# CONTRIBUTORS

## Scotland County Hazard Mitigation Planning Committee

### Jurisdictional Representatives

| Name | | Title | Department | Jurisdiction/Agency/Organiz |
|---|---|---|---|---|
| Duane | Ebeling | Presiding Commission | Commission | Scotland County |
| David | Wiggins | Associate Commissioner | Commission | Scotland County |
| Danette | Clatt | Associate Commissioner | Commission | Scotland County |
| Alan | Creek | City Administrator | Administration | City of Memphis |
| Angela | Newman | City Clerk | Administration | City of Memphis |
| Twila | Stevenson | City Clerk | Administration | Village of Arbela |
| Carol | McCaba | Trustee | Administration | Village of Rutledge |
| Dale | Halderman | Mayor | Administration | Village of Rutledge |
| Ryan | Burgeson | Superintendent | Administration | Scotland County R-1 |

### Stakeholder Representatives

| Name | | Title | Department | Agency/Organization |
|---|---|---|---|---|
| Amy | Crawford | Area Engineer | Transportation | Missouri Department of Transportation |
| Lisa | Doster | County Engagement Specialist | Administration | MU Extension |
| Randy | Tobler | CEO | Health Care | Scotland County Hospital |
| Dorsey | Swaringen | President | Utility | CPWSD#1 |
| Cole | Trippett | General Manager | Utility | Tri-County Electric Co-Op |

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# EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Scotland County and participating jurisdictions and school/special districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazard events to the County and its communities and school/special districts. The plan is an update of a plan that was approved on April 21, 2015. The plan and the update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to result in eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

The Scotland County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following jurisdictions that participated in the planning process:

- Unincorporated Scotland County
- City of Memphis
- Village of Arbela
- Village of Rutledge
- Scotland County R-I School District

City of South Gorin and Village of Granger was invited to participate in the planning process but did not meet all of the established requirements for official participation. When the future five-year update is developed for this plan, City of South Gorin and Village of Granger will be invited again to participate.

Scotland County and the entities listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on April 21, 2015 (hereafter referred to as the *2015 Hazard Mitigation Plan*). This current planning effort serves to update that previously approved plan.

The plan update process followed a methodology in accordance with FEMA guidance, which began with the formation of a Mitigation Planning Committee (MPC) comprised of representatives from Scotland County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Scotland County and analyzed jurisdictional vulnerability to these hazards. The MPC also examined the capabilities in place to mitigate the hazard damages, with emphasis on changes that have occurred since the previously approved plan was adopted. The MPC determined that the planning area is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Riverine and flash flooding, winter storms, severe thunderstorms/hail/lightning/high winds, and tornadoes are among the hazards that historically have had a significant impact.

Based upon the risk assessment, the MPC updated goals for reducing risk from hazards. The goals are listed below:

1. Public Awareness- Using a variety of communications avenues to increase the citizens awareness of and promote education about the natural hazards that they may face, vulnerability to these hazards, and how to lessen the effect of future natural hazards.

2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of natural hazards.

3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

To advance the identified goals, the MPC developed recommended mitigation actions, as summarized in the table on the following pages. The MPC developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more. These additional details are provided in Chapter 4.

## Table I. Mitigation Action Matrix

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| Scotland County 2020.2 | Implement flood mitigation activities to eliminate effects on Scotland County residents | Scotland County | High | 3 | Flooding | ✓ | ✓ | |
| Scotland County 2020.3 | Installation or upgrade of warning siren in areas of the County needing a siren or one upgraded | Scotland County | Medium | 3 | All Hazards | ✓ | | |
| Scotland County 2020.4 | Maintain Transportation Infrastructure | Scotland County | High | 3 | Flooding, Severe Thunderstorms, Winter Weather | ✓ | | |
| Scotland County 2020.5 | Response to Pandemic | Scotland County | Medium | 2 | Pandemic | ✓ | ✓ | |
| Scotland County 2020.6 | Safe Room and Storm Shelters | Scotland County | High | 3 | Tornado, Severe Thunderstorm | ✓ | | |
| Scotland County 2020.7 | Generator for Shelter (s) | Scotland County | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| Scotland County 2020.8 | Emergency Operations Center | Scotland County | Low | 3 | All Hazards | ✓ | ✓ | |
| City of Memphis 2020.1 | Generator for Shelter (s) | Memphis | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| City of Memphis 2020.2 | Maintain Transportation Infrastructure | Memphis | High | 3 | Flooding, Severe Thunderstorm, Winter Storms | ✓ | | |
| City of Memphis 2020.3 | Installation/Upgrade Siren | Memphis | Medium | 3 | All Hazards | ✓ | | |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |
| Village of Arbela 2020.1 | Installation Upgrade Sirens | Arbela | High | 3 | All Hazards | ✓ | | |
| Village of Arbela 2020.2 | Maintain Transportation Infrastructure | Arbela | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Arbela 2020.3 | Safe Rooms and Storm Shelters | Arbela | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.1 | Installation/Upgrade Sirens | Rutledge | High | 3 | All Hazards | ✓ | | |
| Village of Rutledge 2020.2 | Maintain Transportation Infrastructure | Rutledge | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Rutledge 2020.3 | Safe Rooms and Storm Shelters | Rutledge | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |
| Scotland County R-1 2020.1 | Build Safe Room | Scotland County R-1 | High | 3 | Tornado, Severe Thunderstorms, Earthquake | ✓ | | |
| Scotland County R-1 2020.2 | Upgrade intercom system | Scotland County R-1 | Medium | 3 | Tornado, Severe Thunderstorm, Earthquake | ✓ | | |

# PREREQUISITES

**44 CFR requirement 201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.**

This plan has been reviewed by and adopted with resolutions or other documentation of adoption by all participating jurisdictions and schools/special districts. The documentation of each adoption is included in Appendix C, and a model resolution is included on the following page.

The jurisdictions listed in the Executive Summary participated in the development of this plan and have adopted the multi-jurisdictional plan.

## Model Resolution

(*LOCAL GOVERNING BODY/SCHOOL DISTRICT*), Missouri RESOLUTION NO. _____

A RESOLUTION OF THE (*LOCAL GOVERNING BODY /SCHOOL DISTRICT*) ADOPTING THE (*PLAN NAME*)

WHEREAS the (*local governing body/school district*) recognizes the threat that natural hazards pose to people and property within the (local governing body/school district); and

WHEREAS the (*local governing body/school district*) has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the (*plan name*), hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the *Plan* identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the *(local governing body/school district*) from the impacts of future hazards and disasters; and

WHEREAS the (*local governing body*) recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the (*local governing body/school district*) will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the (*local governing body/school district*) demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE (*LOCAL GOVERNMENT/SCHOOL DISTRICT*), in the State of Missouri, THAT:

In accordance with (*local rule for adopting resolutions*), the (*local governing body/school district*) adopts the final *FEMA-approved Plan*.

ADOPTED by a vote of_____in favor and__against, and__abstaining, this_____day of _____,_____.

By (Sig): _____
Print name: _____

ATTEST:
By (Sig.): _____
Print name: _____

APPROVED AS TO FORM:
By (Sig.): _____
Print name: _____

# 1 INTRODUCTION AND PLANNING PROCESS



## 1.1 PURPOSE

Hazard mitigation is “any actions taken to reduce or eliminate the long-term risk to human life and property from natural hazards”. We understand that hazard events will continue to occur, and at their worst can result in death and destruction of property and infrastructure. The work done to minimize the impact of hazard events to life and property is called hazard mitigation. Scotland County and the participating jurisdictions, and school districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazards.

- The County of Scotland, City of Memphis, Village of Arbela, Village of Rutledge, Scotland County R-I School District, adopted the plan as a Prerequisite for mitigation grant eligibility and cite the current legislation authorizing plan development.

- City of South Gorin and Village of Granger will not be eligible for grant funding due to their lack of participation and plan adoption.

## 1.2 BACKGROUND AND SCOPE

This plan is a 5-year update of a plan that was approved in April 21, 2015. The plan and update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to result in the eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant programs.

- Following is a list of participants in both the previous plan as well as the current plan: County of Scotland, City of Memphis, Village of Arbela, Village of Rutledge, and Scotland County R-I School District.

- City of South Gorin and Village of Granger chose not to participate in the plan update.

In addition to securing Hazard Mitigation Grant Funding eligibility, the plan is useful for incorporating hazard mitigation planning and principals into other documents, such as zoning regulations and land use plans.

