed picture below).



⁴⁴ (Iowa DNR Dam Safety Program, 2013)

⁴⁵ (Garton, 2013)

The Kincart Farms dam is the third moderate hazard dam located in Davis County (see picture below). This dam is located just west of Bloomfield, with Highway 2/63 serving as the dam. While the City of Bloomfield is located less than a mile downstream, the lake does not have a big capacity and would not impact any significant structures directly downstream. The biggest threat this dam poses is the potential washout of the highway.

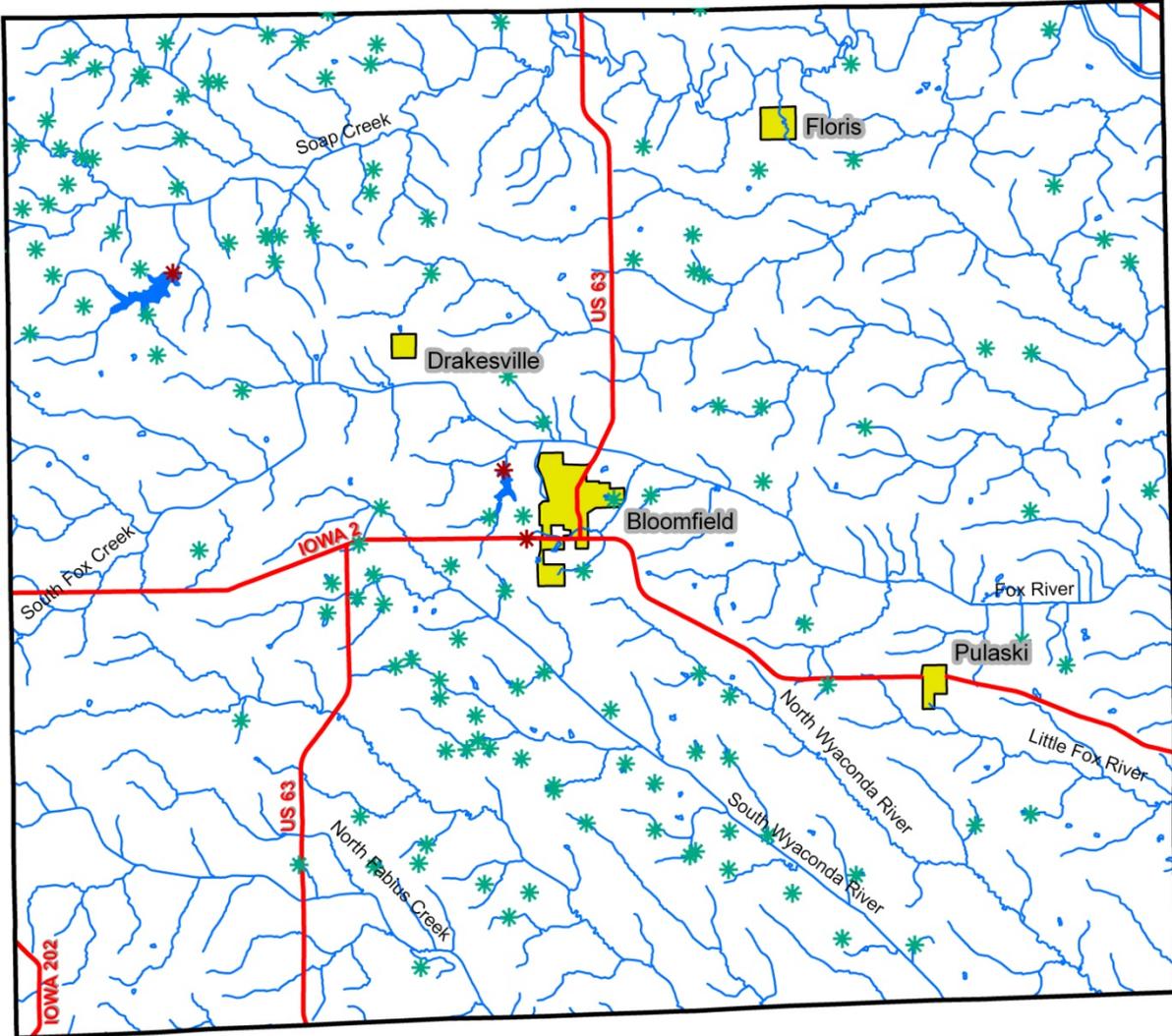


Each of the jurisdictions participating in this plan expressed a limited amount concern with dam failure. Only Bloomfield, Rural Davis County, and the Davis County Community School District expressed any concern with dam failure; all of which indicated a low vulnerability rating for this hazard.

Dam failure is a hazard which has some very obvious land use implications as far as future development is concerned. While there are no such zoning regulations prohibiting it, it is in the best interest of property owners to limit development in potential inundation areas. Ideally, future inundation studies will be carried out, which will help the local jurisdictions better regulate development in inundation areas.

The map on page 77 provides an overview of the mapped and identified locations of dams throughout Davis County. Due to the lack of any inundation studies in Davis County, this limits the opportunity to assess potential losses as a result. Going forward, it would be useful to collect this information for future analysis. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Davis County Dams



Legend

DNR Dam Classification Hazard

- * Low
- * Moderate
- County Boundary
- City Limits



Created By:
Area 15 Regional Planning Commission

Earthquakes

An earthquake is shaking or vibrating in the earth’s crust as a result of tectonic activity. It is caused by the breaking and shifting of rock beneath the earth’s surface. Davis County is located in the low risk Seismic Zone 0⁴⁶.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: Iowa has experienced only a few earthquakes in the past 175 years. The epicenters of 13 earthquakes have been located in the state with the majority being along the Mississippi and Missouri Rivers. No earthquakes have seriously impacted Davis County or had an epicenter within the County. The closest occurred around Wayland, MO and Keokuk, IA on April 13, 1905 and is estimated to have been a IV or V on the Mercalli magnitude scale. The approximate epicenter would have been about as close as 39 miles to the southeast of Davis County. The largest earthquake in Iowa occurred near Davenport in 1934 (Mercalli magnitude VI, see table 26), and resulted in only slight damage⁴⁷.

Probability/Severity: The odds of any significant earthquake occurring in Davis County are highly unlikely. The effects in Davis County of a 6.5 magnitude earthquake along the New Madrid Fault Zone is expected to create vibrations similar to the passing of a heavy truck; rattling of dishes, creaking of walls, and swinging of suspended objects. A magnitude 6.5 earthquake at the New Madrid Fault Zone, would only create magnitude 4 effects in the very southeastern portion of the state, which would result in little or no damage⁴⁸. Delivery services such as water, wastewater, electricity, communications, etc may suffer minor, short term impacts.

Vulnerability Overview: Earthquakes will be more intense east of Davis County, primarily along the Mississippi River. Associated damage with an earthquake in Iowa would typically be minimal; the most vulnerable structures being those built on poorly consolidated substrate, especially floodplain materials.

⁴⁶ (Iowa DNR, 2013)

⁴⁷ (Iowa Department of Homeland Security, 2010)

⁴⁸ (Iowa Department of Homeland Security, 2010)

Table 27: The Modified Mercalli Scale & The Richter Scale

| Level of Damage | | | Richter Scale |
|-----------------|--------------------------|---|---------------|
| 1-4 | Instrumental to Moderate | No Damage | ≤ 4.3 |
| 5 | Rather Strong | Damage negligible. Small, unstable objects displaced or upset; some dishes and glassware broken. | 4.4 - 4.8 |
| 6 | Strong | Damage slight. Windows, dishes, glassware broken. Furniture moved or overturned. Weak plaster and masonry cracked | 4.9 - 5.4 |
| 7 | Very Strong | Damage slight-moderate in well-built structures; considerable in poorly-built structures. Furniture and weak chimneys broken. Masonry damaged. Loose bricks, tiles, plaster, and stones will fall | 5.5 - 6.1 |
| 8 | Destructive | Structure damage considerable, particularly to poorly built structures. Chimneys, monuments, towers, elevated tanks may fail. Frame houses moved. Trees damaged. Cracks in wet ground and steep slopes. | 6.2 - 6.5 |
| 9 | Ruinous | Structural damage severe; some will collapse. General damage to foundations. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. | 6.6 - 6.9 |
| 10 | Disastrous | Most masonry and frame structures/foundations destroyed. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Sand and mud shifting on beaches and flat land. | 7.0 - 7.3 |
| 11 | Very Disastrous | Few or no masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely bent. Widespread earth slumps and landslides. | 7.4 - 8.1 |
| 12 | Catastrophic | Damage nearly total. Large rock masses displace. Lines of sight and level distorted. | > 8.1 |

Each of the jurisdictions participating in this plan expressed a limited amount concern with earthquakes. Bloomfield, Floris, Pulaski, rural Davis County, and the Davis County Community School District indicated a high vulnerability rating for this hazard. Drakesville indicated a moderate vulnerability to this hazard.

Earthquakes are a hazard that has relatively few land use implications in our region, and its impact on future development is expected to be negligible. Obviously, poorly constructed buildings are likely to increase vulnerability. Encouraging communities to adopt building codes is one way to ensure that new development will be structurally sound. Currently, Pulaski is the only community in Davis County that enforces any kind of building codes... which is one way of mandated certain standards. Movement towards adopting building codes in the other jurisdictions is not expected anytime in the near future.

A lack of historical data limits the opportunity to assess potential losses from earthquakes. Going forward, it would be useful to collect this information for future analysis. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Expansive Soils

High clay soils and soft rock that swell or shrink excessively due to changes in moisture content are known as expansive soils. The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. Expansive soils have the potential to create extensive structural damage, but because it develops so slowly and does not risk loss of life, the phenomenon receives little attention.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | X | X | X | X |

Historic Occurrences: A representative from Iowa State Extension stated, “expansive soil events have been somewhat infrequent and are hard to predict.” Most events involve building foundations and retaining walls being damaged from the soils. There have been no major events reported in Davis County.



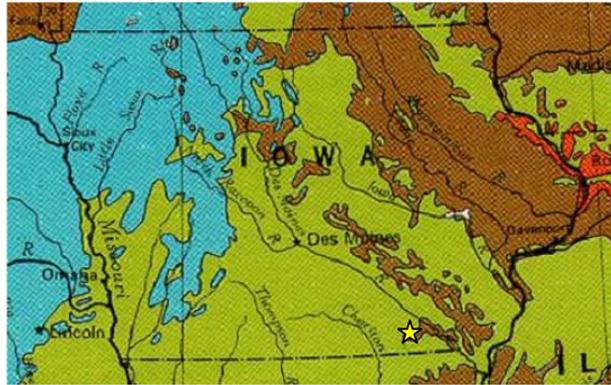
Probability/Severity: Prolonged periods of drought followed by high amounts of precipitation typically yield conditions where the effects of expansive soils can be seen. The primary concern with such a hazard are the cumulative effects of shrinking and swelling over many years. Expansive soils do not create a situation that makes development unsuitable, but certain measures should be taken to ensure that foundations are protected in certain high-risk areas. The United States Geological Survey provides an inventory of areas prone to ground swelling.

Vulnerability: Expansive soils present little impacts to human life. The most significant threat posed by expansive soils is potential damage to structures, infrastructure, streets, and small buildings. While expansive soils are unlikely to pose risks to human life, they are likely to produce economic losses as a result of structural damages, particularly where development is located on soils with high clay content. The map shown on the following page gives an overview of the portions of the State that are the most vulnerable to expansive soils.

Due to the high clay content of the soils in Davis County, all jurisdictions are vulnerable to this hazard. Each of the jurisdictions participating in this plan expressed a very limited concern with this and indicated a low vulnerability rating for this hazard.

U.S. Geological Survey
Swelling Clays Map Of The Conterminous U.S.

Soil Map of Iowa



| MAP LEGEND | |
|---|---|
|  | Unit contains abundant clay having high swelling potential |
|  | Part of unit (generally less than 50%) consists of clay having high swelling potential |
|  | Unit contains abundant clay having slight to moderate swelling potential |
|  | Part of unit (generally less than 50%) consists of clay having slight to moderate swelling potential |
|  | Unit contains little or no swelling clay |
|  | Data insufficient to indicate clay content of unit and/or swelling potential of clay (Shown in westernmost states only) |

Source: (Iowa Department of Homeland Security, 2010)

To help mitigate any significant effects of this hazard, structural reinforcement of all structures new and old is important. Foundations of and base layers of future developments should be constructed to resist ground swell.

A lack of available data limits the opportunity to assess potential losses from expansive soils. In most cases, structural values depreciate over the course of time for a variety of reasons. There are no current plans as of yet to take a more detailed inventory of the locations in the County where expansive soils exist. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

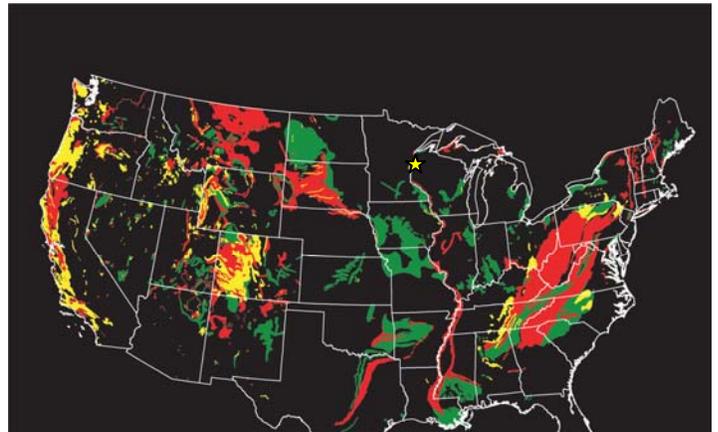
Landslides

Landslides occur when susceptible rock, earth, or debris moves down a slope under the force of gravity and water. Landslides can be very small or very large, and can move at slow to very high speeds. Landslides can occur because of rainstorms, fires, earthquakes, and various human activities that modify slope and drainage.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | | X | | | X |

Historic Occurrences: There have been no known occurrences of landslides reported in Davis County according to the Keokuk County Planning Team. Slides have occurred, however, the areas likely to have been affected are isolated, rarely cause significant damage worth reporting, and are for the most part relatively insignificant.