## 1.3 PLAN ORGANIZATION

Below is the outline of the plan.

- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
  Appendices

Table 1.1 provides details on the changes made in the plan update.

**Table 1.1. Changes Made in Plan Update**

| Plan Section | Summary of Updates |
|---|---|
| **Chapter 1 - Introduction and Planning Process** | Updated members of the Mitigation Planning Committee (MPC) and participating jurisdictions formally adopted the MPC. |
| **Chapter 2 - Planning Area Profile and Capabilities** | Noted new GIS capabilities for participating jurisdictions. |
| **Chapter 3 - Risk Assessment** | Combined extreme heat and extreme cold into one hazard: extreme temperatures. |
| **Chapter 4 - Mitigation Strategy** | The mitigation category of each action was added to the action worksheets. |
| **Chapter 5 - Plan Implementation and Maintenance** | Updated MPC meetings for evaluating and updating the plan to quarterly. |

## 1.4 PLANNING PROCESS

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

Scotland County Commissioners contracted with the Northeast Missouri Regional Planning Commission (NMRPC) to facilitate the update of the multi-jurisdictional, local hazard mitigation plan. In fulfillment of this role, the NMRPC:

- Assisted in establishing a Mitigation Planning Committee (MPC) as defined by the

Disaster Mitigation Act (DMA)

- Ensured the updated plan met the Disaster Mitigation Assistance requirements as established by federal regulations and followed the most current planning guidance of the Federal Emergency Management Agency (FEMA)
- Facilitated the entire plan development process,
- Identified the data the MPC participants could provide and conducted the research and documentation necessary to augment the data,
- Assisted in the soliciting public input,
- Produced the draft and final plan update in a FEMA-approvable document, Coordinate the Missouri State of Emergency Management Agency (SEMA) and (FEMA) plan reviews.

**Table 1.2. Jurisdictional Representatives of Scotland County Mitigation Planning Committee**

| Name | | Title | Department | Jurisdiction/Agency /Organization |
|---|---|---|---|---|
| Duane | Ebeling | Presiding Commission | Commission | Scotland County |
| David | Wiggins | Associate Commissioner | Commission | Scotland County |
| Danette | Clatt | Associate Commissioner | Commission | Scotland County |
| Alan | Creek | City Administrator | Administration | City of Memphis |
| Angela | Newman | City Clerk | Administration | City of Memphis |
| Twila | Stevenson | City Clerk | Administration | Village of Arbela |
| Carol | McCaba | Trustee | Administration | Village of Rutledge |
| Dale | Halderman | Mayor | Administration | Village of Rutledge |
| Ryan | Burgeson | Superintendent | Administration | Scotland County R-1 |

**Table 1.3** demonstrates each member's expertise in the six mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects and Public Information).

**Table 1.3 MPC Capability with Six Mitigation Categories**

| Community Department/Office | Prevention | Structure and Infrastructure Projects | | Natural Systems Protection | Education and Awareness Programs | Emergency Services |
|---|---|---|---|---|---|---|
| | | Property Protection | Structural Flood Control Projects | | | |
| County Commission | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| EMD | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| County Public Works | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Public Safety | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| City Clerk | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Building Official | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| City Administrator | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mayor | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| School Administration | ✓ | ✓ | | ✓ | ✓ | ✓ |

### 1.4.1 Multi-Jurisdictional Participation

**44 CFR Requirement §201.6(a)(3): Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.**

Hazard mitigation is defined as "sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards" and its purpose is to lessen the negative impact of a disaster on community's economic, social and environmental well-being.

Outreach programs the increase the public' awareness of hazard risks, projects to protect critical facilities and the removal of structures from flood hazard areas are all examples of mitigation actions. Local mitigation actions and concepts can also be incorporated into land use plans and building codes.

Locals governments have the responsibility to protect the health, safety, and welfare of their citizens. Proactive mitigation policies and actions help to reduce risk and create safer, more disaster-resilient communities. Mitigation is an investment in a community's future safety and sustainability by facilitating:

- The protection of public safety and prevention of loss of life and injury.
- The reduction of harm to existing and future development
- The prevention of damage to a community's unique assets

The importance of active public participation in such an endeavor is obvious but can be difficult to obtain reality. Nowhere is difficulty more apparent than in small rural communities like those in Northeast Missouri. The County of Scotland, City of Memphis, Village of Arbela, Village of Rutledge, Scotland County R-I School District participated in all elements of the planning process. City of South Gorin and Village of Granger did not complete the Data Collection Questionnaire or submit Action items.

Local government jurisdictions were invited to participate in the planning process via email and in many cases follow up phone calls and personal visits. (Appendix B – public documentation). Committee members were placed on a contact list featuring email and contact information. They were also directed to the Northeast Missouri Regional Planning webpage.

Jurisdictions that were presented with a multi-jurisdictional plan are required to participate in the planning process and formally adopt the plan. The County of Scotland, City of Memphis, Village of Arbela, Village of Rutledge, Scotland County R-I School District, participated in the plan update by meeting minimal requirements as described in the next paragraph. Each participating jurisdiction has formally adopted the mitigation plan.

Minimum participation requirements included:

- Designation of a representative to serve on the MPC
- Provision of sufficient information to support plan development by completion and return of Data Collection Questionnaires and validating/correcting critical facility inventories
- When applicable provide progress reports on mitigation actions from previously approved plan and identify additional mitigation actions plan
- Eliminate from further consideration those actions from the previously approved plan

that were not implemented because they were impractical, inappropriate, not cost-effective, or were otherwise not feasible
- Review and comment on plan drafts
- Provide documentation to show time donated to the planning effort (if a FEMA planning grant was awarded to the county); and
- Formally adopt the mitigation plan prior to submittal to SEMA and FEMA for final approval.

The County of Scotland, City of Memphis, Village of Arbela, Village of Rutledge, Scotland County R-I School District, met the participation requirements.

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**Table 1.4. Jurisdictional Participation in Planning Process**

| Jurisdiction | Planning Meeting | Data Collection Questionnaire Response | Update/Develop Mitigation Actions |
|---|---|---|---|
| Unincorporated Scotland County | ✓ | ✓ | ✓ |
| City of Memphis | ✓ | ✓ | ✓ |
| City of South Gorin | | | |
| Village of Arbela | ✓ | ✓ | ✓ |
| Village of Granger | | | |
| Village of Rutledge | ✓ | ✓ | ✓ |
| Scotland County R-I School | ✓ | ✓ | ✓ |

## 1.4.2 The Planning Steps

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**Table 1.5. Scotland County Mitigation Plan Update Process**

| Community Rating System (CRS) Planning Steps (Activity 510) | Local Mitigation Planning Handbook Tasks (44 CFR Part 201) |
|---|---|
| Step 1. Organize | Task 1: Determine the Planning Area and Resources |
| | Task 2: Build the Planning Team 44 CFR 201.6(c)(1) |
| Step 2. Involve the public | Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(1) |
| Step 3. Coordinate | Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3) |
| Step 4. Assess the hazard | Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii) |
| Step 5. Assess the problem | |
| Step 6. Set goals | Task 6: Develop a Mitigation Strategy |

| | |
|---|---|
| Step 7. Review possible activities | 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii) |
| Step 8. Draft an action plan | |
| Step 9. Adopt the plan | Task 8: Review and Adopt the Plan |
| Step 10. Implement, evaluate, revise | Task 7: Keep the Plan Current |
| | Task 9: Create a Safe and Resilient Community<br>44 CFR 201.6(c)(4) |

## *Step 1: Organize the Planning Team*
***(Handbook Tasks 1, 2, and 4)***

**Table 1.6. Schedule of MPC Meetings**

| Meeting | Topic | Date |
|---|---|---|
| Planning Participation | Every local jurisdiction was contacted by email and phone calls to discuss the planning process and importance of participation | February- August |
| Planning Meeting | Purpose, process, planning area, building a team, participation, requirements, public outreach, data collection questionnaires, discussion of hazards risk assessment, review of draft plan, plan maintenance, discussion of adoption and submission to SEMA/FEMA. | October 8, 2020 |

On February 5, 2020 NMRPC staff meet with the Scotland County Commissioners to begin the planning process. On October 8, 2020 a Planning meeting was held for the Scotland County Plan Update. Local jurisdictions were notified by e-mail and letter of the Planning meeting and personal phone calls were made to promote attendance at the Planning meeting. Agenda for the Planning meeting is included in Appendix B as well as the minutes for the Planning meeting.