Probability/Severity: Although no reported events have occurred, they most likely have occurred and will continue to occur in isolated events. Davis County does not have much in terms of steep terrain, and therefore, most landslides would be small and affect an area about the size of a couple acres or less. There have been no reported injuries or deaths in the State of Iowa as a result of landslides. Resulting damage from a landslide would likely be limited to minor property and infrastructure damage, and potentially limited interruption of essential facilities and services for a short period of time.



Landslide Potential: Red areas have very high potential, yellow areas have high potential, and green areas have moderate potential. (Source: United States Geological Survey)

Vulnerability Overview: While the event can often occur without notice, susceptible areas can be identified well in advance of a potential incident. Steep slopes, creek and riverbanks, and slopes without vegetation, and recently disturbed soils all have risk of landslides. A large rain can increase the probability of a landslide in these areas, which can sometimes be forecasted days in advance.



According to the Davis County Planning Team, there have been no areas of the County specified as more vulnerable than others, but landslides always have the potential to occur. Steep slopes exist in areas throughout the County, and these areas are most likely to be affected. Nearby structures and infrastructure would be most susceptible.

All jurisdictions could potentially be vulnerable to this hazard, yet such incidents may only occur in an isolated area. Some communities just don't have any critical facilities or structures near any steep slopes. Drakesville, Davis County Community School District, and rural Davis County indicated a low vulnerability rating for this hazard.

To help mitigate any significant effects of this hazard, it would help to adopt zoning and building permits to help prevent development at unsuitable locations.

A lack of available data limits the opportunity to assess potential losses from landslides. There are no current plans as of yet to take a more detailed inventory of the locations in the County where landslides occur. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Sinkholes

The loss of surface elevation due to the removal of subsurface support defines a sinkhole. The primary causes of most incidents are human activities such as mining and the drawing of petroleum and groundwater. Land subsidence, or the process by which the land sinks, can occur slowly over time or sometimes abruptly. “Karst” subsidence occurs from carbonates, which are slowly dissolving types of rock which form the uppermost portion of the bedrock over roughly the eastern half of Iowa. The portion of the state in which these types of sinkholes pose the biggest risk is not in Davis County⁴⁹. Part of why they are a hazard is because often their locations are unknown. Sinkholes have the potential to cause damage to buildings, roads, and the land.

| Vulnerable Jurisdictions | | | | | |
|--------------------------|------------|-------------|--------|---------|------------------|
| Davis County | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD |
| X | X | | | X | X |

Historic Occurrences: There have been no known occurrences of mine subsidence or sinkholes reported in Davis County according to sources through the DNR and the Davis County Planning Team.



⁴⁹ (Iowa DNR Geologic Hazards, 2013)

Probability/Severity: Although no reported events have occurred, there is always a chance that they could occur. There are abandoned mines and wells in and around various portions of the county that could potentially cause problems. Land subsidence occurs at different rates throughout the state, and does occur in Davis County, though historically not at significant rates. Sinkholes primarily pose structural risks to buildings as well as roads and infrastructure. There may be the potential for a very limited interruption of essential facilities and services.

Vulnerability Overview: Regional land subsidence occurs gradually over time, while the collapse of mines and voids in soil layers can occur suddenly. Measures can be taken below the ground to address the potential damages that abandoned mines can create. Slowly occurring land subsidence can sometimes be addressed early to prevent extensive structural damage.

The majority of sinkholes occur along the Upper Iowa River in the northeast portion of the state. Iowa has a rich history of coal mining, with operations subsiding in the 1930s. Most mining operations were surface mines along the Des Moines River in the southern portion of the state. In Davis County, most mining activities took place in the northern part of the County. While mines and carbonate soils do exist in Davis County, sinkholes related to these features have not been reported.

All jurisdictions could potentially be vulnerable to this hazard to some extent, yet such incidents are rare and are unpredictable. Most of the mines in Iowa were surface mines, but there were some underground operations, yet though the locations of those are not all known. Bloomfield, Pulaski, Davis County Community School District, and rural Davis County indicated a low vulnerability rating for this hazard.

Sinkholes are a hazard that has relatively few land use implications in our region, and its impact on future development is expected to be negligible.

A lack of available data limits the opportunity to assess potential losses from sinkholes. There are no current plans as of yet to take a more detailed inventory of the locations in the County where sinkholes occur. For further explanation about vulnerability, refer to valuation data on pages 26 through 30.

Section 4 – Mitigation Strategy

When the Davis County Hazard Mitigation Planning Team discussed the potential hazards that threaten the county, certain needs and specific mitigation actions were discussed throughout the planning process. Participants firstly identified goals to help guide the process. Secondly, participants of the planning teams were given an opportunity to review the recommendations outlined in the previous plan, and identify new mitigation actions moving forward that could help offset damages brought on by future disasters. Identifying such projects can provide guidance for incorporation into local budgets and capital improvement plans.

Mitigation Goals

Goal 1: Decrease impact of potential hazards to property.

- Use the most effective approaches to protect buildings from hazards.
- Enact and enforce regulatory measures to ensure that new structures do not increase threats to existing properties.
- Seek future projects to reduce threat of potential damages or injuries to the residents and properties in Davis County.

Goal 2: Protect health, safety and quality of life for the residents of Davis County.

- Prioritize mitigation projects, policies, and programs starting with those that address the greatest threats to health and safety of the residents as well as those that address threats to property.
- Utilize any disaster recovery plans in the process after a disaster occurs.
- Ensure that property owners can maintain and improve property to help protect citizens of the county.

Goal 3: Ensure continued government and emergency functions in the event of a disaster.

- Coordinate planning with the appropriate agencies in Davis County to be prepared in the event of a disaster.
- Run exercises and have meetings pertaining to which agencies handle which situations in the case of a disaster.
- Encourage each city and Davis County to develop and follow their own continuity plans in disaster situations.

Goal 4: Provide public education and encourage preparedness to the public.

- Make sure all resources that would help in the public in a disaster are available for them.
- Hold severe weather awareness weeks to notify the public of the dangers can occur in all disaster situations.
- Encourage the use of a family preparedness kit that will provide the adequate supplies for them during a disaster situation.

Goal 5: Ensure that public funding is being used efficiently to prevent hazards from occurring.

- Use available funds, based on each cities budget, appropriately to protect critical facilities and public services.
- Use public funds for projects where the benefits to the public exceed the costs of the project.
- Maximize the use of outside sources of funding, such as grant opportunities.
- Encourage owner participation in mitigation efforts to protect their properties.

Mitigation Measures

Many preparatory actions can be taken to help mitigate the potential effects of the various hazards that threaten Davis County. A mitigation action has the potential to alleviate dangers of multiple hazards, just like any one hazard has the potential to cause various forms of damage. The mitigation measures identified in this plan can be grouped into six categories. The table on pages 92-94 presents an examination of mitigation actions identified for all of Davis County, including rural Davis County. Each mitigation action includes cost estimates and funding sources, the hazards that were addressed, prioritization of the project, responsible parties, as well as the status.

Prevention

Government administrative or regulatory measures or processes that influence the way land and buildings are developed and built. These measures also include public activities to reduce hazard losses. Examples include:

- Planning and zoning
- Hazard mapping
- Local codes
- Subdivision regulations
- Studies/data collection and analysis to support prevention measures
- Floodplain regulations
- Storm water management regulations
- Multi-jurisdictional collaborative agreements aimed at hazard risks
- Other regulatory measures or processes that reduce hazard risks

Property Protection

Measures that involve modifying existing buildings or structures to protect them from a hazard, removing buildings or structures from the hazard area, or providing insurance to cover potential losses. Examples include:

- Acquisition, elevation, or relocation of hazard-prone property
- Safe room/storm shelter retrofits
- Security retrofits
- Critical facility protection
- Risk reduction retrofits (modifications) to hazard prone properties
- Studies/data collection and analysis to develop property protection measures
- National Flood Insurance Program (NFIP) participation

Public Education and Awareness

Measures to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Examples include:

- Programs to improve awareness of hazard risks
- Programs to improve awareness of hazard risk prevention and reduction

- Education programs directed toward specialized audience, i.e. buildings, developers, and hazard prone neighborhoods.

Natural Resource Protection

Measures that, in addition to minimizing hazard losses; preserve or restore the functions of natural systems. Examples include:

- Sediment and erosion control
- Stream corridor restoration, watershed management
- Forest and vegetation management
- Wetland restoration and preservation

Emergency Services

Measures taken before, during and after a hazard event to protect people and property; although these measures are not typically considered “mitigation”, they significantly minimize the events impact and preserve the community’s health and safety. Examples include:

- Emergency/response facilities and personnel
- Hazard warning systems and equipment
- Health/safety/environmental risk prevention/reduction
- Emergency/response infrastructure
- Emergency/response planning
- Emergency/response training
- Emergency/response vehicles, equipment and protective gear
- Emergency/response services studies and data collection
- Emergency/response communication systems

Structural Projects

Measures that involve the construction and maintenance of structures and infrastructure, that will reduce the impact of a hazard or redirect the impact away from people or property. Examples include:

- Channel modification/maintenance
- Dam and reservoir construction/maintenance
- Levee and floodwall construction and maintenance
- Safe room construction
- Infrastructure construction and maintenance – roads and bridges
- Infrastructure construction and maintenance – utility systems
- Infrastructure construction and maintenance – urban and rural drainage systems
- Studies and data collection to develop structural project

Previously Identified Mitigation Actions - Countywide

The table below is a consolidated list of mitigation measures which were identified in the 2008 Davis County Pre-Disaster Mitigation Plan. Participants in the planning process were given an opportunity to review the mitigation measures outlined in the plan 5 years ago, and discussed how they may have been addressed, if at all. Many of these recommendations address important actions to put forth on an ongoing basis, while others address a specific need. There are many examples of mitigation actions that were identified which fall in line with the general operations of City or County staff, and have been eliminated from the list of proposed mitigation actions shown on page 93 as a result. Since none of the communities in the County have comprehensive or capital improvement plans, there is only a limited opportunity to incorporate these recommendations into other planning mechanisms. Two documents that can particularly be aided by this plan include the Emergency Management Plan and the Emergency Support Function documents. However, it is likely that this plan will serve as a stand-alone document. A lot of the recommendations contained within the plan are for the use of the county's emergency management coordinator, local elected officials, and emergency responders.

| Mitigation Action | | Applicable Jurisdictions | Project Status |
|--|--|--------------------------|---|
| Encourage the use of NOAA All-Hazards Alert Radios in schools, businesses, nursing homes, community centers, and private homes | | ALL | DELETED |
| Encourage citizens to create family preparedness kit to be used in case emergency | | ALL | DEFERRED/ONGOING. Certain news outlets occasionally release public statements, and this will always be a need |
| Designate emergency shelters throughout the county | | 1,3,4,5 | DEFERRED/ONGOING. Action is ongoing. Each incorporated jurisdiction has designated a shelter since the 2008 plan, but shall always be looking for ways to improve |
| Acquire back-up generators for designated shelters | | ALL | DEFERRED/ONGOING. Backup power has been completed in many of the major emergency shelters |
| Acquire back-up power for the Davis County Emergency Operations Center (EOC). | | 1,2 | COMPLETED |
| Acquire Siren Warning Systems for communities that lack sufficient coverage | | 4,5 | DEFERRED/ONGOING. Still need sirens in Pulaski and upgrades/improvements for other community's sirens |
| Remove tree limbs from utility line easements | | ALL | DELETED |
| Encourage the burial of utility lines | | ALL | DEFERRED/ONGOING. This will always be a need |
| Increase use of mutual aid from other fire departments. | | ALL | DEFERRED/ONGOING. This will always be a need |
| Maintain/increase training and equipment for firefighters | | ALL | DEFERRED/ONGOING. This will always be a need |
| Install new dry hydrants in effort to increase fire suppression coverage | | ALL | DEFERRED/ONGOING. There is a current need in many areas |
| Increase size of the Davis County Fire Departments | | 1,3,4,5 | DEFERRED/ONGOING. This will always be a need |
| Maintain snow plowing/removal equipment | | 1,2 | DELETED |

| | | |
|--|---------|--|
| Increase public awareness of emergency heating/cooling shelters (when available) | ALL | DELETED |
| Encourage Citizens to check on the elderly during a disaster | 1 | DELETED |
| Encourage owners of manufactured housing to anchor their dwelling to a permanent foundation | 1,4,5 | DELETED |
| Encourage mobile home parks to build severe weather shelters | 1 | DEFERRED/ONGOING. There is still a need for this particularly vulnerable demographic |
| Establish burning times when it is safe to burn | 1 | COMPLETED. Burn bans have been implemented |
| Promote having citizens contact their fire department prior to burning | 1 | DELETED |
| Encourage use of smoke detectors and carbon monoxide detectors | ALL | DELETED |
| Encourage immunization of the general public | 1,2,3,5 | DELETED |
| Encourage new highways and transportation routes that will alleviate congestion | 1 | DELETED |
| Purchase Hazmat chemical containment devices for when chemicals are involved in a transportation incident | 1 | DEFERRED/ONGOING. While the County has a relationship with the Southern Iowa Response Group, the local departments have few resources to handle HAZMAT incidents |
| Maintain dam inspections and maintenance as required. | 1 | DEFERRED/ONGOING. This will always be a need |
| Maintain watershed: Ensure that drainage flow is not disrupted | 1 | DELETED |
| Provide public education in regard to communication disruption/failures in conjunction with severe weather awareness week in the spring and fall of each year | 1,2,3 | DELETED |
| Provide public education in regard to energy disruption/failures in conjunction with severe weather awareness week in the spring and fall of each year | ALL | DELETED |
| Provide public education in regard to severe windstorms in conjunction with severe weather awareness week in the spring of each year | 1,2,3 | DELETED |
| Provide public education in regard to winter weather in conjunction with winter weather awareness week in the fall of each year | ALL | DELETED |
| Provide public education in regard to tornadoes in conjunction with severe weather awareness week in the spring of each year | ALL | DELETED |
| Provide public education in regard to thunderstorms /lightning in conjunction with severe weather awareness week in the spring of each year | ALL | DELETED |
| Provide public education in regard to grass/Woodland fires in conjunction with severe weather awareness week in the spring as well as Fire Prevention Week in October of each year | 1,4 | DELETED |
| Provide public education in regard to structural fires in conjunction with severe weather awareness week in the spring as well as Fire Prevention Week in October of each year | ALL | DELETED |
| Provide public education about proper wiring requirements for structures and appliances | 1 | DELETED |
| Provide public education about proper appliance maintenance and repair | 1 | DELETED |
| Provide public education in regard to proper sanitation and disease prevention | 1,3,5 | DELETED |
| Provide public education in regard to transportation incidents in conjunction with severe weather awareness week in the spring/fall of each year | 1,3,4,5 | DELETED |
| Provide public education in regard to flash flood events in conjunction with severe weather awareness week in the spring/fall of each year | 1 | DELETED |