## *Step 2: Plan for Public Involvement*
***(Handbook Task 3)***

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.**

The Planning meeting agenda is included in Appendix B which includes discussion, minutes, signature sheet and copies of the handouts. As stated in the minutes, the participants felt a survey tool would not be effective and chose to solicit public involvement at the local level as they would be key contacts for obtaining public comment. A press release inviting the public to participate in

the plan update was in the Scotland County newspaper. Public notice was also posted on the Northeast Missouri Regional Planning Commission website and Facebook pages, a notice was posted at the County Courthouse.

No public comments were received which is characteristic for the area. The public in Scotland County typically does not become active in planning activities such as plan development or updates.

**Step 3: Coordinate with Other Departments and Agencies and Incorporate Existing Information (Handbook Task 3)**

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

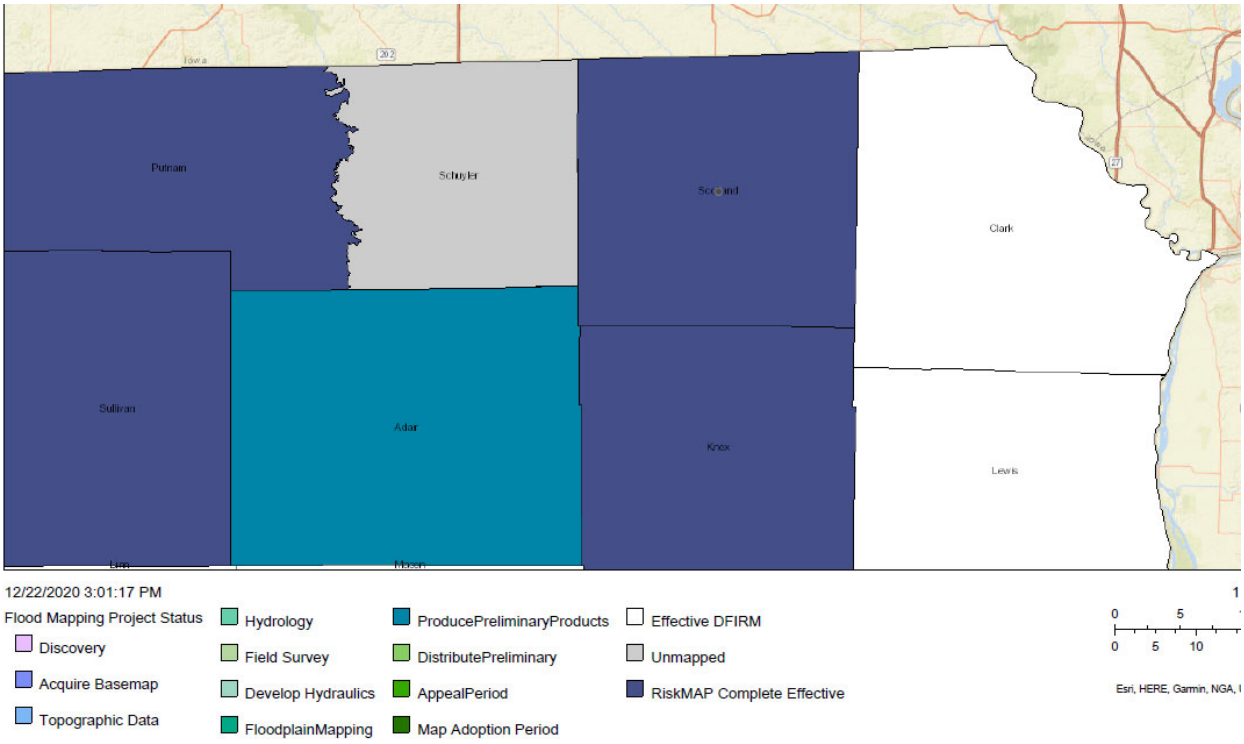
The Scotland County stakeholders were sent an invitation to review the updated plan and provide their input. Stakeholders invited to participate include police departments, fire departments, nursing homes, economic developer, Missouri Department of Natural Resources, Missouri Department of Transportation, water districts and ambulance districts. Neighboring communities were informed of the Scotland County plan update and was invited to offer input to the plan as they see fit. No comments were received from the stakeholders during the planning process.

**Stakeholder Representatives**

| Name | Title | Department | Agency/Organization |
|---|---|---|---|
| Amy Crawford | Area Engineer | Transportation | Missouri Dept. of Transportation |
| Lisa Doster | County Engagement Specialist | Administration | MU Extension |
| Randy Tobler | CEO | Health Care | Scotland County Care Center |
| Dorsey Swaringen | President | Utility | CPWSD#1 |
| Cole Tippet | General Manager | Utility | Tri-County Electric Co-Op |

## Coordination with FEMA Risk MAP Project

**Figure 1.1. Risk MAP Study Status Map**




## Integration of Other Data, Reports, Studies, and Plans

Other documents critical to the formation of the plain include, mitigation plan of the state and adjacent counties, reports from university extensions, Flood Insurance Studies (FIS), Flood Insurance Rate Maps (FIRMs), State Department of Natural Resources (DNR) dam information, the National Inventory of Dams (NID), dam inspection reports, state fire reports, Wildland /Urban Interface and Intermix areas from the SILVIS Lab-Department of Forest Ecology and Management – University of Wisconsin, local comprehensive plans, economic development plans, capital improvement plans, US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics, and local budgets.

Examples of information that was incorporated into the plan include: - FEMA FIRM maps – DNR dam inspection reports – County Master Plan: future growth trends SEMA's Arc GIS helped with mapping for hazards – State Hazard Mitigation Plan – building counts and content exposure – American Factfinder and 2017 American

Community serve, demography.

## *Step 4 Assess the Hazard: Identify and Profile Hazards*
***(Handbook Task 5)***

At the October 8, 2020 Planning meeting MPC profiled their hazards which was accomplished by reviewing:

- previous disaster declarations in the county
- hazards in the most recent State Hazard Mitigation Plan
- hazards identified in the previously approved hazard mitigation plan.

The results of this process can be reviewed in Section 4 of this document. Data Collection Questionnaires from the previous plan update were disseminated to jurisdictions in attendance. Participants were requested to review and update the Questionnaires during the Planning meeting.

## *Step 5: Assess the Problem: Identify Assets and Estimate Losses*

***(Handbook Task 5)***

Assets were identified with demographic data from the US Census, Census of Agriculture, GIS Structure data, Data Collection Questionnaires and information from the NMRPC.

All loss estimates could not be provided due to lack of information provided by participating Jurisdictions. MPC members could not ascertain the value of building in the community, thus the information was not provided.

## *Step 6: Set Goals*
***(Handbook Task 6)***

The MPC reviewed the goals from the previously approved plan at the Planning meeting and accepted the updated goals:

1. Public Awareness- Using a variety of communications avenues to increase the citizens awareness of and promote education about the natural hazards that they may face, vulnerability to these hazards, and how to lessen the effect of future natural hazards.

2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of future natural hazards.

3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

## *Step 7: Review Possible Mitigation Actions and Activities*
***(Handbook Task 6)***

As part of the Planning meeting, members were asked to review the mitigation strategy from the previously approved plan and note changes and update as it pertains to their individual jurisdictions. Committee members were requested to address progress (or lack thereof) on previously identified actions in the previously approved plan. MPC members were encouraged to continue forward only those actions that substantively address long-term mitigation solutions to the risk identified in the risk assessment.

There were virtually no changes to any of the risk assessment in the plan. The MPC used the STAPLEE method to analyze and prioritize proposed actions. Members were provided a copy of the FEMA publication Mitigation Ideas – A Resource for Reducing Risk to Natural Hazard at the Planning meeting.

### *Step 8: Draft an Action Plan*
***(Handbook Task 6)***

The action worksheets, including the plan for implementation, submitted by each jurisdiction for the updated Mitigation Strategy are included in Chapter 4.

## *Step 9: Adopt the Plan*
***(Handbook Task 8)***

After the majority of the draft plan was composed, adoption resolution examples were given to the jurisdictional representatives and requested for adoption by whatever tools their jurisdictions utilize for such activities.