| | | |
|--|-------|---|
| Provide public education in regard to river flood events in conjunction with severe weather awareness week in the spring/fall of each year | 1 | DELETED |
| Provide public education in regard to drought events in conjunction with severe weather awareness week in the spring of each year | 1 | DELETED |
| Provide public education in regard to extreme heat events in conjunction with severe weather awareness week in the spring of each year | 1 | DELETED |
| Provide public education in regard to earthquake events in conjunction with severe weather awareness week in the spring/fall of each year | 1 | DELETED |
| Provide public education in regard to hailstorms in conjunction with severe weather awareness week in the spring/fall of each year | 1,5 | DELETED |
| Provide public education in regard to dam failures in conjunction with severe weather awareness week in the spring/fall of each year | 1 | DELETED |
| Create citywide evacuation plan | 3,4,5 | DELETED. Aspects of this are already addressed in the Emergency Management Plan |
| Increase law enforcement presence | 4,5 | DELETED |
| Maintain/increase hazardous materials training for firefighters | 3,4,5 | DELETED |
| Equip siren warning system with voiceover | 2 | DELETED |
| Acquire back-up power for designated shelter (Mutchler Center) | 2 | COMPLETED |
| Acquire back-up power for the city's wastewater lift stations | 2 | DELETED. Partially completed, as the city acquired two new portable generators |
| Acquire back-up power for the Bloomfield fire station | 2 | DELETED |
| Construct safe rooms in schools | 2 | DEFERRED/ONGOING. Still need safe rooms in schools. |
| Encourage/provide training for severe weather spotters | 2 | DELETED |
| Increase training of Department of Public Works (DPW) personnel | 2 | DELETED |
| Survey residents to determine which households have a NOAA All-Hazards Alert Radio | 3 | DELETED |
| Acquire NOAA All-Hazards Alert Radios for dwellings in Drakesville that are not currently covered by radios | 3 | DELETED |
| Acquire fire radios that will allow firefighters to activate the City's warning system remotely | 3 | DELETED |
| Promote public participation efforts of check-in on the city's elderly population in a severe weather event | 3 | DELETED |
| Inventory and record number of privately owned generators in Drakesville in effort to assess preparedness/capabilities for an energy failure event | 3 | DELETED |
| Create citywide phone tree - cellular and land lines | 3 | DELETED |
| Create plan to facilitate communications during a communications failure event | 3 | DELETED |
| Compile list of designated shelters to be used in a windstorm/thunderstorm event | 3 | DELETED |
| Monitor storm drain at intersection of Main and Jefferson Streets | 3 | DELETED |
| Improve signage around the intersection of South Washington and West Main Street to help control traffic | 3 | DELETED |
| Encourage inspection/cleaning/repair of chimney furnes | 3 | DELETED |
| Acquire response equipment to "dike and dam" spills | 3 | DELETED |

| | | |
|--|---|---------|
| Increase signage along Davis County Road J15 regarding upcoming curves | 4 | DELETED |
| Examine existing building codes regarding dilapidated structures | 4 | DELETED |
| Elimination or repair of dilapidated structures | 4 | DELETED |
| Install water tower to allow for adequate fire suppression capabilities | 5 | DELETED |
| Increase signage along State Highway 2 such as crosswalk signs to alert drivers of pedestrians in the area | 5 | DELETED |

Applicable Jurisdiction:

1. Davis County
2. Bloomfield
3. Drakesville
4. Floris
5. Pulaski

Proposed Mitigation Actions

The table below identifies the mitigation actions chosen by the planning team for the current plan. To a certain extent, many similar recommendations remain from the previous plan. Though a number of the mitigation actions above have a project status of “deleted”, in many cases this has only been identified as such because some variation the action has merely been reworded, or multiple mitigation actions have been consolidated in a way that is best represented through more succinct and all-encompassing statements. Additionally, many of the jurisdictions highlighted in this plan have many projects in mind which could loosely be considered hazard-related, but don’t fall in line with projects commonly associated with the Hazard Mitigation Grant Program.

| Hazards | Mitigation Action | Applicable Jurisdictions | Category | Cost Estimates | Priority | Funding Source | Responsible Party | Project Status |
|-------------------|---|--------------------------|---------------------|-------------------|----------|----------------|-------------------|----------------|
| 3,4,5,6 | Develop safe rooms in schools and critical public facilities | 1,2,3,4,5,6 | Property Protection | \$300,000+ | H | G/LB | C/SS | NEW |
| 3,4,5,6 | Designate shelter sites and provide with adequate supplies and overnight accommodations | 1,2,3,4,5,6 | Emergency Services | \$20,000-\$30,000 | H | G/LB | C/SS | ONGOING |
| 3,4,5,6 | Encourage mobile home parks to build safe rooms or severe weather shelters | 1,2,3,4,5 | Property Protection | \$20,000+ | L | G/LB | C | NEW |
| 2,3,4,5,6,7,11,12 | Develop emergency plans for all shelter sites | 1,2,3,4,5,6 | Emergency Services | VARIABLES | H | LT | EM/C | NEW |

| | | | | | | | | |
|----------------------|--|-------------|--------------------------------|----------|---|------|---------|---------|
| 1,2,3,4,5,6,7,12 | agreements and support regional HAZ-MAT teams Provide a backup communications system including satellite phones and handheld PRS walkie-talkies | 1,2,3,4,5,6 | Emergency Services | \$5,000+ | L | G/LB | C/FD | ONGOING |
| 1,2,3,5,7,9,12 | Encourage citizens to create family preparedness kits to be used in case of an emergency | 1,2,3,4,5,6 | Public Education and Awareness | N/A | L | LT | C | ONGOING |
| N/A | Encourage citizen use of Iowa 1 Call | 1,2,3,4,5 | Public Education and Awareness | N/A | M | LT | UC | ONGOING |
| 15 | Initiate system to inventory locations of sinkholes and abandoned wells/mines | 1,2,3,4,5 | Prevention | VARIES | L | LT | PW | NEW |
| 11 | Continue to maintain Lake Fisher as a backup water resource | 1,2 | Prevention | VARIES | M | LB | C | NEW |
| 1,2,3,5,7,9,10,11,12 | Prepare evacuation plans for community facilities | 1,2,3,4,5,6 | Emergency Services | N/A | H | LT | EM/FD/C | NEW |
| | Develop a post-disaster building inspection plan | 1,2,3,4,5,6 | Emergency Services | N/A | M | LT | EM/FD/C | NEW |
| 1,2,3,6,10 | Develop procedures for effective operation of Code Red | 1,2,3,4,5,6 | Emergency Services | N/A | M | LT | C | NEW |

Hazards:

1. River Flooding
2. Severe Winter Storm
3. Tornado
4. Windstorm
5. Thunderstorms & Lightning
6. Hailstorm
7. Flash Flood
8. Drought
9. Extreme Heat
10. Grass/Woodland Fire

11. Dam Failure
12. Earthquake
13. Expansive Soils
14. Landslide
15. Sinkholes

Priority:

- H - High
M - Medium
L - Low

Applicable Jurisdiction:

1. Davis County
2. Bloomfield
3. Drakesville
4. Floris
5. Pulaski
6. Davis County Schools

Responsible Party

- EM - Emergency Management
M - Mayor
C - City Council/Board of Sup.
PW - Public Works
PD - Police/Sheriff
FD - Fire Department
UC - Utility Company
SS - School Superintendent

Funding Sources:

- G - Grant
LB - Local Budget
LT - Local Time

STAPLEE

STAPLEE is an evaluation tool explained in the FEMA How to Guide (386-3), used by local communities to prioritize and determine the feasibility of identified mitigation measures. This is one of the ways in which the Davis County Planning Team wished to evaluate the mitigation actions identified. This acronym is based off of each of the variables used to evaluate each action's Social, Technical, Aministrative, Political, Legal, Economic, and Environmental considerations. In the event of tie scores, local decision makers will prioritize actions as opportunities permit. The STAPLEE evaluation can be seen in Appendix C (page 133).

S - Social

- Is the proposed mitigation action acceptable to the community?
- Will the measure treat all individuals and groups equitably?
- Will the measure result in an inadvertent negative treatment of one or more segments of the population?

T - Technical

- Will the measure reduce losses in the long-term?
- Is the measure a whole or partial solution to the problem?
- Does the measure solve the problem instead of the symptoms?

A - Administrative

- Do the agencies responsible for implementing the measure have the skill, experience, knowledge, ability, staffing, funding, and maintenance capability to do so?

P - Political

- Does the measure have the support of elected officials, public or private agencies, and the general public?

L - Legal

- Does the jurisdiction responsible for implementing the measure have the legal authority to do so?
- Is there a legal basis (local code/ordinance, state law, or federal law) for the measure?

E - Economic

- Do the measure's benefits exceed the costs?
- Does the measure contribute to the overall economic goals of the community?
- Are there current sources of funds to implement the measure?
- Will the measure impose an increased burden on the tax base or the local economy?

E - Environmental

- How does the measure impact the natural environment?
- Does the measure comply with local, state, and federal laws?
- Is the measure consistent with current environmental goals?

Implementation/Incorporation

Davis County, the Davis County Planning Team, and the participating jurisdictions are responsible for overseeing the implementation of this plan, with assistance from ADLM Emergency Management. The mitigation actions identified on pages 92-94 were prioritized by the planning team thru discussions, evaluations of cost and benefits, and the STAPLEE process. Cost estimates were given by the planning team to help determine which mitigation actions best aligned with the economic goals of each jurisdiction. Through discussions with the planning team, it was emphasized to prioritize the implementation of identified mitigation actions by minimizing costs and maximizing benefits. This was an important issue that was discussed at the planning meetings, because the planning team wanted to get many important mitigation projects completed, which depended on budgets and available funding. The planning team decided that a timeline of three years would be assigned to all mitigation actions and would be evaluated later at that time.

Local jurisdictions will be responsible to refer to this plan when relevant planning decisions are to be made, in order to ensure consistency, minimize risk, and better coordinate mitigation activities. Where possible, mitigation actions identified in this plan will be incorporated into related planning documents. However, none of these communities have comprehensive or capital improvement plans, so there is only a limited opportunity for incorporation into other planning mechanisms. Two documents that can be aided by this plan include the Emergency Management Plan and the Emergency Support Function documents. However, this plan will likely serve as a stand-alone document. A lot of the recommendations contained within the plan are for the use of the county's EMC, local elected officials, and emergency responders.

Financial Resources

Availability of funding can play a significant role in the formulation, implementation and proposed project mitigation actions. Funding for various projects is available through FEMA programs including the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Assistance Program, and Flood Mitigation Assistance Program.

Once the plan is completed, approved, and adopted, local governments will be eligible for funding assistance from FEMA for mitigation strategies put forth in the plan. Applicable programs include (but not limited to):

- Pre-Disaster Mitigation Program (PDM): This is a yearly program where nationwide applications are accepted and approved on a competitive basis. Applications must be filed through the e-grants system on FEMA's website.
- Hazard Mitigation Grant Program (HMGP): Through this program, funding is available from FEMA after a major disaster strikes. Money is available to the state and distributed amongst local jurisdictions to be used for mitigation planning and projects.
- Flood Mitigation Assistance Program (FMAP): This program is aimed at reducing flood losses by elevation of structures or removal of structures from a flood-prone area.

Plan Maintenance/Plan Updates

Plan maintenance involves taking action to ensure that the plan stays current with information, priorities are still in order, and goals and objectives are maintained and updated. The progress and status of the Davis County Hazard Mitigation Plan and grant program, as required, are to be revisited and evaluated annually by each jurisdiction. During this time, information is to be collected to document related efforts, recent hazard events, and other pertinent activities to mitigate hazards. The plan will be monitored based on the mitigation strategies identified in the plan and associated status updates. Projects that are complete will be monitored for effectiveness. Any strategies that are removed from the plan will be examined and documented. Part of plan maintenance is maintaining the planning team, which is composed of local elected officials, community leaders, city employees, and other interested parties. It is important to be able to reconvene the planning team when necessary. A comprehensive update is required at least once every five years.

Continued Public Participation

The public will be involved in the implementation of the plan through meetings with the County Board of Supervisors, City Councils, and general public meetings. Mitigation actions and implementation strategies will be discussed, for which the public will be encouraged to provide input. Davis County notifies the public by emails, newspapers notices and other methods to citizens in the area to participate in the mitigation planning process. Additional avenues by which the County can pursue public engagement is through the increased usage of social media sites and/or public surveys to gauge overall community support. All residents are invited and welcome to participate in any such meetings that are to be held.

The opportunity for the public to take part in updates and reviews of this plan will comply with Iowa's Open Meeting Law (Iowa Code, Chapter 21). For each plan update (the five year period), the plan will be presented to the public for a thirty day comment and review period prior to approval by the State of Iowa and FEMA. For each annual review, public notices should be announced. The plan shall then be available through each jurisdiction's City Hall and at the Davis County Courthouse. Public participation is an essential part of the planning process.

Plan Evaluation

Evaluate the effectiveness of the planning process

- Reconvene the Planning Team
- Review Planning Process

Discussion Items:

- Building the Planning Team
- Engaging the Public
- Coordinating with other City and County Agencies

Evaluate the effectiveness of your actions

- What were the results of the implemented action? Did the results achieve the goals/objectives outlined in the plan? Did the actions have the intended results?
- Was the implemented project cost-effective? Did (or would) the project result in the reduction of potential losses?
- Document actions which were slow to get started or not implemented

Determine why the actions worked (or did not work)

- Lack of available resources
- The political or popular support for or against the action
- The availability of funds
- The actual time necessary to implement the actions

Determine if there are Changes to Plan Contents

- Have there been any hazard events in the past year (for annual review)? In the past 5 years (for plan updates)?
- Have there been any changes to maximum threat, vulnerability, or probability of hazards?
- Have there been significant changes to the demographics of Davis County? Is there new Census information for Davis County?
- Has there been new construction in Davis County? If so, is it in a potential hazard area?
- Has there been any change to the number of repetitive loss properties in Davis County?
- Have there been any changes to maximum threat, vulnerability, or probability of hazards?
- Should any hazards be added or removed?
- Should any new mitigation actions be added?
- Does the County have any new ordinances or plans? How has the hazard mitigation plan been used to develop new ordinances or plans? How have new ordinances or plans been incorporated into the hazard mitigation plan (if relevant)?

FEMA Preparedness List

FEMA has released safety guidelines to assist homeowners in their preparations for potential disasters. This list provides a summary of the necessary precautionary measures necessary to be explored prior to a hazard - such as escape plans, emergency contact numbers, and items to include in a home or auto disaster supplies kit. The following items are recommended for inclusion in your basic disaster supplies kit:

- Three day supply of non-perishable food
- Three day supply of water - one gallon of water per person, per day
- Portable, battery-powered radio or television and extra batteries
- Flashlight and extra batteries
- First aid kit and manual
- Sanitation and hygiene items (moist towelettes and toilet paper)
- Matches and waterproof container
- Whistle
- Extra clothing
- Kitchen accessories and cooking utensils, including a can opener
- Photocopies of credit and identification cards
- Cash and coins
- Special needs items, such as prescription medications, eye glasses, contact lens solutions, and hearing aid batteries
- Items for infants, such as formula, diapers, bottles, and pacifiers
- Other items to meet your unique family needs

If you live in a cold climate, you must think about warmth. It is possible that you will not have heat. Think about your clothing and bedding supplies. Be sure to include one complete change of clothing and shoes per person, including:

- Jacket or coat
- Long pants
- Long sleeve shirt
- Sturdy shoes
- Hat, mittens, and scarf
- Sleeping bag or warm blanket (per person)

The following are things to consider when putting together your food supplies:

- Avoid foods that will make you thirsty
- Stock canned foods, dry mixes, and other staples that do not require refrigeration, cooking, water, or special preparation.
- Include special dietary needs

For more information on being prepared for a disaster, refer to FEMA's website:

<http://www.ready.gov/build-a-kit>

Section 5: Davis County Jurisdictions

City of Bloomfield

Resolution # 2012-16

Bloomfield City Council

A resolution to participate the Davis County Multi-Jurisdiction Hazard Mitigation Plan of 2013

WHEREAS, the Robert T. Stafford Act, Section 404 provides post-hazard mitigation assistance through the Hazard Mitigation Grant Program; and

WHEREAS, the Disaster Mitigation Act of 2000 amended the Stafford Act to require communities to have a Hazard Mitigation Plan (Plan) approved in order to receive funds available through the HMGP as of November 2004; and

WHEREAS, the Iowa Homeland Security and Emergency Management Division (IHSEMD) is implementing the federal requirements through an agreement with Davis County; and

WHEREAS, Davis County has been awarded funding to assist in the preparation of the Davis County Multi-Jurisdiction Hazard Mitigation Plan; and

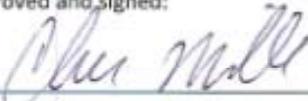
WHEREAS, the City of Bloomfield desires to actively participate in the planning process of the plan and provide information and data for the multi-jurisdiction planning elements required by the Federal Emergency Management Administration;

THEREFORE, let it be resolved that the City Council of the City of Bloomfield hereby agrees to:

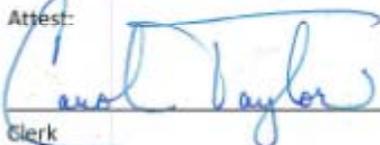
1. Provide assistance and necessary data to the planning effort
2. Assist in the coordination of community meetings with the assistance of the planning team
3. Assist the planning team in the development of plan goals and implementation strategies
4. Coordinate, as necessary with other City departments, public agencies, and stakeholders during plan development.
5. Prepare for plan consideration, adoption or approval by the City, County, Federal Emergency Management Administration (FEMA), and Iowa Homeland Security and Emergency Management Division (IHSEMD)

Adopted this 7th day of June, 2012.

Approved and signed:



Chairman

Attest:


Clerk

Planning Team

The City of Bloomfield Planning Team consisted of the following members:

| | |
|---------------------|----------------------|
| Chris Miller | Ted Henderson |
| Carol Taylor | Dan Hutchings |
| Sandy Jones | Ralph Hopkins |

Planning Process

The City of Bloomfield Planning Team held meetings throughout the planning process to collect information and share information with the general public and the planning team. Notices for meetings were published in the Bloomfield Democrat, a local newspaper. Specific occasions for public participation for this plan are listed below:

- **January 3, 2013:** The Hazard Mitigation Plan was discussed prior to the City's regularly scheduled council meeting. Participants were introduced to the plan, the process, as well as the grant programs associated with the plan. Participants discussed potential threat of hazards, the National Flood Insurance Program, and critical facilities of particular concern.
- **January 17, 2013:** The plan was discussed for a second time. Attendees reviewed the status of mitigation actions identified in the 2008 plan, other mitigation actions that have been carried out, and identified mitigation actions to pursue in the current plan.
- **June 18, 2013:** Plan was made available for public review and submitted to Iowa Department of Homeland Security and Emergency Management for review and approval

Previous Mitigation Actions

The Planning Team identified a number of mitigation actions that have been carried out since the adoption of the 2008 plan:

- Acquired a backup generator for the Bloomfield Law Center, and two generators for lift stations
- Implemented CodeRed in 2008
- Undertook significant stormwater renovations after the 2008 and 2010 flood events
- Acquired and installed a new outdoor warning siren
- Designated the Muchler Center as the community's storm shelter
- Constructed concrete containments for hazardous material storage behind City Hall
- Sponsored a number of classes open to the public on disaster preparedness
- Promoted the use of Iowa One-Call through various avenues
- Received a countywide grant for backup radios for hospital and police/fire departments

Record of Review

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following documents were identified and reviewed by the City of Bloomfield:

- City of Bloomfield City Code, 2004
- Davis County Comprehensive Emergency Management Plan, 2011

The plan and code were reviewed to evaluate current mitigation efforts underway. The plan helped provide a better understanding of the roles of certain personnel in emergency situations. Certain aspects of the code were discussed in team meetings, including how the City can improve their permit review process to help mitigate future disasters, and evaluate the viability of NFIP when the FEMA FIRM maps are completed.

| Demographics | | Workforce | |
|---|------------|---|--------------|
| Population | 2,640 | Total Labor Force | 1,247 |
| Median Age | 43.0 | Employed | 1,161 |
| 65 Years and Over | 599 | Time Travel to Work | 17.1 |
| Household/Income | | Property Valuations | |
| Median Household Income | \$44,890 | Residential | \$69,615,720 |
| Per Capital Income | \$21,587 | Commercial | \$20,364,500 |
| | | Industrial | \$3,580,340 |
| Housing | | General Information | |
| Total Housing Units | 1,259 | Flood Insurance Rate Map | No |
| Occupied Housing Units | 1,122 | NFIP Participant | No |
| Average Household Size | 2.27 | Comprehensive Plan | No |
| New Building Permits Since 2000 | 28 | Zoning/Land Use Ordinance | Yes |
| Housing Units removed/demolished since 2000 | 6 | Building Permits | Yes |
| | | Subdivision Ordinance | Yes |
| Service | | Provider | |
| Electric | | City of Bloomfield/Southern Iowa Electrical Coop. | |
| Water | | City of Bloomfield | |
| Sewage Treatment | | City of Bloomfield | |
| Telephone | | Citizens Mutual Telephone Cooperative | |
| Ambulance | | Davis County Hospital | |
| Fire Protection | | Bloomfield Fire Department | |
| Police/Law Enforcement | | City of Bloomfield PD | |
| Structures | | | |
| Residential | Commercial | Industrial | Public |
| 948 | 262 | 28 | 19 |

Source: (US Census Bureau, 2010); (Heckethorn, 2013)

Hazard Risk Assessment

The Davis County Hazard Mitigation Planning Team determined the countywide hazard rankings. At the January 3, 2013 meeting, the countywide hazard ranking was presented to the City of Bloomfield. The City was also provided with information and statistics relevant to hazards affecting Bloomfield, including records of past events and damages. Participants were reminded of many of the critical facilities located in the City of Bloomfield which are identified on page 27. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Bloomfield, and if not, how Bloomfield's situation differs from the County. Based on this discussion, prevalent hazards were determined for Bloomfield. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the City. After the discussion among the Planning Team, it was decided that the city would re-prioritize the hazards of the countywide ranking for their jurisdictional portion of the plan based on the hazards that threaten the City. The City eliminated some of the hazards that were in the countywide ranking... as the Planning Team felt that those hazards did not apply. The Planning Team was not aware of any levees located in the City. Additionally, the City is relatively flat and has never had any issues with landslides.

It is recognized that Bloomfield may be susceptible to other hazards, but those hazards are not considered to be a high risk and are not examined at this time. However, if it is later determined that a hazard affecting Bloomfield does pose a higher risk than originally determined, it will be examined at that time or when the plan is updated.

Table 28: Bloomfield Hazard Ranking

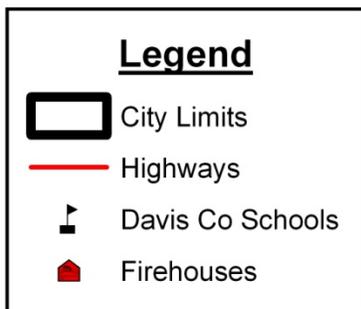
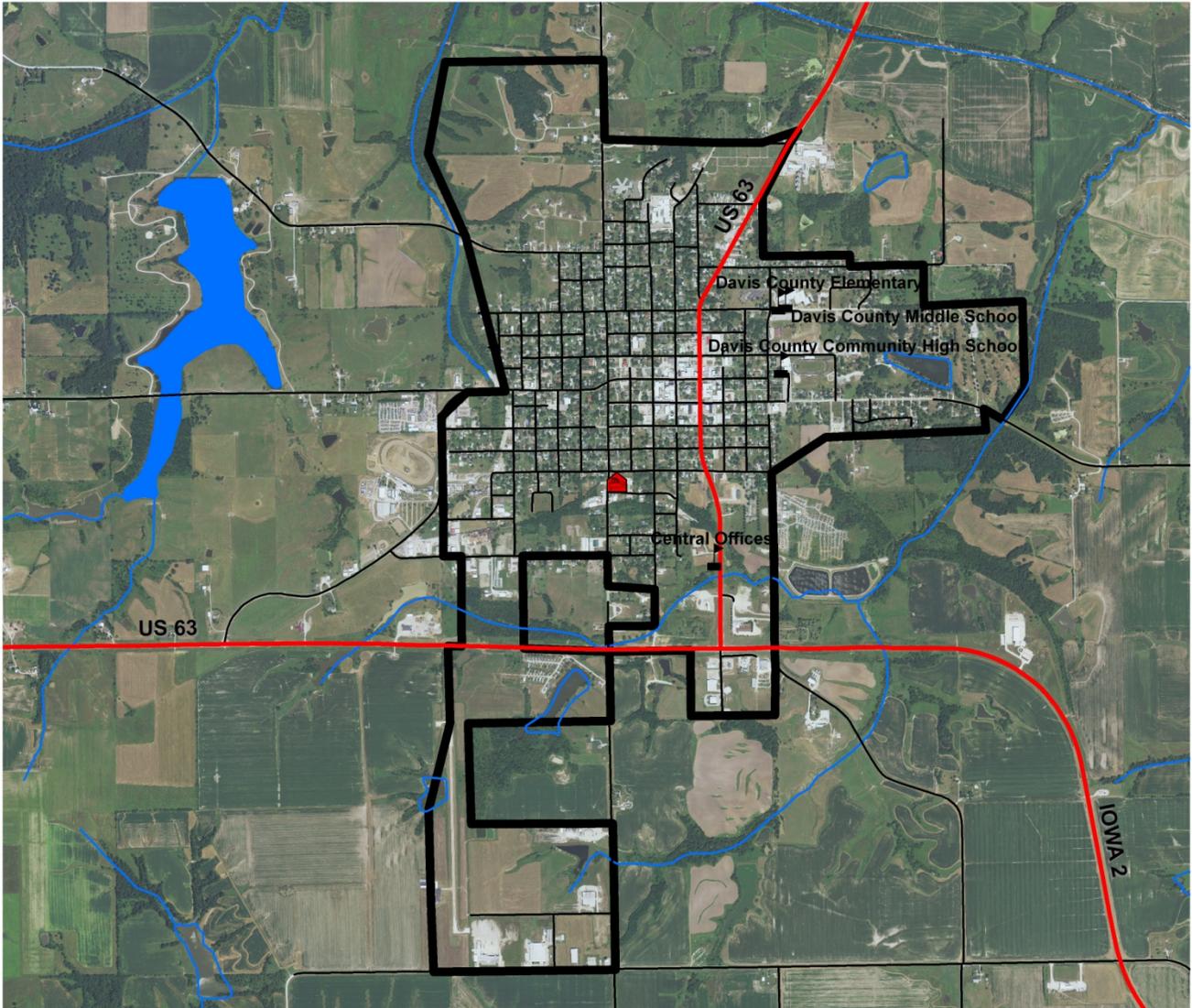
| Ranking | Hazard |
|----------------|--------------------------------------|
| 1 | Thunderstorms & Lightning |
| 2 | Tornado |
| 3 | Severe Winter Storm |
| 4 | Hailstorm |
| 5 | Flash Flood |
| 6 | Windstorm |
| 7 | Extreme Heat |
| 8 | Dam Failure |
| 9 | Drought |
| 10 | Earthquakes |
| 11 | Sinkholes |
| 12 | Expansive Soils |
| 13 | River Flooding |
| 14 | Grass/Woodland Fire |

Bloomfield, Iowa Identified Mitigation Actions

The Bloomfield Planning Team met on January 17, 2013 to identify the mitigation actions identified in the 2008 plan, the mitigation actions carried out since the 2008 plan, and potential mitigation actions to be undertaken in the future. A list of mitigation actions identified by the planning team can be seen on page 92.