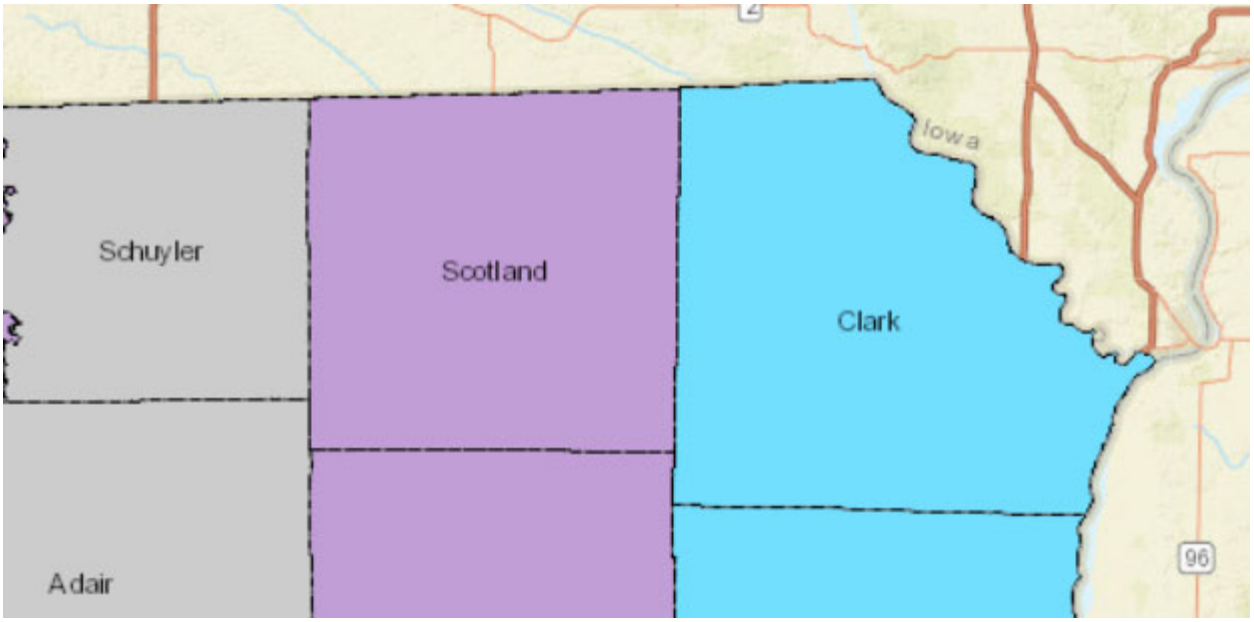
## *Step 10: Implement, Evaluate, and Revise the Plan*
***(Handbook Tasks 7 & 9)***

Part of the plan draft development included an outline of plan maintenance (Chapter 5) and was discussed and accepted by the MPC at the Planning meeting. This process includes reviews annually and in the wake of any significant hazard event, as well as provisions for the five-year update process.

# 2 PLANNING AREA PROFILE AND CAPABILITIES

## 2.1 SCOTLAND COUNTY PLANNING AREA PROFILE

**Figure 2.1 Map of Scotland County**




Scotland County location is in the northeastern portion of the U.S. State of Missouri. As of the 2010 Census, the population was 4,843, making it the fifth-least populous county in Missouri. The county seat is Memphis. The county was organized January 29, 1841, and named for Scotland.

## Geography, Geology and Topography

Scotland County has a total of 439 square miles, of which 437 square miles is land and 2.6 square miles is water.

The County is a mix of residents living in unincorporated and incorporated areas. The City of Memphis is the largest with a population of 1,860, Village of Arbela has a population of 42 residents, Village of Rutledge has 111 residents as of the 2018 American Community Survey. The remaining residents live in the unincorporated areas.

Scotland County is a rural area with the primary land used for farming. The Fabius River watershed covers a large portion of Scotland County.

## Climate

Scotland County gets an average of 38 inches of rain per year. The average snowfall is 19 inches per year. On average there are 197 sunny days per year. The average high temperature is 63 degrees, and the average low is 44 degrees. The average low in January is 27 degrees and in July the average temperature is 77 degrees.

## Population/Demographics

Table 2.1 provides the populations for each city, village, and the unincorporated county for 2000, 2010, and latest population estimates or American Community Survey with the number and percentage change. The unincorporated area population can be estimated by subtracting the populations of the incorporated areas from the overall county population.

**Table 2.1. Scotland County Population 2000-2010 by Jurisdiction**

| Jurisdiction | 2000 Population | 2010 Population | 2018 Annual Population Estimate or ACS Population | # Change (2010-2018) | % Change (2010-2018) |
|---|---|---|---|---|---|
| Unincorporated Scotland County | 2,767 | 2,901 | 2,885 | 18 | .65% |
| City of Memphis | 2,061 | 1,822 | 1,860 | 38 | 2.22% |
| Village of Arbela | 41 | 41 | 42 | 1 | 2.44% |
| Village of Rutledge | 103 | 109 | 111 | 2 | 1.95% |
| Total | 4,972 | 4,873 | 4,898 | 29 | .06% |

Source: U.S. Bureau of the Census, Decennial Census, annual population estimates/ 5-Year American Community Survey 2018;
*population includes the portions of these cities in adjacent counties

**Table 2.2. Scotland County Population Under 5 and Over Age 65, 2010 Census Data**

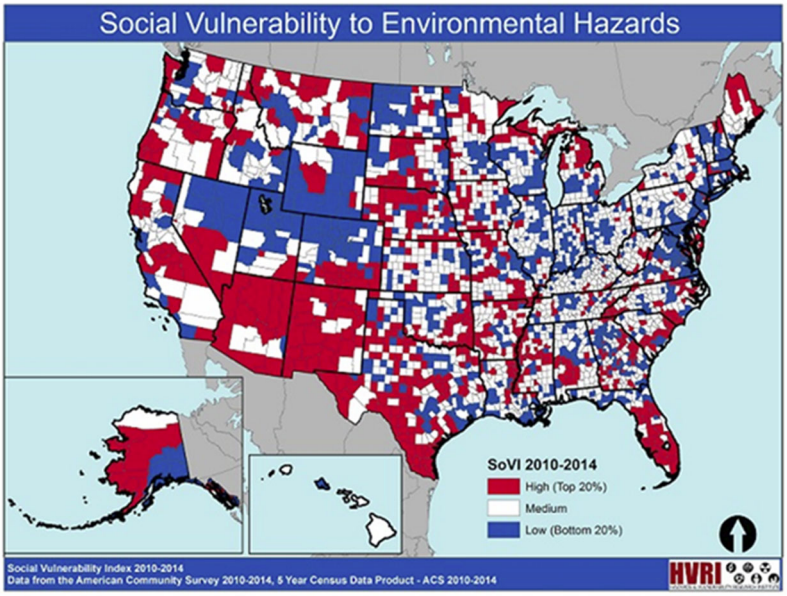
| Jurisdiction | Population Under 5 Years | Population 65 Years and Over |
|---|---|---|
| Unincorporated Scotland County | 465 | 883 |
| City of Memphis | 145 | 493 |
| Village of Arbela | 0 | 5 |
| Village of Rutledge | 58 | 37 |

Source: US Census Bureau

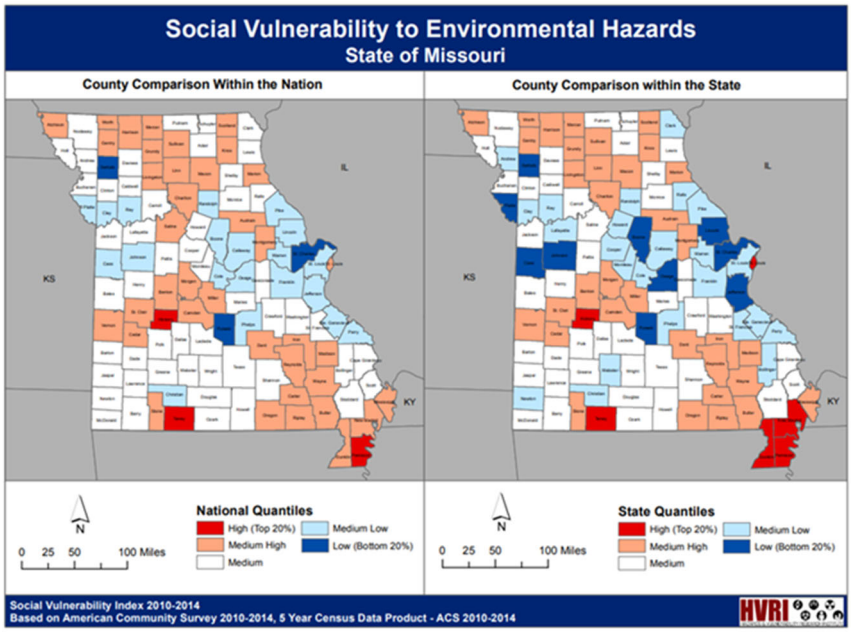
According to the 2010 Census Data, 6.6% of the County's population is under the age 5. This is slightly higher than the State of Missouri at 6.1% and 6.2% for the Nation. The 2010 Census Data shows 12.7% of Scotland County's population was 65 years or older. The National percentage is 35.8% and the State of Missouri percentage is 7.4%.