Cost estimates for the mitigation actions were given by the Planning Team to help determine which actions were of a higher importance and fit in the economic goals of the county/cities/schools. A major factor in the implementation of the mitigation actions was their benefit versus how much the project would cost; however, the economics of implementing mitigation actions were discussed extensively during planning. Actions will be undertaken as funding become available. Realistically, the priority of the projects will be largely dependent on the time, place, imminent need, feasibility, and opportunity. For this reason, the identified mitigation actions were all determined to be of equal priority. No timeframe was identified for the implementation of these mitigation actions. A complete list of the mitigation actions identified for Davis County and Bloomfield is located on pages 92-94. The process of implementing these actions is outlined on pages 96.

City of Bloomfield



Created By:
Area 15 Regional Planning Commission

City of Drakesville

Resolution # 118

Drakesville City Council

A resolution to participate the Davis County Multi-Jurisdiction Hazard Mitigation Plan of 2013

WHEREAS, the Robert T. Stafford Act, Section 404 provides post-hazard mitigation assistance through the Hazard Mitigation Grant Program; and

WHEREAS, the Disaster Mitigation Act of 2000 amended the Stafford Act to require communities to have a Hazard Mitigation Plan (Plan) approved in order to receive funds available through the HMGP as of November 2004; and

WHEREAS, the Iowa Homeland Security and Emergency Management Division (IHSEMD) is implementing the federal requirements through an agreement with Davis County; and

WHEREAS, Davis County has been awarded funding to assist in the preparation of the Davis County Multi-Jurisdiction Hazard Mitigation Plan; and

WHEREAS, the City of Drakesville desires to actively participate in the planning process of the plan and provide information and data for the multi-jurisdiction planning elements required by the Federal Emergency Management Administration;

THEREFORE, let it be resolved that the City Council of the City of Drakesville hereby agrees to:

1. Provide assistance and necessary data to the planning effort
2. Assist in the coordination of community meetings with the assistance of the planning team
3. Assist the planning team in the development of plan goals and implementation strategies
4. Coordinate, as necessary with other City departments, public agencies, and stakeholders during plan development.
5. Prepare for plan consideration, adoption or approval by the City, County, Federal Emergency Management Administration (FEMA), and Iowa Homeland Security and Emergency Management Division (IHSEMD)

Adopted this 2 day of JULY, 2012.

Approved and signed:


Chairman

Attest:


Clerk

Planning Team

The City of Drakesville Planning Team consisted of the following members:

| | | |
|------------------------|----------------------|--------------------------|
| Robert Sampson | Sharon Sines | Davida Chickering |
| Mary Stocker | Karen Rudd | Andre Chickering |
| Bill D. Bassett | G. Brad McKee | Tiffany Lindley |
| Delores Smith | Vicky Thomas | Logan Boas |
| Dean Stocker | Brian Thomas | Harley Tapley |

Planning Process

The City of Drakesville Planning Team held meetings throughout the planning process to collect information and share information with the general public and the planning team. Notices for meetings were published in the Bloomfield Democrat, a local newspaper. Specific occasions for public participation for this plan are listed below:

- **October 1, 2012:** The Hazard Mitigation Plan was discussed prior to the City's regularly scheduled council meeting. Participants were introduced to the plan, the process, as well as the grant programs associated with the plan. Participants discussed potential threat of hazards, the National Flood Insurance Program, and critical facilities of particular concern.
- **November 5, 2012:** The plan was discussed for a second time. Attendees reviewed the status of mitigation actions identified in the 2008 plan, other mitigation actions that have been carried out, and identified mitigation actions to pursue in the current plan.
- **June 18, 2013:** Plan was made available for public review and submitted to Iowa Department of Homeland Security and Emergency Management for review and approval

Previous Mitigation Actions

The Planning Team identified a number of mitigation actions that have been carried out since the adoption of the 2008 plan:

- City designated their fire station as their community shelter.
- Acquired and installed a backup power generator at fire station
- Acquired a new brush truck for the Drakesville Fire Department
- Acquired jaws of life and rescue air bags for the Drakesville Fire Department
- Received a countywide grant for backup radios for hospital and police/fire departments

Record of Review

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following documents were identified and reviewed by the City of Drakesville:

- Davis County Emergency Operations Plan, 2011
- Drakesville City Code

The plan and code were reviewed to evaluate current mitigation efforts underway. The plan helped provide a better understanding of the roles of certain personnel in emergency situations. Certain aspects of the code were discussed in team meetings, including how the City can improve their permit review process to help mitigate future disasters, and evaluate the viability of NFIP when the FEMA FIRM maps are completed.

| Demographics | | Workforce | |
|---|------------|---------------------------------------|-------------|
| Population | 184 | Total Labor Force | 104 |
| Median Age | 41.0 | Employed | 98 |
| 65 Years and Over | 34 | Time Travel to Work | 22.0 |
| Household/Income | | Property Valuations | |
| Median Household Income | \$29,375 | Residential | \$3,366,080 |
| Per Capital Income | \$25,716 | Commercial | \$519,460 |
| | | Industrial | - |
| Housing | | General Information | |
| Total Housing Units | 85 | Flood Insurance Rate Map | No |
| Occupied Housing Units | 76 | NFIP Participant | No |
| Average Household Size | 2.42 | Comprehensive Plan | No |
| New Building Permits Since 2000 | 1 | Zoning/Land Use Ordinance | No |
| Housing Units removed/demolished since 2000 | 2 | Building Permits | Yes |
| | | Subdivision Ordinance | Yes |
| Service | | Provider | |
| Electric | | Alliant Energy | |
| Water | | Rathbun RWA | |
| Sewage Treatment | | Rathbun RWA | |
| Telephone | | Citizens Mutual Telephone Cooperative | |
| Ambulance | | Davis County Hospital | |
| Fire Protection | | Drakesville Fire Department | |
| Police/Law Enforcement | | Davis County Sheriff | |
| Structures | | | |
| Residential | Commercial | Industrial | Public |
| 76 | 17 | - | 8 |

Source: (US Census Bureau, 2010); (Heckethorn, 2013)

Hazard Risk Assessment

The Davis County Hazard Mitigation Planning Team determined the countywide hazard rankings. At the October 1, 2013 meeting, the countywide hazard ranking was presented to the City of Drakesville. The City was also provided with information and statistics relevant to hazards affecting Bloomfield, including records of past events and damages. Participants were reminded of many of the critical facilities located in the City of Drakesville which are identified on page 27. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Drakesville, and if not, how Drakesville's situation differs from the County. Based on this discussion, prevalent hazards were determined for Drakesville. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the City. After the discussion among the Planning Team, it was decided that the city would re-prioritize the hazards of the countywide ranking for their jurisdictional portion of the plan based on the hazards that threaten the City. The City eliminated some of the hazards that were in the countywide ranking... as the Planning Team felt that those hazards did not apply. The City did not profile river floods, or dam failure, since there are no rivers or streams that come through the City. Additionally, they did not profile sinkholes, since there were not any coal mines in their area and they have had no issues with sinkholes in the past.

It is recognized that Drakesville may be susceptible to other hazards, but those hazards are not considered to be a high risk and are not examined at this time. However, if it is later determined that a hazard affecting Drakesville does pose a higher risk than originally determined, it will be examined at that time or when the plan is updated.

Table 29: Drakesville Hazard Ranking

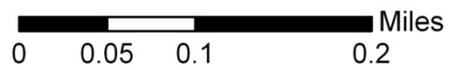
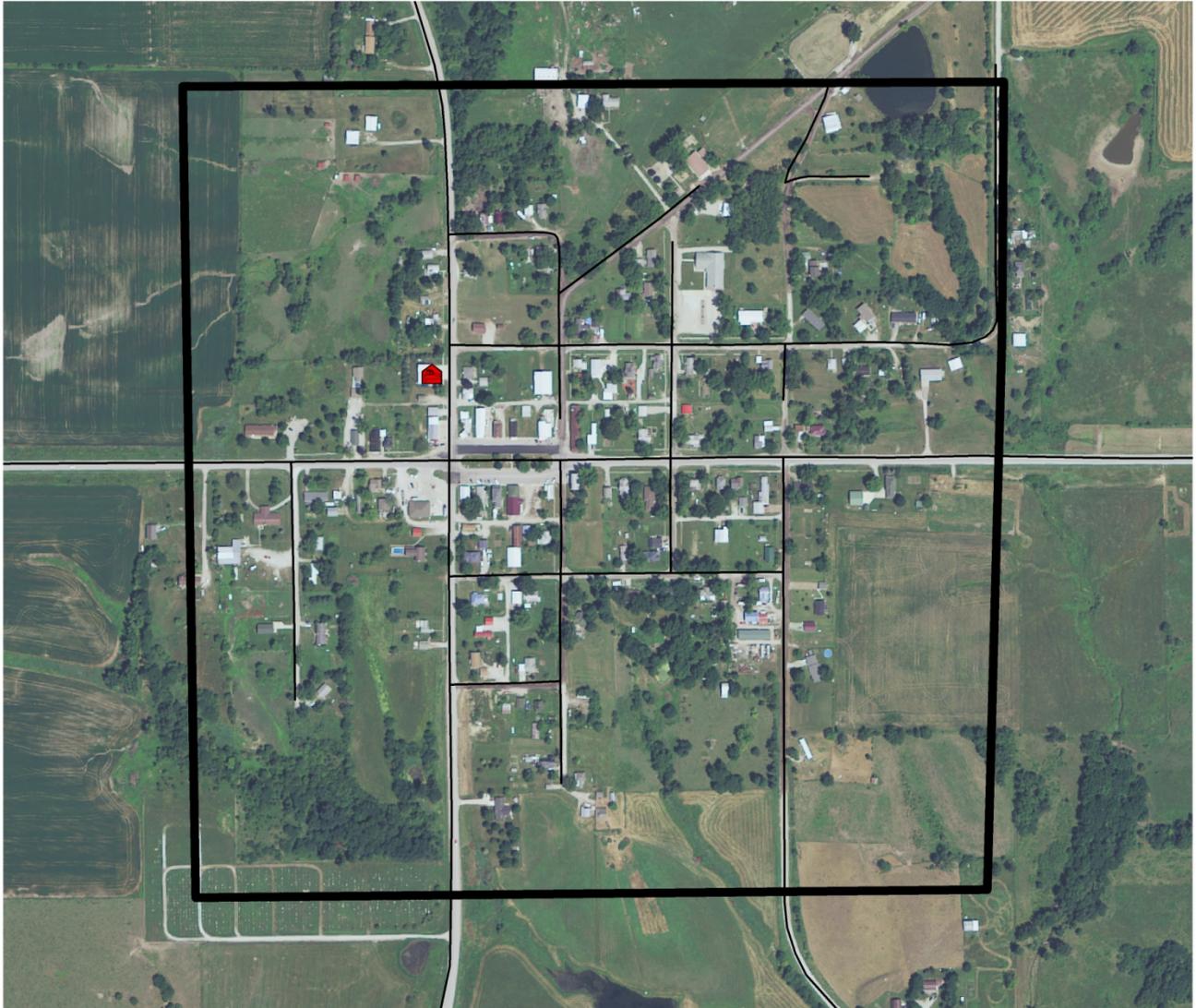
| Ranking | Hazard |
|----------------|------------------------------------|
| 1 | Windstorm |
| 2 | Tornado |
| 3 | Severe Winter Storms |
| 4 | Thunderstorms and Lightning |
| 5 | Hailstorm |
| 6 | Grass/Woodland Fire |
| 7 | Earthquake |
| 8 | Drought |
| 9 | Extreme Heat |
| 10 | Flash Flood |
| 11 | Landslide |
| 12 | Expansive Soils |

Drakesville, Iowa Identified Mitigation Actions

The Bloomfield Planning Team met on January 17, 2013 to identify the mitigation actions identified in the 2008 plan, the mitigation actions carried out since the 2008 plan, and potential mitigation actions to be undertaken in the future. A list of mitigation actions identified by the planning team can be seen on page 92.

Cost estimates for the mitigation actions were given by the Planning Team to help determine which actions were of a higher importance and fit in the economic goals of the county/cities/schools. A major factor in the implementation of the mitigation actions was their benefit versus how much the project would cost; however, the economics of implementing mitigation actions were discussed extensively during planning. Actions will be undertaken as funding becomes available. Realistically, the priority of the projects will be largely dependent on the time, place, imminent need, feasibility, and opportunity. For this reason, the identified mitigation actions were all determined to be of equal priority. No timeframe was identified for the implementation of these mitigation actions. A complete list of the mitigation actions identified for Davis County and Drakesville is located on pages 92-94. The process of implementing these actions is outlined on pages 96.

City of Drakesville



Legend

-  City Limits
-  Highways
-  Firehouses



Created By:
Area 15 Regional Planning Commission

City of Floris

Resolution # 86-12

Floris City Council

A resolution to participate the Davis County Multi-Jurisdiction Hazard Mitigation Plan of 2013

WHEREAS, the Robert T. Stafford Act, Section 404 provides post-hazard mitigation assistance through the Hazard Mitigation Grant Program; and

WHEREAS, the Disaster Mitigation Act of 2000 amended the Stafford Act to require communities to have a Hazard Mitigation Plan (Plan) approved in order to receive funds available through the HMGP as of November 2004; and

WHEREAS, the Iowa Homeland Security and Emergency Management Division (IHSEMD) is implementing the federal requirements through an agreement with Davis County; and

WHEREAS, Davis County has been awarded funding to assist in the preparation of the Davis County Multi-Jurisdiction Hazard Mitigation Plan; and

WHEREAS, the City of Floris desires to actively participate in the planning process of the plan and provide information and data for the multi-jurisdiction planning elements required by the Federal Emergency Management Administration;

THEREFORE, let it be resolved that the City Council of the City of Floris hereby agrees to:

1. Provide assistance and necessary data to the planning effort
2. Assist in the coordination of community meetings with the assistance of the planning team
3. Assist the planning team in the development of plan goals and implementation strategies
4. Coordinate, as necessary with other City departments, public agencies, and stakeholders during plan development.
5. Prepare for plan consideration, adoption or approval by the City, County, Federal Emergency Management Administration (FEMA), and Iowa Homeland Security and Emergency Management Division (IHSEMD)

Adopted this 6th day of August, 2012.

Approved and signed:

Carolynne Brown
Chairman-Mayor

Attest:

Wynonia K Brown
Clerk

Planning Team

The City of Floris Planning Team consisted of the following members:

| | |
|-----------------------|-----------------------|
| Carolyne Brown | Bonnie Davis |
| Wyomia Brown | Maxine Harward |
| Robin Benge | Gordon Hawles |
| Darian Benge | Jason Marks |
| Russell Bales | Mary Marks |
| Bill Covert | Dwight Miller |

Planning Process

The City of Floris Planning Team held meetings throughout the planning process to collect information and share information with the general public and the planning team. Notices for meetings were published in the Bloomfield Democrat, a local newspaper. Specific occasions for public participation for this plan are listed below:

- **October 1, 2012:** The Hazard Mitigation Plan was discussed prior to the City's regularly scheduled council meeting. Participants were introduced to the plan, the process, as well as the grant programs associated with the plan. Participants discussed potential threat of hazards, the National Flood Insurance Program, and critical facilities of particular concern.
- **November 5, 2012:** The plan was discussed for a second time. Attendees reviewed the status of mitigation actions identified in the 2008 plan, other mitigation actions that have been carried out, and identified mitigation actions to pursue in the current plan.
- **June 18, 2013:** Plan was made available for public review and submitted to Iowa Department of Homeland Security and Emergency Management for review and approval

Previous Mitigation Actions

The Planning Team identified a number of mitigation actions that have been carried out since the adoption of the 2008 plan:

- Designated the community hall as a community shelter
- Received a grant to upgrade handicap accessibility to community shelter
- Received a countywide grant for backup radios for hospital and police/fire departments

Record of Review

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following documents were identified and reviewed by the City of Floris:

- Davis County Emergency Operations Plan, 2011
- City of Floris City Code

The plan and code were reviewed to evaluate current mitigation efforts underway. The plan helped provide a better understanding of the roles of certain personnel in emergency situations. Certain aspects of the code were discussed in team meetings, including how the City can initiate a permit review process to help mitigate future disasters, and evaluate the viability of NFIP when the FEMA FIRM maps are completed.

| Demographics | | Workforce | |
|---|------------|---------------------------------------|-------------|
| Population | 138 | Total Labor Force | 60 |
| Median Age | 45.0 | Employed | 47 |
| 65 Years and Over | 29 | Time Travel to Work | 41.6 |
| Household/Income | | Property Valuations | |
| Median Household Income | \$26,250 | Residential | \$2,140,090 |
| Per Capital Income | \$16,677 | Commercial | \$103,810 |
| | | Industrial | - |
| Housing | | General Information | |
| Total Housing Units | 62 | Flood Insurance Rate Map | No |
| Occupied Housing Units | 58 | NFIP Participant | No |
| Average Household Size | 2.38 | Comprehensive Plan | No |
| New Building Permits Since 2000 | 0 | Zoning/Land Use Ordinance | No |
| Housing Units removed/demolished since 2000 | 2 | Building Permits | No |
| | | Subdivision Ordinance | No |
| Service | | Provider | |
| Electric | | Alliant Energy | |
| Water | | Wapello Rural Water Association | |
| Sewage Treatment | | Wapello Rural Water Association | |
| Telephone | | Citizens Mutual Telephone Cooperative | |
| Ambulance | | Davis County Hospital | |
| Fire Protection | | Floris Fire Department | |
| Police/Law Enforcement | | Davis County Sheriff | |
| Structures | | | |
| Residential | Commercial | Industrial | Public |
| 62 | 6 | - | 4 |

Source: (US Census Bureau, 2010); (Heckethorn, 2013)

Hazard Risk Assessment

The Davis County Hazard Mitigation Planning Team determined the countywide hazard rankings. At the January 3, 2013 meeting, the countywide hazard ranking was presented to the City of Floris. The City was also provided with information and statistics relevant to hazards affecting Floris, including records of past events and damages. Participants were reminded of many of the critical facilities located in the City of Floris which are identified on page 27. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Floris, and if not, how Floris' situation differs from the County. Based on this discussion, prevalent hazards were determined for Floris. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the City. After the discussion among the Planning Team, it was decided that the city would re-prioritize the hazards of the countywide ranking for their jurisdictional portion of the plan based on the hazards that threaten the City. The City eliminated some of the hazards that were in the countywide ranking... as the Planning Team felt that those hazards did not apply. The City did not profile dam failure, since there are no dams that would affect the city. Landslides have never posed much of an issue to the City due to the general topography. Also, they did not profile sinkholes, since there were not any coal mines in their area and they have had no issues with sinkholes in the past.

It is recognized that Floris may be susceptible to other hazards, but those hazards are not considered to be a high risk and are not examined at this time. However, if it is later determined that a hazard affecting Floris does pose a higher risk than originally determined, it will be examined at that time or when the plan is updated.

Table 30: Floris Hazard Ranking

| Ranking | Hazard |
|----------------|------------------------------------|
| 1 | Flash Flood |
| 2 | Windstorm |
| 3 | Thunderstorms and Lightning |
| 4 | Severe Winter Storm |
| 5 | Hailstorm |
| 6 | River Flooding |
| 7 | Tornado |
| 8 | Drought |
| 9 | Extreme Heat |
| 10 | Grass/Woodland Fire |
| 11 | Earthquake |
| 12 | Expansive Soils |

Floris, Iowa Identified Mitigation Actions

The Bloomfield Planning Team met on January 17, 2013 to identify the mitigation actions identified in the 2008 plan, the mitigation actions carried out since the 2008 plan, and potential mitigation actions to be undertaken in the future. A list of mitigation actions identified by the planning team can be seen on page 92.

Cost estimates for the mitigation actions were given by the Planning Team to help determine which actions were of a higher importance and fit in the economic goals of the county/cities/schools. A major factor in the implementation of the mitigation actions was their benefit versus how much the project would cost; however, the economics of implementing mitigation actions were discussed extensively during planning. Actions will be undertaken as funding become available. Realistically, the priority of the projects will be largely dependent on the time, place, imminent need, feasibility, and opportunity. For this reason, the identified mitigation actions were all determined to be of equal priority. No timeframe was identified for the implementation of these mitigation actions. A complete list of the mitigation actions identified for Davis County and Floris is located on pages 92-94. The process of implementing these actions is outlined on pages 96.

City of Floris



Legend

-  City Limits
-  Highways
-  Firehouses



Created By:
Area 15 Regional Planning Commission

City of Pulaski

Resolution # 10-1-2012 (2)

Pulaski City Council

A resolution to participate the Davis County Multi-Jurisdiction Hazard Mitigation Plan of 2013

WHEREAS, the Robert T. Stafford Act, Section 404 provides post-hazard mitigation assistance through the Hazard Mitigation Grant Program; and

WHEREAS, the Disaster Mitigation Act of 2000 amended the Stafford Act to require communities to have a Hazard Mitigation Plan (Plan) approved in order to receive funds available through the HMGP as of November 2004; and

WHEREAS, the Iowa Homeland Security and Emergency Management Division (IHSEMD) is implementing the federal requirements through an agreement with Davis County; and

WHEREAS, Davis County has been awarded funding to assist in the preparation of the Davis County Multi-Jurisdiction Hazard Mitigation Plan; and

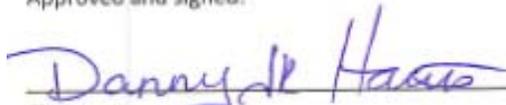
WHEREAS, the City of Pulaski desires to actively participate in the planning process of the plan and provide information and data for the multi-jurisdiction planning elements required by the Federal Emergency Management Administration;

THEREFORE, let it be resolved that the City Council of the City of Pulaski hereby agrees to:

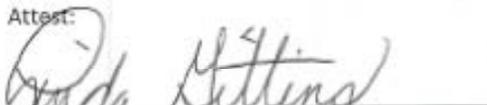
1. Provide assistance and necessary data to the planning effort
2. Assist in the coordination of community meetings with the assistance of the planning team
3. Assist the planning team in the development of plan goals and implementation strategies
4. Coordinate, as necessary with other City departments, public agencies, and stakeholders during plan development.
5. Prepare for plan consideration, adoption or approval by the City, County, Federal Emergency Management Administration (FEMA), and Iowa Homeland Security and Emergency Management Division (IHSEMD)

Adopted this 1st day of Oct., 2012.

Approved and signed:


Chairman

Attest:


Clerk



Planning Team

The City of Pulaski Planning Team consisted of the following members:

| | |
|------------------------|-----------------------|
| Danny Harris | Rosa Archer |
| Linda Gittins | Angie Breeding |
| Forrest Woods | Kyle Garmon |
| Jeremy Breeding | Dean Graham |
| Ross Hunter | Leon Wright |
| Karen Miller | Don Whistler |
| Sheryl Wright | |

Planning Process

The City of Pulaski Planning Team held meetings throughout the planning process to collect information and share information with the general public and the planning team. Notices for meetings were published in the Bloomfield Democrat, a local newspaper. Specific occasions for public participation for this plan are listed below:

- **October 1, 2012:** The Hazard Mitigation Plan was discussed prior to the City's regularly scheduled council meeting. Participants were introduced to the plan, the process, as well as the grant programs associated with the plan. Participants discussed potential threat of hazards, the National Flood Insurance Program, and critical facilities of particular concern.
- **November 5, 2012:** The plan was discussed for a second time. Attendees reviewed the status of mitigation actions identified in the 2008 plan, other mitigation actions that have been carried out, and identified mitigation actions to pursue in the current plan.
- **June 18, 2013:** Plan was made available for public review and submitted to Iowa Department of Homeland Security and Emergency Management for review and approval

Previous Mitigation Actions

The Planning Team identified a number of mitigation actions that have been carried out since the adoption of the 2008 plan:

- Constructed a new city hall and fire station in 2007
- Acquired backup power generator for new city hall/fire station
- Designated new city hall/fire station as a community shelter
- Carried out major improvements in ditching and culverts in 2011
- Acquired new fire trucks in 2009 and 2011
- Received a countywide grant for backup radios for hospital and police/fire department

Record of Review

In the preparation of this plan, existing plans and other technical information was considered. The purpose of this review was to give consideration to existing information before setting future mitigation goals. The following documents were identified and reviewed by the City of Pulaski:

- Davis County Emergency Operations Plan, 2011
- City of Pulaski City Code

The plan and code were reviewed to evaluate current mitigation efforts underway. The plan helped provide a better understanding of the roles of certain personnel in emergency situations. Certain aspects of the code were discussed in team meetings, such as incorporating NFIP principles and adopting a floodplain ordinance when the FEMA FIRM maps are completed and how the City can improve their overall permit review process to help mitigate future disasters.

| Demographics | | Workforce | |
|---|------------|---|-------------|
| Population | 260 | Total Labor Force | 192 |
| Median Age | 39.7 | Employed | 184 |
| 65 Years and Over | 36 | Time Travel to Work | 26.9 |
| Household/Income | | Property Valuations | |
| Median Household Income | \$51,250 | Residential | \$5,239,290 |
| Per Capital Income | \$22,609 | Commercial | \$556,520 |
| | | Industrial | - |
| Housing | | General Information | |
| Total Housing Units | 117 | Flood Insurance Rate Map | No |
| Occupied Housing Units | 104 | NFIP Participant | No |
| Average Household Size | 2.50 | Comprehensive Plan | No |
| New Building Permits Since 2000 | 3 | Zoning/Land Use Ordinance | Yes |
| Housing Units removed/demolished since 2000 | 1 | Building Permits | Yes |
| | | Subdivision Ordinance | No |
| Service | | Provider | |
| Electric | | Alliant Energy | |
| Water | | City of Pulaski and Rathbun Rural Water Association | |
| Sewage Treatment | | Rathbun Rural Water Association | |
| Telephone | | Citizens Mutual Telephone Cooperative | |
| Ambulance | | Davis County Hospital | |
| Fire Protection | | Pulaski Fire Department | |
| Police/Law Enforcement | | Davis County Sheriff | |
| Structures | | | |
| Residential | Commercial | Industrial | Public |
| 111 | 20 | - | 9 |

Source: (US Census Bureau, 2010); (Heckethorn, 2013)

Hazard Risk Assessment

The Davis County Hazard Mitigation Planning Team determined the countywide hazard rankings. At the January 3, 2013 meeting, the countywide hazard ranking was presented to the City of Pulaski. The City was also provided with information and statistics relevant to hazards affecting Pulaski, including records of past events and damages. Participants were reminded of many of the critical facilities located in the City of Pulaski which are identified on page 92. The City was asked to review the information from the countywide rankings and determine if highest risk hazards for the County applied to Pulaski, and if not, how Pulaski's situation differs from the County. Based on this discussion, prevalent hazards were determined for Pulaski. Along with the information and statistics provided, the people present were asked to draw upon their knowledge and experiences of hazards affecting the City. After the discussion among the Planning Team, it was decided that the city would re-prioritize the hazards of the countywide ranking for their jurisdictional portion of the plan based on the hazards that threaten the City. The City eliminated some of the hazards that were in the countywide ranking... as the Planning Team felt that those hazards did not apply. The City did not profile river floods, or dam failure, since there are no rivers or significant streams that come through the City. Additionally, landslides have never posed much of an issue to the City due to the general topography.

It is recognized that Pulaski may be susceptible to other hazards, but those hazards are not considered to be a high risk and are not examined at this time. However, if it is later determined that a hazard affecting Pulaski does pose a higher risk than originally determined, it will be examined at that time or when the plan is updated.