The University of South Carolina developed an index to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 29 socioeconomic variables which research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI ® data sources include primarily those from the United States Census Bureau.

**Figure 2.2 SoVI for Scotland County**




Source: http://artsandsciences.sc.edu/geog/hvri/sovi%C2%AE-0




Source:http://artsandsciences.sc.edu/geog/hvri/sites/sc.edu.geog.hvri/files/attachments/MO_1014.pdf

A low number means that the county is more resilient to hazard events, and a high number means the county is less resilient. Scotland County has a medium high rating.

**Table 2.3. Unemployment, Poverty, Education, and Language Percentage Demographics, Scotland County, Missouri**

| Jurisdiction | Total in Labor Force | Percent of Population Unemployed | Percent of Families Below the Poverty Level | Percentage of Population (High School graduate) | Percentage of Population (Bachelor's degree or higher) | Percentage of population with spoken language other than English |
|---|---|---|---|---|---|---|
| Unincorporated Scotland County | 3654 | 24% | 15.8% | 99.1% | 13.8% | 9.2% |
| City of Memphis | 868 | .42% | 18.2% | 88.9% | 15.9% | 1.5% |
| Village of Arbela | 25 | 0% | 3.2% | 90% | 0% | 0% |
| Village of Rutledge | 50 | 0% | 0% | 100% | 0% | 0% |
| State of Missouri | 6,126,452 | 4.9% | 13.1% | 91.1% | .3% | 4.2% |
| Nation | 327,167,439 | 4.9% | 13.1% | 88.3% | 32.6% | 30.6% |

Source: U.S. Census, 2018 American Community Survey, 5-year Estimates.

## History

Scotland County was organized by an act of the Missouri General Assembly on January 29, 1841. At first its boundaries contained all the land now known as Knox County as well, but another act by the General Assembly in 1843 divided it off. Stephen W. B. Carnegy suggested that the county be named after his native country of Scotland. He also gave several settlements in the area Scottish names.

The first white settlement in Scotland County was in 1833 by brothers Levi and George Rhodes and their families near a location known as "Sand Hill". Sand Hill was in the southern part of the county, about twelve miles from present-day Memphis. A general store was opened there around 1835 by James I. Jones, who also served as Scotland County's first sheriff.

Slavery, while never as prevalent in Scotland County as in others further south in the state's Little Dixie region, did exist from the county's earliest days. Robert T. Smith brought the first slaves, a group of three, to the county in 1834. In 1850 Scotland County had 157 slaves or other "non-free people of color". However, by the 1860 census that number was reduced to 131.

Farming was the primary economic lifeblood of Scotland County from its earliest times. Once the stands of timber were cleared and the tough prairie grass was plowed aside, settlers found rich soil. Between 1850 and 1880 the number of farms in the county grew from 334 to 1,994. The value of the farmland, in 1880 dollars, was over $3.72 million. Corn was the major cash crop, followed by oats, wheat, and potatoes.

Scotland County was the scene of three notable engagements during the Civil War. The first happened at Etna on July 21, 1861. The 1st Northeast Missouri Home Guards under Colonel David Moore with assistance of additional units from Iowa and Illinois attacked pro-Confederate Missouri State Guard (MSG) forces using Etna as a training and resupply point. The action was part of General Nathaniel Lyon's efforts to clear "rebels" from rural Missouri. After a brief battle the MSG forces, mostly lightly armed cavalry, were driven from the town and surrounding areas of Scotland County and Moore's unit returned to its main base at Athens, Missouri.

On July 13, 1862 Confederate Colonel Joseph C. Porter approached Memphis, Missouri in four converging columns totaling 125–169 men and captured it with little or no resistance. They first

raided the Federal armory, seizing about a hundred muskets with cartridge boxes and ammunition, and several uniforms. The Confederate rounded up all adult males, who were taken to the courthouse to swear not to divulge any information about the raiders for forty-eight hours. Porter freed all militiamen and suspected militiamen to await parole, a fact noted by champions of his character. Citizens expressed their sympathies variously; Porter gave safe passage to a physician, an admitted supporter of the Union, who was anxious to return to his seriously ill wife. A verbally abusive woman was threatened with a pistol by one of Porter's troops, perhaps as a bluff. Porter's troops entered the courthouse and destroyed all indictments for horse theft; the act is variously understood as simple lawlessness, intervention on behalf of criminal associates, or interference with politically motivated, fraudulent charges.

At Memphis, a key incident occurred which would darken Colonel Porter's reputation, and which his detractors see as part of a consistent behavioral pattern which put him and his men beyond the norms of warfare. According to the "History of Shelby County," which is generally sympathetic to Porter, "Most conceded that Col. Porter's purpose for capturing Memphis, MO. was to seize Dr. Wm. Aylward, a prominent Union man of the community." Aylward was captured during the day by Captain Tom Stacy's men and confined to a house. Stacy was generally regarded as a genuine mean people, with his company called "the chain gang" by the other members of Porter's command due to their behavior. After rousing Doctor Aylward overnight and removing him from his home, ostensibly to see Porter, guards claimed that he escaped. However, witnesses reported the sounds of a strangling, and his body was found the next day, with marks consistent with hanging or strangulation. Supporters of Porter attribute the murder of Aylward to Stacy. However, a Union gentleman who came to inquire about Aylward and a captured officer before the discovery of the body stated that when he asked Porter about Aylward, the response was, "He is where he will never disturb anybody else."

The next engagement in the county took place on July 18, 1862. Union Colonel (later General) John McNeil had been pursuing Porter and his forces across northeast Missouri for some time. When hearing of the capture of Memphis, McNeil sent a detachment of three companies (C, H, and I), about three hundred men, of Merrill's Horse under Major John Y. Clopper from Newark, Missouri to rescue the town. Colonel Porter and his Confederate forces, their strength estimated at anywhere between one hundred twenty-five men to upwards of six hundred, planned to ambush the Federals. This would become known as the "Battle of Vassar Hill" in the *History of Scotland County.* Porter himself called it "Oak Ridge," and Federal forces called it "Pierce's Mill". By whatever name, it happened approximately ten miles southwest of Memphis on the south fork of the Middle Fabius River.

Porter's men were concealed in brush and stayed low when the Federals stopped to fire prior to each charge. Porter's men held their fire until the range was very short, increasing the lethality of the volley. Clopper was in the Federal front, and out of 21 men of his advance guard, all but one were killed or wounded. The Federals made at least seven mounted charges doing little but adding to the body count. A battalion of roughly 100 men  of the 11th Missouri State Militia Cavalry under Major Rogers arrived and dismounted. While Clopper claimed to have driven the enemy from the field after this, eyewitness Dr. Joseph Mudd said that the Union troops instead fell back and ended the engagement leaving Porter in possession of the field until he withdrew. Clopper's reputation suffered as a result of his poor tactics. Before the final charge one company officer angrily asked, "Why don't you dismount those men and stop murdering them?"  Union casualties were about 24 killed and mortally wounded (10 from Merrill's Horse and 14 from the 11th MSM Cavalry), and perhaps 59 wounded (24 from Merrill's Horse, and 35 from the 11th MSM Cavalry.) Porter's loss was as little as three killed and five wounded according to Mudd, or six killed, three mortally wounded, and 10 wounded left on the field according to the Shelby County History.  In the 1880s, a group called The Tax-payers' Association of Scotland County formed to resist paying local taxes and to intimidate any

potential bidders on horses and mules that had been seized to cover those taxes. The handling of county debt collection went to the Supreme Court in Findlay v. McAllister.

Today the incorporated cities of Memphis, South Gorin, and villages of Arbela, Granger, and Rutledge lie within the boundaries of Scotland County. In addition, several small unincorporated villages are within the county. The location of these cities and villages are shown on the Scotland County base map.