Table 31: Pulaski Hazard Ranking

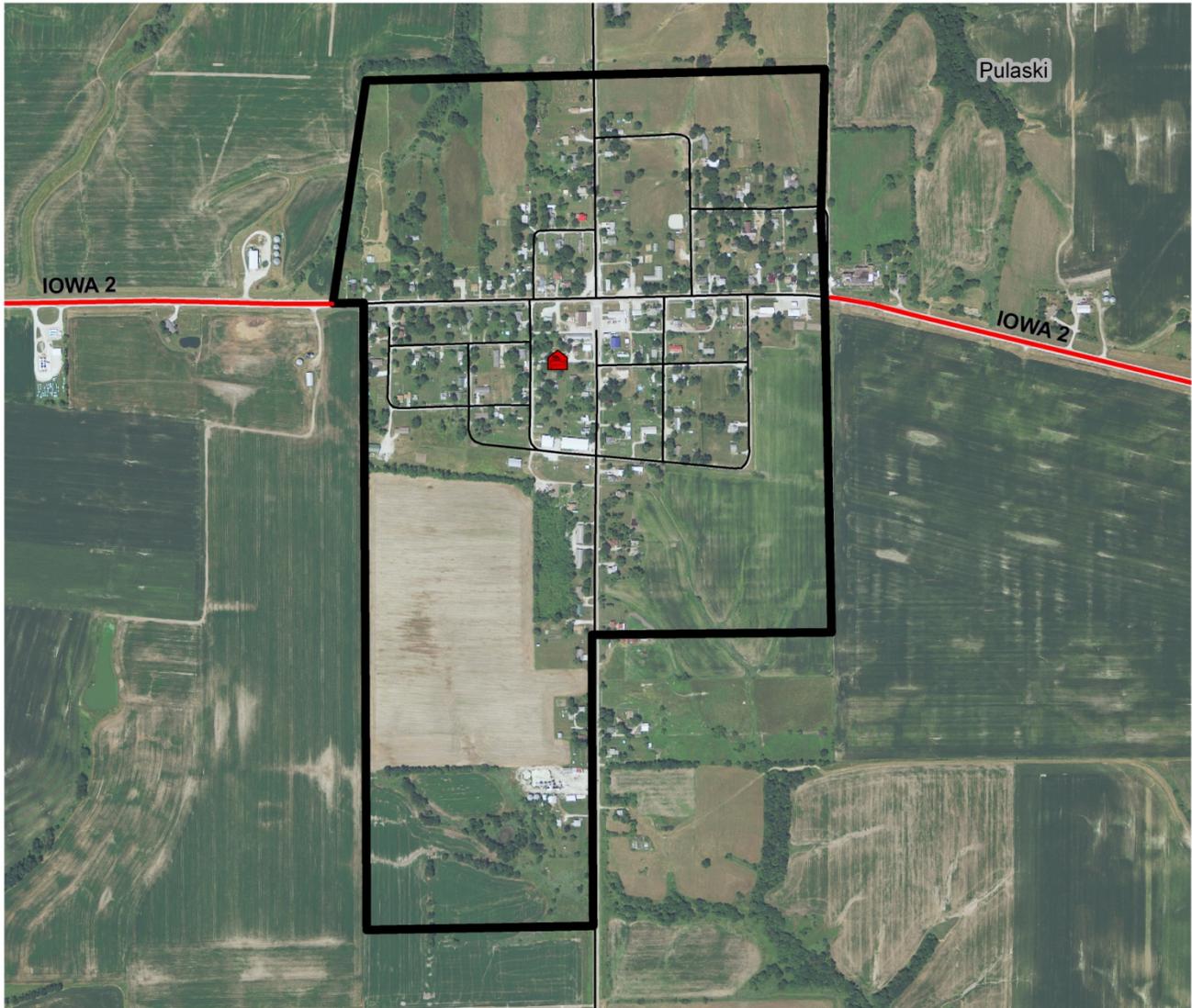
| Ranking | Hazard |
|----------------|------------------------------------|
| 1 | Severe Winter Storm |
| 2 | Tornado |
| 3 | Windstorm |
| 4 | Thunderstorms and Lightning |
| 5 | Hailstorm |
| 6 | Drought |
| 7 | Extreme Heat |
| 8 | Grass/Woodland Fire |
| 9 | Earthquake |
| 10 | Expansive Soils |
| 11 | Sinkholes |
| 12 | Flash Flood |

Pulaski, Iowa Identified Mitigation Actions

The Pulaski Planning Team met on January 17, 2013 to identify the mitigation actions identified in the 2008 plan, the mitigation actions carried out since the 2008 plan, and potential mitigation actions to be undertaken in the future. A list of mitigation actions identified by the planning team can be seen on page 92.

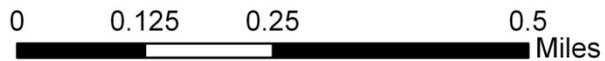
Cost estimates for the mitigation actions were given by the Planning Team to help determine which actions were of a higher importance and fit in the economic goals of the county/cities/schools. A major factor in the implementation of the mitigation actions was their benefit versus how much the project would cost; however, the economics of implementing mitigation actions were discussed extensively during planning. Actions will be undertaken as funding become available. Realistically, the priority of the projects will be largely dependent on the time, place, imminent need, feasibility, and opportunity. For this reason, the identified mitigation actions were all determined to be of equal priority. No timeframe was identified for the implementation of these mitigation actions. A complete list of the mitigation actions identified for Davis County and Pulaski is located on pages 92-94. The process of implementing these actions is outlined on page 96.

City of Pulaski



Legend

-  City Limits
-  Highways
-  Firehouses



Created By:
Area 15 Regional Planning Commission

Davis County Community School District

Resolution

Davis County Community School District

A resolution to participate the Davis County Multi-Jurisdiction Hazard Mitigation Plan of 2013

WHEREAS, the Robert T. Stafford Act, Section 404 provides post-hazard mitigation assistance through the Hazard Mitigation Grant Program; and

WHEREAS, the Disaster Mitigation Act of 2000 amended the Stafford Act to require jurisdictions to have a Hazard Mitigation Plan (Plan) approved in order to receive funds available through the HMGP as of November 2004; and

WHEREAS, the Iowa Homeland Security and Emergency Management Division (IHSEMD) is implementing the federal requirements through an agreement with Davis County; and

WHEREAS, Davis County has been awarded funding to assist in the preparation of the Davis County Multi-Jurisdiction Hazard Mitigation Plan; and

WHEREAS, the Davis County Community School District desires to actively participate in the planning process of the plan and provide information and data for the multi-jurisdiction planning elements required by the Federal Emergency Management Administration;

THEREFORE, let it be resolved that the school board of the Davis County Community School District hereby agree to:

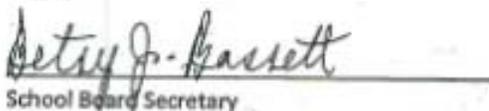
1. Provide assistance and necessary data to the planning effort
2. Assist in the coordination of community meetings with the assistance of the planning team
3. Assist the planning team in the development of plan goals and implementation strategies
4. Coordinate, as necessary with other agencies and stakeholders during plan development.
5. Prepare for plan consideration, adoption or approval by the school board, County, Federal Emergency Management Administration (FEMA), and Iowa Homeland Security and Emergency Management Division (IHSEMD)

Adopted this 20th day of August, 2012.

Approved and signed:


School Board Chair

Attest:


School Board Secretary

The Davis County Community School District is located in Bloomfield, Iowa. The district has a total enrollment of 342 students. They offer a general education for preschool through twelfth grade students. The following table displays the most recent enrollment numbers for the district.

| Keota School District Enrollment | | |
|---|-----------------------------------|-------------------|
| | Level of Education | Enrollment |
| Davis County Elementary School | Pre-5 th | 549 |
| Davis County Middle School | 6 th -8 th | 357 |
| Davis County High School | 9 th -12 th | 380 |

Planning Team

The Davis County Community School District Planning Team consisted of the following members:

| <u>Name</u> | <u>Representation</u> |
|--------------|------------------------------------|
| Dan Maeder | Davis County CSD Superintendent |
| Dan Roberts | Davis County CSD Support Services |
| Ken Wuthrich | Davis County School Board |
| Jeff Graves | Davis County High School Principal |

Planning Process

A meeting was held for the planning process to collect information and share information with the general public and the planning team. Specific occasions for public participation for this plan are listed below:

- **October 4, 2012.** In this meeting, Matt Bauman of the Area 15 Regional Planning Commission explained what the hazard mitigation plan is, the school’s role in the process, and what opportunities are available through the Hazard Mitigation Grant Program. The group discussed current preparedness actions that have been carried out, and what can be pursued in the future. The group discussed and analyzed current threats and how they affected the district’s critical facilities.

Previous Mitigation Actions

The Planning Team identified a number of mitigation actions that have been carried out since the adoption of the 2008 plan:

- Acquired new RACOM radios
- Installed security cameras at the elementary and middle schools
- Installed card key access at middle school
- Built a new high school in 2009

Hazard Risk Assessment

The Davis County Mitigation Team determined the countywide hazard ranking. At the October 4, 2012 meeting, Area 15 RPC staff presented the countywide hazard ranking to the Davis County School District. Attendees were also provided with information and statistics relevant to hazards affecting the district, including records of past events and damages. Participants were then asked to review the information from the countywide hazard rankings and determine which hazards are likely to affect the Davis County School District. After the discussion among the members of the planning team and Area 15 RPC staff, it was decided that the District would re-prioritize the potential threat of each of the identified hazards for their jurisdictional portion of the plan. The District chose not to profile some of the hazards that were in the countywide hazard ranking... as the Planning Team felt that those hazards did not apply. The District did not profile river flood or dam failure, since there are no rivers or significant streams that affect any district buildings. They chose not to profile extreme heat, since all of the buildings are air conditioned. Sinkholes was not profiled because there has never been an issue with them in the past. Grass/woodland fires do not pose much of a risk since there aren't any wooded or grassy areas near any district-owned structures. Structural fires are a much larger concern for the district, and practice fire drills regularly as a precautionary measure.

It is recognized the Davis County School District may be susceptible to other hazards in the State of Iowa Hazard Mitigation Plan, but those hazards are not considered to be high risk and are not examined at this time. However, if it is later determined that a hazard affecting the District does pose a higher risk than originally determined, it will be examined at that time when the plan is updated.

Table 32: Davis County School District Hazard Ranking

| Ranking | Hazard |
|----------------|------------------------------------|
| 1 | Tornado |
| 2 | Thunderstorms and Lightning |
| 3 | Hailstorms |
| 4 | Windstorms |
| 5 | Severe Winter Storm |
| 6 | Flash Flood |
| 7 | Landslide |
| 8 | Expansive Soils |
| 9 | Earthquake |
| 10 | Drought |

Davis County School District Identified Mitigation Actions

In the meeting with the Davis County School District on October 4, 2012, the school district identified a number of mitigation actions. These actions reflect what they, as a jurisdiction involved in the hazard mitigation planning process, see as a priority. A list of mitigation actions identified by the planning team can be seen on page 92.

Cost estimates for the mitigation actions were given by the Planning Team to help determine which actions were of a higher importance and fit in the economic goals of the county/cities/schools. A major factor in the implementation of the mitigation actions was their benefit versus how much the project would cost; however, the economics of implementing mitigation actions were discussed extensively during planning. Actions will be undertaken as funding become available. Realistically, the priority of the projects will be largely dependent on the time, place, imminent need, feasibility, and opportunity. For this reason, the identified mitigation actions were all determined to be of equal priority. No timeframe was identified for the implementation of these mitigation actions. For a complete list of the Mitigation Actions for Davis County, refer to the Davis County Mitigation Actions Table located on pages 92-94. The process of implementing these actions is outlined on pages 96.

Appendix A - Glossary

100-year flood plain – area in which the chance of a flood occurring in any given year is 1% independent of any other year; this is statistically about once every 100 years, this does not mean that if there is not a flood this year that next year the chance goes up to 2%.

500-year flood plain – the area in which the chance is .2% chance of a flood occurring in any given year independent of any other year; this is statistically about once every 500 years this does not mean that if there is not a flood this year that next year the chance goes up to .4%.

Acceptable risk hazards – hazards that have been determined by the Keokuk County Planning Team to be low priority for mitigation strategies and projects to the point of no actions or steps are worth taking currently.

Agricultural drought – drought which refers to soil moisture deficiencies.

Aquifer – an underground layer of porous rock or soils such as sand or gravel from which water can be drawn from.

BFE – Base Flood Elevation; shown on the FIRM, is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year.

Demographics – statistical data about a population including age, total population, income, housing status; information found in the US Census.

EOP – Emergency Operations Plan.

Essential Facility – Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations (FEMA).

Flood hazard area – The area shown to be inundated by a flood of a given magnitude on a map; the land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA) on NFIP maps. The SFHA is the area where the NFIP's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies (FEMA).

FIRM – Flood Insurance Rate Map.

FIS – Flood Insurance Study.

Flood plain – area along a stream or river where flooding is a natural occurrence: flood plains can change over time based on changing conditions upstream such as urban development, dam or levee constructions, and other human actions.

Fujita Scale – Rates Tornadoes with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while and F5 indicated severe damage sustained (FEMA).

Funnel cloud – a rapidly rotating funnel-shaped cloud extending downward from the base of a cumulonimbus cloud, which, if it touches the surface of the earth, is a tornado or waterspout (Dictionary.com).

Gradient winds - horizontal wind velocity tangent to the contour line of a constant pressure surface (or to the isobar of a geopotential surface) at or above 2,500 feet (762 meters) (Dictionary.com).

HazMat – short-hand for Hazardous Materials, also used as HazMat Team to indicate the trained professionals that respond to release of hazardous substances.

Heat index – a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature.

High-risk hazards – hazards that are determined by the Jefferson County Planning Team to pose the most risk to the community and of priority for developing projects or policies to address.

Horizontal peak gravity acceleration – a measure of how hard the earth shakes in a given area.

Hydrological drought – drought which refers to declining surface water and groundwater supplies.

Infrastructure – Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, drydocks, piers and regional dams (FEMA).

IDNR – Iowa Department of Natural Resources.

Land uses – classifications of how land is used in a given space including farmland, forests, water bodies, or urban areas; also a system of classifications used in zoning ordinances.

Low-risk hazards – hazards that are determined by the Jefferson County Planning Team to pose a low risk to the community and of low priority for developing projects or policies to address.