**Schools of Scotland County:**

**Public schools**

Scotland County R-I School District- Memphis

Scotland County Elementary School (K-06)

Scotland County High School (7-12)

## Occupations

Table 2.4 provides occupation statistics for the incorporated cities and the county, as a whole.

**Table 2.4. Occupation Statistics, Scotland County, Missouri**

| Place | Management, Business, Science, and Arts Occupations | Service Occupations | Sales and Office Occupations | Natural Resources, Construction, and Maintenance Occupations | Production, Transportation, and Material Moving Occupations |
|---|---|---|---|---|---|
| Scotland County | 752 | 298 | 357 | 405 | 280 |
| Memphis | 283 | 191 | 172 | 80 | 79 |
| South Gorin | 3 | 3 | 11 | 0 | 4 |
| Arbela | 0 | 6 | 12 | 0 | 1 |
| Granger | 0 | 5 | 0 | 0 | 1 |
| Rutledge | 10 | 0 | 0 | 5 | 0 |

Source: U.S. Census, 2018 American Community Survey, 5-year Estimates.

## Agriculture

Scotland County has a total of 713 farms with the total acreage of 250,189 acres. The average farm size is 351 acres which is above the state average of 285 acres. The top crops for Scotland County are soybeans with 67,616 acres planted and corn is second with 50,170 acres planted. The average sales per farm is $121,937. Scotland has 247 total farm jobs, that is 21% of the total workforce.

## [redacted]FEMA Hazard Mitigation Assistance (HMA) Grants in Planning Area

No Hazard Mitigation Assistance grants were identified in Scotland County for the period of 1993 to 2020.

## [redacted]FEMA Public Assistance (PA) Grants in Planning Area

**Table 2.5. FEMA PA Grants in County from 1993-2019**

| Disaster Declaration | Project Type | Project Size | Applicant | Project Total |
|---|---|---|---|---|
| 1412 | Severe Storms | Small | Scotland County | $6,338 |
| 1412 | Severe Storms | Small | Scotland County | $1,213 |
| 1412 | Severe Storms | Small | Scotland County | $2,455 |
| 1412 | Severe Storms | Small | Scotland County | $3,501 |
| 1412 | Severe Storms | Small | Scotland County | $2,767 |
| 1412 | Severe Storms | Small | Scotland County | $2,562 |
| 1412 | Severe Storms | Small | Scotland County | $1,157 |
| 1412 | Severe Storms | Small | Scotland County | $1,051 |
| 1412 | Severe Storms | Small | Scotland County | $17,504 |
| 1412 | Severe Storms | Small | Scotland County | $4,392 |
| 1412 | Severe Storms | Small | Scotland County | $3,445 |
| 1412 | Severe Storms | Small | Scotland County | $6,607 |
| 1412 | Severe Storms | Large | Scotland County | $79,300 |
| 1412 | Severe Storms | Small | Scotland County | $1,475 |
| 1412 | Severe Storms | Small | Scotland County | $17,088 |
| 1736 | Severe Ice Storm | Small | Scotland County | $3,458 |
| 1736 | Severe Ice Storm | Small | Scotland County | $13,169 |
| 1736 | Severe Ice Storm | Small | Scotland County | $4,063 |
| 1773 | Severe Storms | Small | Scotland County | $7,219 |
| 1773 | Severe Storms | Small | Scotland County | $6,127 |
| 1773 | Severe Storms | Small | Scotland County | $13,631 |
| 1773 | Severe Storms | Small | Scotland County | $13,032 |
| 1773 | Severe Storms | Small | Scotland County | $8,875 |
| 1773 | Severe Storms | Small | Scotland County | $9,197 |
| 1773 | Severe Storms | Small | Scotland County | $16,125 |
| 1773 | Severe Storms | Small | Scotland County | $3,932 |
| 1773 | Severe Storms | Small | Scotland County | $12,205 |
| 1773 | Severe Storms | Small | Scotland County | $3,940 |
| 1773 | Severe Storms | Small | Scotland County | $5,509 |
| 1773 | Severe Storms | Small | Scotland County | $8,351 |
| 1773 | Severe Storms | Small | Scotland County | $8,136 |
| 1773 | Severe Storms | Small | Scotland County | $2,241 |
| 1773 | Severe Storms | Small | Scotland County | $8,337 |
| 1773 | Severe Storms | Small | Scotland County | $6,759 |
| 1773 | Severe Storms | Small | Scotland County | $7,314 |
| 1773 | Severe Storms | Small | Scotland County | $11,075 |
| 1773 | Severe Storms | Small | Scotland County | $17,070 |
| 1773 | Severe Storms | Small | Scotland County | $3,919 |
| 1773 | Severe Storms | Small | Scotland County | $8,280 |
| 1809 | Severe Storms | Small | Scotland County | $1,789 |
| 1809 | Severe Storms | Small | Scotland County | $2,025 |
| 1809 | Severe Storms | Small | Scotland County | $2,320 |
| 1809 | Severe Storms | Small | Scotland County | $1,319 |
| 1809 | Severe Storms | Small | Scotland County | $1,365 |
| 1809 | Severe Storms | Small | Scotland County | $2,132 |

| | | | | |
|---|---|---|---|---|
| 1809 | Severe Storms | Small | Scotland County | $2,068 |
| 1809 | Severe Storms | Small | Scotland County | $1,763 |
| 1809 | Severe Storms | Small | Scotland County | $1,130 |
| 1809 | Severe Storms | Small | Scotland County | $1,507 |
| 1809 | Severe Storms | Small | Scotland County | $1,813 |
| 1809 | Severe Storms | Small | Scotland County | $1,224 |
| 1809 | Severe Storms | Small | Scotland County | $28,794 |
| 1809 | Severe Storms | Small | Scotland County | $4,808 |
| 1934 | Severe Storms | Small | Scotland County | $23,979 |
| 1934 | Severe Storms | Small | Scotland County | $18,466 |
| 1934 | Severe Storms | Small | Scotland County | $16,624 |
| 1934 | Severe Storms | Small | Scotland County | $4,368 |
| 1934 | Severe Storms | Small | Scotland County | $9,155 |
| 1934 | Severe Storms | Small | Scotland County | $17,236 |
| 1934 | Severe Storms | Small | Scotland County | $2,180 |
| 1934 | Severe Storms | Small | Scotland County | $36,143 |
| 1934 | Severe Storms | Small | Scotland County | $39,707 |
| 1934 | Severe Storms | Small | Scotland County | $30,775 |
| 1934 | Severe Storms | Small | Scotland County | $28,357 |
| 1934 | Severe Storms | Small | Scotland County | $18,519 |
| 1934 | Severe Storms | Small | Scotland County | $19,087 |
| 1934 | Severe Storms | Small | Scotland County | $13,222 |
| 1934 | Severe Storms | Small | Scotland County | $24,865 |
| 1934 | Severe Storms | Small | Scotland County | $39,456 |
| 1934 | Severe Storms | Small | Scotland County | $27,277 |
| 1934 | Severe Storms | Small | Scotland County | $27,259 |
| 1934 | Severe Storms | Small | Scotland County | $19,078 |
| 1934 | Severe Storms | Small | Scotland County | $11,105 |
| 1934 | Severe Storms | Small | Scotland County | $19,386 |
| 1934 | Severe Storms | Small | Scotland County | $60,285 |
| 1961 | Severe Storms | Small | Scotland County | $1,408 |
| 1961 | Severe Storms | Small | Scotland County | $12,492 |
| 1961 | Severe Storms | Small | Scotland County | $2,187 |
| 4130 | Severe Storms | Small | Scotland County | $1,000 |
| 4130 | Severe Storms | Small | Scotland County | $51,808 |
| 4130 | Severe Storms | Small | Scotland County | $3,868 |
| 4238 | Severe Storms | Small | Scotland County | $37,516 |
| 4238 | Severe Storms | Small | Scotland County | $8,911 |
| 4238 | Severe Storms | Small | Scotland County | $16,585 |
| 4238 | Severe Storms | Small | Scotland County | $12,468 |
| 4238 | Severe Storms | Small | Scotland County | $19,830 |
| 4238 | Severe Storms | Small | Scotland County | $12,850 |
| 4238 | Severe Storms | Small | Scotland County | $12,696 |
| 4238 | Severe Storms | Small | Scotland County | $23,364 |
| 4238 | Severe Storms | Small | Scotland County | $23,436 |
| 4238 | Severe Storms | Small | Scotland County | $15,724 |
| 4238 | Severe Storms | Small | Scotland County | $24,920 |
| 4238 | Severe Storms | Small | Scotland County | $13,245 |
| 4238 | Severe Storms | Small | Scotland County | $10,242 |
| 4238 | Severe Storms | Small | Scotland County | $16,767 |
| 4451 | Severe Storms | Small | Scotland County | $72,556 |
| 4451 | Severe Storms | Small | Scotland County | $67,722 |
| 4451 | Severe Storms | Small | Scotland County | $3,386 |
| **Total** | | | | $1,377,384 |

Source: Federal Emergency Management Agency, December 22, 2020

## 2.1.1 Unincorporated Scotland County

By Missouri Statue (Section 483.020.1) Scotland County is defined as a 3rd Class County, meaning it's assessed valuation is less than six hundred million dollars. The County seat is located in Memphis.

Scotland County has 2 townships (City of Memphis, City of South Gorin), 3 Villages ( Villages of Arbela, Village of Granger, Village of Rutledge), and 13 Unincorporated Communities (Azen, Bible Grove, Brock, Crawford, Edinburg, Energy, Etna, Hitt, Kilwinning, Middle Fabius, Pleasant Grove, Sand Hill, and Unity). The county government provides services such as law enforcement, judicial services, land records, tax collection, property assessment, administration of elections.

The County is governed by an elected board of Commissioners composed of a Presiding Commissioner and two Associate Commissioners. Other positions within Scotland County's government include:

- Assessor
- Associate Circuit Judge
- Circuit Clerk
- Collector
- Coroner
- County Clerk
- Emergency Management Director
- Presiding Circuit Judge
- Prosecuting Attorney
- Public Administrator
- Recorder
- Sheriff
- Treasurer
- General Services
- Health Department
- Health Services

**Mitigation Initiatives/Capabilities**

The County of Scotland have implemented zoning and building requirements which govern development within the County. The County also has an Emergency Management Director (EMD). The EMD plans and directs disaster responses or crisis management activities, provides disaster preparedness training and prepares emergency plans and procedures for natural disasters.

The County has a Comprehensive Plan, County Emergency Plan, County Mitigation Plan, Transportation Plan, and Mutual Aid Agreements.

Scotland County's Mitigation initiatives includes:

- Flood Mitigation
- Install/Upgrade Warning Sirens
- Maintain Transportation Infrastructure
- Response to Pandemic
- Safe Rooms and Storm Shelters
- Generator for Shelter (s)
- Emergency Operations Center

**Table 2.6. Unincorporated Scotland County Mitigation Capabilities**

| Capabilities | Status Including Date of Document or Policy |
|---|---|
| **Planning Capabilities** | |
| Comprehensive Plan | Yes |
| Builder's Plan | No |
| Capital Improvement Plan | No |
| City Emergency Operations Plan | No |
| County Emergency Operations Plan | Yes 7/2013 |
| Local Recovery Plan | No |
| County Recovery Plan | No |
| City Mitigation Plan | No |
| County Mitigation Plan | Yes |
| Debris Management Plan | No |
| Economic Development Plan | No |
| Transportation Plan | Yes |
| Land-use Plan | No |
| Flood Mitigation Assistance (FMA) Plan | No |
| Watershed Plan | No |
| Fire wise or other fire mitigation plan | No |
| School Mitigation Plan | No |
| Critical Facilities Plan (Mitigation/Response/Recovery) | No |
| **Policies/Ordinance** | |
| Zoning Ordinance | Yes |
| Building Code | Yes |
| Floodplain Ordinance | No |
| Subdivision Ordinance | No |
| Tree Trimming Ordinance | No |
| Nuisance Ordinance | No |
| Stormwater Ordinance | No |
| Drainage Ordinance | No |
| Site Plan Review Requirements | No |
| Historic Preservation Ordinance | No |
| Landscape Ordinance | No |
| Seismic Construction Ordinance | No |
| **Program** | |
| Zoning/Land Use Restrictions | No |
| Codes Building Site/Design | No |
| Hazard Awareness Program | No |
| National Flood Insurance Program (NFIP) | No |

| | |
|---|---|
| NFIP Community Rating System (CRS) program | No |
| National Weather Service (NWS) Storm Ready | No |
| Fire wise Community Certification | No |
| Building Code Effectiveness Grading (BCEGs) | No |
| ISO Fire Rating | Yes |

| Capabilities | Status Including Date of Document or Policy |
|---|---|
| Economic Development Program | No |
| Land Use Program | No |
| Public Education/Awareness | No |
| Property Acquisition | No |
| Planning/Zoning Boards | No |
| Stream Maintenance Program | No |
| Tree Trimming Program | No |
| Engineering Studies for Streams (Local/County/Regional) | No |
| Mutual Aid Agreements | Yes |
| **Studies/Reports/Maps** | |
| Hazard Analysis/Risk Assessment (Local) | No |
| Hazard Analysis/Risk Assessment (County) | No |
| Flood Insurance Maps | No |
| FEMA Flood Insurance Study (Detailed) | No |
| Evacuation Route Map | No |
| Critical Facilities Inventory | No |
| Vulnerable Population Inventory | No |
| Land Use Map | No |
| **Staff/Department** | |
| Building Code Official | No |
| Building Inspector | No |
| Mapping Specialist (GIS) | No |
| Engineer | No |
| Development Planner | No |
| Public Works Official | No |
| Emergency Management Director | Yes |
| NFIP Floodplain Administrator | No |
| Emergency Response Team | No |
| Hazardous Materials Expert | No |
| Local Emergency Planning Committee | Yes |
| County Emergency Management Commission | No |
| Sanitation Department | No |
| Transportation Department | No |
| Economic Development Department | No |
| Housing Department | No |
| Historic Preservation | No |
| **Non-Governmental Organizations (NGOs)** | |
| American Red Cross | Yes |
| Salvation Army | No |
| Veterans Groups | Yes |
| Local Environmental Organization | No |
| Homeowner Associations | No |
| Neighborhood Associations | No |
| Chamber of Commerce | Yes |

| | |
|---|---|
| Community Organizations (Lions, Kiwanis, etc. | Yes |

| Capabilities | Status Including Date of Document or Policy |
|---|---|
| **Local Funding Availability** | |
| Apply for Community Development Block | Yes |
| Fund projects through Capital | Yes |
| Authority to levy taxes for a specific purpose | Yes |
| Fees for water, sewer, gas, or electric services | No |
| Impact fees for new development | No |
| Ability to incur debt through general obligation bonds | Yes |
| Ability to incur debt through special tax bonds | No |
| Ability to incur debt through private activities | No |
| Withhold spending in hazard prone areas | No |

Source: Data Collection Questionnaire, March 5, 2020

## 2.1.2 City of Memphis

Memphis is a city in Scotland County, Missouri, United States. The population was 1,822 at the 2010 census. It is the county seat of Scotland County. Memphis is located adjacent to U.S. Highway 136, east of Lancaster and west of Kahoka.

Although Scotland County was organized by an act of the Missouri General Assembly on January 29, 1841 the town of Memphis did not come to be until more than two years later. County commissioners met at Sand Hill on May 15, 1843 to select the county seat. A spot near the geographical center of the county was chosen, and after some debate, was named Memphis, after the ancient city of Memphis Egypt. The name had been previously used by a U.S. Post Office that operated on the North Fabius River a short distance away. The land for the town, about fifty acres, was donated to the county by early settler Samuel Cecil. After being laid out in town lots, the original plat of Memphis was filed with county court on October 11, 1843. However, a few homes already existed on the site and had for several years, the first being a log cabin constructed in 1835 by Burton Tompkins.

Scotland County's first courthouse, a two-story brick structure, was completed in June, 1845 at a cost of $1,500. However, just a decade later the building was declared unsafe by the county court and a second, larger courthouse was constructed in the middle of the town square in 1856 at a cost of $19,500. The second building served the county well until the turn of the 20th century, but at just forty feet by seventy feet it was becoming increasingly cramped. It was condemned in May, 1905 and razed in early 1907. The current Scotland County courthouse was constructed between October, 1907 and July, 1908 at a cost of $50,000.