Magnitude – size or extent.

Median – statistical convention of indicating that half of the data is higher and half of the data is lower than this number; the median number does not necessarily mean the average though it can be the same.

Meteorologic drought – drought which refers to precipitation deficiency.

Mine subsidence – mine collapses or cave-ins leading to depressions or sink holes on the surface.

Mitigation – any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event. Mitigation, also known as prevention (when done before a disaster), encourages long-term reduction of hazard vulnerability. The goal of mitigation is to decrease the need for response as opposed to simply increasing the response capability (FEMA).

NFIP – National Flood Insurance Program; Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3 (FEMA).

NCDC-National Climactic Data Center.

NWS - National Weather Service.

Pandemic (disease) – a disease that is found through a large population, a widespread disease.

Probability (hazard occurrence) – Likelihood of the hazard event, sometimes without regard to hazard history.

Seismic zone – a designated area where earthquakes and other seismic activity may take place.

Severity of Impact – assessment of the severity in terms of fatalities, injuries, property losses, and economic losses.

Socio-economic – pertaining to the interaction between economic and social conditions.

Special Flood Hazard Area (SFHA).is defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. Moderate flood hazard areas, labeled Zone B or Zone X (shaded) are also shown on the FIRM, and are the areas between the limits of the base flood and the 0.2-percentannual-chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded) (FEMA).

Speed of Onset – potential amount of warning time available before the hazard occurs.

Subsidence – sinking or lowering to a different level; also known as sink holes.

Tectonic – pertaining to the structure of the earth.

Topography – detailed description of a specific place including the shape of the land, where the highs and lows are, and how hills are shaped.

Tributary – a creek or stream that feeds into a larger creek or stream or a river.

USDA – U.S. Department Agriculture.

Vulnerability – measure of the percentage of people and property that would be affected by the hazard event.

Watch vs. warning – The National Weather Service uses a watch to indicate that conditions are right for a given storm to develop while warning indicates that a given storm is in the area; these classifications are applied to Tornados, winter storms, thunderstorms, and other weather events

Appendix B - Vulnerability Chart & Ratings

| Probability, Severity, and Vulnerability Worksheet | | | | | | | | |
|--|---------------|----------------------------|------------|-------------|--------|---------|---------------------|--------------------------|
| | | Davis County (unincorp) | Bloomfield | Drakesville | Floris | Pulaski | Davis County CSD | Overall Planning Area |
| Flash Flood | Probability | H | H | H | H | H | H | H |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | H | H | M | H | M | M | H |
| Tornadoes | Probability | M | M | M | L | M | M | M |
| | Severity | H | H | H | H | H | H | H |
| | Vulnerability | H | H | H | M | H | H | H |
| Windstorms | Probability | H | H | H | H | H | H | H |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | H | H | H | H | H | M | H |
| Extreme Heat | Probability | M | H | M | M | M | - | M |
| | Severity | L | L | L | L | L | - | L |
| | Vulnerability | M | M | M | M | M | - | M |
| Hailstorms | Probability | H | H | H | H | H | H | H |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | M | H | H | H | H | M | H |
| Grass/Woodland Fire | Probability | L | L | L | L | L | - | L |
| | Severity | M | L | M | L | M | - | L |
| | Vulnerability | M | L | M | L | M | - | M |
| Sinkholes | Probability | L | L | - | - | L | L | L |
| | Severity | L | L | - | - | L | L | L |
| | Vulnerability | L | L | - | - | L | L | L |
| River Flooding | Probability | M | L | - | L | - | - | L |
| | Severity | L | L | - | M | - | - | L |
| | Vulnerability | L | L | - | M | - | - | L |
| Severe Winter Storms | Probability | H | H | H | H | H | H | H |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | H | H | H | H | H | M | H |
| Drought | Probability | M | M | M | M | M | M | M |
| | Severity | L | L | L | L | L | L | L |
| | Vulnerability | M | L | M | M | M | L | M |
| Earthquakes | Probability | L | L | L | L | L | L | L |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | L | L | M | L | L | L | L |
| Landslides | Probability | L | - | L | - | - | L | L |
| | Severity | L | - | L | - | - | L | L |
| | Vulnerability | L | - | L | - | - | L | L |
| Expansive Soils | Probability | H | H | H | H | H | H | H |
| | Severity | L | L | L | L | L | L | L |
| | Vulnerability | L | L | L | L | L | L | L |
| Thunderstorms & Lightning | Probability | H | H | H | H | H | H | H |
| | Severity | M | M | M | M | M | M | M |
| | Vulnerability | M | H | H | H | H | M | H |
| Dam Failure | Probability | L | L | - | - | - | L | L |
| | Severity | L | L | - | - | - | L | L |
| | Vulnerability | L | L | - | - | - | L | L |

Appendix C - STAPLEE Chart

| Hazards | Mitigation Action | S | T | A | P | L | E | E | Total |
|-------------------------------------|---|--------|-----------|----------------|-----------|-------|----------|---------------|-------|
| | | Social | Technical | Administrative | Political | Legal | Economic | Environmental | |
| 3,4,5,6 | Develop safe rooms in schools and critical public facilities | +1 | 0 | +1 | +1 | +1 | 0 | 0 | +4 |
| 3,4,5,6 | Designate shelter sites and provide with adequate supplies and overnight accommodations | +1 | 0 | +1 | +1 | +1 | -1 | 0 | +3 |
| 3,4,5,6 | Encourage mobile home parks to build safe rooms or severe weather shelters | +1 | 0 | 0 | +1 | 0 | -1 | 0 | +1 |
| 2,3,4,5,6,7,11,12 | Develop emergency plans for all shelter sites | +1 | 0 | +1 | +1 | 0 | +1 | 0 | +4 |
| 3 | Install new and upgrade existing warning siren systems where needed | +1 | 0 | 0 | +1 | 0 | -1 | 0 | +1 |
| 2,3,4,5,9,12 | Purchase and install backup generators where needed | +1 | 0 | 0 | +1 | 0 | -1 | 0 | +1 |
| 1,7 | Encourage buyouts (acquisitions) of structures located in floodplains and/or repetitive loss properties | 0 | -1 | 0 | +1 | 0 | 0 | 0 | 0 |
| 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 | Maintain, improve and protect public buildings, facilities, and utilities against all hazards | +1 | 0 | 0 | +1 | +1 | -1 | 0 | +2 |
| 1,2,3,7,11,12,13,14,15 | Maintain and improve roads, intersections, bridges, culverts, and ditches as needed | +1 | +1 | 0 | +1 | +1 | 0 | 0 | +4 |
| 2,3,4,5,6 | Update, strengthen, and encourage burial of existing power lines | +1 | 0 | +1 | +1 | 0 | -1 | +1 | +3 |
| 11 | Maintain dam inspections and maintenance | +1 | -1 | 0 | +1 | +1 | -1 | 0 | +1 |
| 1,7,11,14,15 | Make use of codes and zoning tools to regulate construction in unsuitable areas | +1 | 0 | -1 | 0 | 0 | -1 | +1 | 0 |
| 2,3,4,5,6,12,13 | Make use of building codes to ensure adequate structural reinforcement and maintenance | +1 | 0 | -1 | 0 | 0 | -1 | +1 | 0 |
| 1,7 | Encourage compliance in the National Flood Insurance Program (NFIP) | +1 | +1 | 0 | 0 | +1 | 0 | 0 | +3 |
| 1,7 | Survey affected areas during flood events and note repair needs | +1 | -1 | 0 | +1 | +1 | -1 | +1 | +2 |
| 1,7 | Develop watershed studies and implement watershed management plans | +1 | +1 | 0 | 0 | +1 | 0 | +1 | +4 |
| 1,7 | Purchase standby and portable pumps for flood protection | +1 | 0 | 0 | 0 | 0 | -1 | +1 | +1 |
| 1,2,5,7,13 | Improvements to existing storm water and sewer systems | 0 | 0 | 0 | +1 | +1 | -1 | -1 | 0 |
| 1,7 | Pursue the construction of flood protection infrastructure in affected areas | +1 | +1 | 0 | 0 | +1 | 0 | 0 | +3 |
| 3,5,10 | Maintain/increase training and equipment for EMS and firefighters | +1 | -1 | 0 | 0 | +1 | 0 | +1 | +2 |
| 1,3,7,10 | Increase size of the Davis County Fire Departments | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 1,3,7,10 | Increase use of mutual aid from other fire departments | +1 | 0 | +1 | 0 | 0 | -1 | +1 | +2 |
| 10 | Install new dry hydrants in effort to increase fire suppression coverage | +1 | 0 | +1 | +1 | 0 | 0 | 0 | +3 |
| N/A | Purchase Hazmat chemical containment devices for when chemicals are involved | +1 | 0 | 0 | +1 | 0 | -1 | +1 | +2 |
| N/A | Regulate and enforce rules for hazardous material storage facilities | +1 | 0 | +1 | +1 | 0 | -1 | +1 | +3 |
| N/A | Encourage communities to continue HAZ-MAT agreements and support regional HAZ-MAT teams | +1 | 0 | +1 | 0 | 0 | -1 | +1 | +2 |

| | | | | | | | | | |
|----------------------|---|----|----|----|----|----|----|----|----|
| 1,2,3,4,5,6,7,12 | Provide a backup communications system including satellite phones and handheld PRS walkie-talkies | +1 | +1 | 0 | 0 | +1 | -1 | 0 | +2 |
| 1,2,3,5,7,9,12 | Encourage citizens to create family preparedness kits to be used in case of an emergency | +1 | 0 | +1 | +1 | 0 | 0 | 0 | +3 |
| N/A | Encourage citizen use of Iowa 1 Call | +1 | 0 | 0 | +1 | +1 | 0 | 0 | +3 |
| 15 | Initiate system to inventory locations of sinkholes and abandoned wells/mines | 0 | -1 | 0 | +1 | 0 | 0 | 0 | 0 |
| 11 | Continue to maintain Lake Fisher as a backup water resource | 0 | 0 | +1 | +1 | 0 | -1 | -1 | 0 |
| 1,2,3,5,7,9,10,11,12 | Prepare evacuation plans for community facilities | +1 | 0 | 0 | 0 | 0 | 0 | 0 | +1 |
| | Develop a post-disaster building inspection plan | +1 | +1 | 0 | 0 | 0 | 0 | +1 | +3 |
| 1,2,3,6,10 | Develop procedures for effective operation of Code Red | +1 | 0 | +1 | +1 | +1 | +1 | 0 | +5 |

Hazards:

- | | |
|------------------------------|---------------------|
| 1. River Flooding | 11. Dam Failure |
| 2. Severe Winter Storm | 12. Earthquake |
| 3. Tornado | 13. Expansive Soils |
| 4. Windstorm | 14. Landslide |
| 5. Thunderstorms & Lightning | 15. Sinkholes |
| 6. Hailstorm | |
| 7. Flash Flood | |
| 8. Drought | |
| 9. Extreme Heat | |
| 10. Grass/Woodland Fire | |

Appendix D - Adoption Resolutions

Davis County Multi Jurisdiction Hazard Mitigation Plan

Addendum

Participants in the Planning Process

Rosa Archer – Pulaski Council
John Arnold – ADLM Emergency Mgmt
Russell Bales – Floris Council
Trent Barker – Floris Fire Dept.
Bill D. Bassett – Drakesville Council
Darian Bengé – Floris Council
Robert Bengé – Floris Council
Logan Boas – Drakesville resident
Angie Breeding – Pulaski FD
Jeremy Breeding – Pulaski FD
Caroline Brown – Floris Mayor
Wyomia Brown – Floris City Clerk
Andre Chickering – Drakesville resident
Davida Chickering – Drakesville resident
Betty Covert – Floris resident
Bill Covert – Floris resident
Bonnie Davis – Floris Council
Dave Davis – Davis Co Sherrif
Lynn Fellingner – Davis Co Hospital
Kyle Garmon – Pulaski FD
Linda Gittins – Pulaski City Clerk
Dean Graham – Pulaski Fire Dept.
Jeff Graves – Davis Co High School Principal
Teri Hanna – Davis Co Hospital
Danny Harris – Pulaski Mayor
Maxine Harward – Floris Council
Robert Hasz – GESAC Representative
Gordon Hawles – Floris FD
Ted Henderson – Bloomfield Engineer
Donnie Herteen – ADLM Emergency Mgmt.
Ross Hunter – Pulaski City Council
Dan Hutchings – Bloomfield resident
Ralph Hopkins – Bloomfield resident
Sandy Jones – Bloomfield Deputy Clerk
Mike Lamb – ADLM Emergency Mgmt.
Tiffany Lindley – Drakesville resident
Dan Maeder – Davis Co Schools Superintendent
Katherine Main – Davis Co Dispatch
Jason Marks – Floris resident
Mary Marks – Floris resident
Jeff McClure – Bloomfield Fire Chief
G. Brad McKee – Drakesville Council
Chris Miller – Bloomfield Mayor
Dwight Miller – Floris Council
Karen Miller – Pulaski City Council
Rhonda Northup – Davis County Hospital Home
& Community Health
Josh O’Dell – Davis Co Sherrifs office
Steve Park – Davis Co Hwy Dept.
Edward Reese Jr. – GESAC Representative
Dan Roberts – Davis Co Schools
Karen Rudd – Drakesville Council
Robert Sampson – Drakesville Mayor
Ryan Schock – Davis Co Secondary Roads
Sharon Sines – Drakesville Council
Dolores Smith – Drakesville Council
Dean Stocker – Drakesville resident
Mary Stocker – Drakesville City clerk
Vicki Sullivan – Davis Co Dispatch
Harley Tapley – Drakesville resident
Carol Taylor – Bloomfield Clerk
Dale Taylor – Davis Co Supervisor
Brian Thomas – Drakesville Fire
Chief/Councilman
Vicky Thomas – Drakesville Council
Tanner Vitko – ADLM Emergency Mgmt.
Don Whisler – Pulaski resident
Forrest Woods – Pulaski Public Works
Jack Woolard – Bloomfield City Council
Leon Wright – Pulaski resident
Sheryl Wright – Pulaski Council
Ken Wutherich – Davis Co School Board