Scotland County was the scene of two notable engagements during the American Civil War. On July 13, 1862 Confederate Colonel Joseph C. Porter approached Memphis in four converging columns totaling 125–169 men and captured it with little or no resistance. They first raided the Federal armory, seizing about a hundred muskets with cartridge boxes and ammunition, and several uniforms. The Confederates rounded up all adult males, who were taken to the courthouse to swear not to divulge any information about the raiders for forty-eight hours. Porter freed all militiamen or suspected militiamen to await parole, a fact noted by champions of his character. Citizens expressed their sympathies variously; Porter gave safe passage to a physician, an admitted supporter of the Union, who was anxious to return to his seriously ill wife. A verbally

abusive woman was threatened with a pistol by one of Porter's troops, perhaps as a bluff. Porter's troops entered the courthouse and destroyed all indictments for horse-theft; the act is variously understood as simple lawlessness, intervention on behalf of criminal associates, or interference with politically motivated, fraudulent charges. At Memphis, a key incident occurred which would darken Colonel Porter's reputation, and which his detractors see as part of a consistent behavioral pattern which put him and his men beyond the norms of warfare. According to the "History of Shelby County," which is generally sympathetic to Porter, "Most conceded that Col. Porter's purpose for capturing Memphis, MO. was to seize Dr. Wm. Aylward, a prominent Union man of the community." Aylward was captured during the day by Captain Tom Stacy's men and confined to a house. Stacy was generally regarded as a genuine bushwhacker, with his company called "the chain gang" by the other members of Porter's command due to their behavior. After rousing Doctor Aylward overnight and removing him from his home, ostensibly to see Porter, guards claimed that he escaped. However, witnesses reported hearing the sounds of a strangling, and his body was found the next day, with marks consistent with hanging or strangulation. Supporters of Porter attribute the murder of Aylward to Stacy. However, a Union gentleman who came to inquire about Aylward and a captured officer before the discovery of the body stated that when he asked Porter about Aylward, the response was, "He is where he will never disturb anybody else."

As of the census of 2010, there were 1,822 people, 813 households, and 466 families residing in the city. The population density was 1,167.9 inhabitants per square mile. There were 994 housing units at an average density of 637.2 per square mile. The racial makeup of the city was 98.5% White, 0.2% African American, 0.5% Native American, 0.1% Asian, 0.1% from other races, and 0.8% from two or more races. Hispanic or Latino of any race were 0.2% of the population.

There were 813 households of which 27.2% had children under the age of 18 living with them, 41.5% were married couples living together, 10.9% had a female householder with no husband present, 4.9% had a male householder with no wife present, and 42.7% were non-families. 39.1% of all households were made up of individuals and 20% had someone living alone who was 65 years of age or older. The average household size was 2.15 and the average family size was 2.85.

The median age in the city was 43.8 years. 24% of residents were under the age of 18; 7.3% were between the ages of 18 and 24; 20.2% were from 25 to 44; 25.1% were from 45 to 64; and 23.3% were 65 years of age or older. The gender makeup of the city was 44.6% male and 55.4% female.

The City of Memphis's mitigation initiatives includes:

- Generator for Shelter (s)
- Maintain Transportation Infrastructure
- Installation/Upgrade Sirens
- NFIP Participation

## Table 2.7. City of Memphis Mitigation Capabilities

| Capability | Status Including Date of Document or Policy |
|---|---|
| **Planning Capabilities** | |
| Comprehensive Plan | No |
| Builder's Plan | No |
| Capital Improvement Plan | No |
| Local Emergency Plan | No |
| County Emergency Plan | Yes |
| Local Recovery Plan | No |
| County Recovery Plan | No |
| Local Mitigation Plan | No |
| County Mitigation Plan | Yes |
| Local Mitigation Plan (PDM) | No |
| County Mitigation Plan (PDM) | No |
| Economic Development Plan | No |
| Transportation Plan | Yes |
| Land-use Plan | No |
| Flood Mitigation Assistance (FMA) Plan | No |
| Watershed Plan | No |
| Fire wise or other fire mitigation plan | No |
| School Mitigation Plan | No |
| Critical Facilities Plan (Mitigation/Response/Recovery) | No |
| **Policies/Ordinance** | |
| Zoning Ordinance | Yes |
| Building Code | Yes |
| Floodplain Ordinance | Yes |
| Subdivision Ordinance | Yes |
| Tree Trimming Ordinance | Yes |
| Nuisance Ordinance | Yes |
| Storm Water Ordinance | Yes |
| Drainage Ordinance | Yes |
| Seismic Construction Ordinance | No |
| **Capability** | |
| Site Plan Review Requirements | No |
| Historic Preservation Ordinance | No |
| Landscape Ordinance | No |
| Iowa Wetlands and Riparian Areas Conservation Plan | Yes |
| Debris Management Plan | No |
| **Program** | |
| Zoning/Land Use Restrictions | Yes |
| Codes Building Site/Design | No |
| National Flood Insurance Program (NFIP) Participant | Yes |
| NFIP Community Rating System (CRS) Participating Community | No |
| Hazard Awareness Program | No |
| National Weather Service (NWS) Storm Ready | No |
| Building Code Effectiveness Grading (BCEGs) | No |
| ISO Fire Rating | Yes |
| Economic Development Program | No |
| Land Use Program | No |
| Public Education/Awareness | No |
| Property Acquisition | No |
| Planning/Zoning Boards | Yes |
| Stream Maintenance Program | No |
| Tree Trimming Program | Yes |
| Engineering Studies for Streams (Local/County/Regional) | No |
| Mutual Aid Agreements | Yes |

| Capability | Status Including Date of Document or Policy |
|---|---|
| **Studies/Reports/Maps** | |
| Hazard Analysis/Risk Assessment (Local) | No |
| Hazard Analysis/Risk Assessment (County) | No |
| Flood Insurance Maps | No |
| FEMA Flood Insurance Study (Detailed) | No |
| Evacuation Route Map | No |
| Critical Facilities Inventory | No |
| Vulnerable Population Inventory | No |
| Land Use Map | Yes |
| **Staff/Department** | |
| Building Code Official | Yes |
| Building Inspector | Yes |
| Mapping Specialist (GIS) | No |
| Engineer | Yes |
| Development Planner | No |
| Public Works Official | Yes |
| Emergency Management Coordinator | No |
| NFIP Floodplain Administrator | No |
| Emergency Response Team | No |
| Hazardous Materials Expert | No |
| Local Emergency Planning Committee | No |
| County Emergency Management Commission | No |
| Sanitation Department | Yes |
| Transportation Department | Yes |
| Economic Development Department | No |
| Housing Department | No |
| Historic Preservation | No |
| **Non-Governmental Organizations (NGOs)** | |
| American Red Cross | No |
| Salvation Army | No |
| Veterans Groups | No |
| Environmental Organization | No |
| Homeowner Associations | No |
| Neighborhood Associations | No |
| Chamber of Commerce | Yes |
| Community Organizations (Lions, Kiwanis, etc. | Yes |
| **Local Funding Availability** | |
| Ability to apply for Community Development Block Grants | Yes |
| Ability to fund projects through Capital Improvements funding | No |
| Authority to levy taxes for a specific purpose | Yes |
| Fees for water, sewer, gas, or electric services | Yes |
| Impact fees for new development | No |
| Ability to incur debt through general obligation bonds | No |
| Ability to incur debt through special tax bonds | No |
| Ability to incur debt through private activities | No |
| Ability to withhold spending in hazard prone areas | No |

Source: Data Collection Questionnaire, October 2020

## [redacted] Village of Arbela

Arbela was originally named "North Perryville", and under the latter name was platted in 1858. With the coming of the Keokuk & Western Railroad some years later, the town was resurveyed and the present name chosen.

As of the census of 2010, there were 41 people, 20 households, and 13 families living in the village. The population density was 455.6 inhabitants per square mile. There were 25 housing units at an average density of 277.8 per square mile. The racial makeup of the village was 97.6% White and 2.4% from other races. Hispanic or Latino of any race were 2.4% of the population.

There were 20 households of which 20.0% had children under the age of 18 living with them, 50.0% were married couples living together, 15.0% had a female householder with no husband present, and 35.0% were non-families. 25.0% of all households were made up of individuals and 5% had someone living alone who was 65 years of age or older. The average household size was 2.05 and the average family size was 2.23.

The median age in the village was 49.5 years. 17.1% of residents were under the age of 18; 0% were between the ages of 18 and 24; 24.4% were from 25 to 44; 39.1% were from 45 to 64; and 19.5% were 65 years of age or older. The gender makeup of the village was 46.3% male and 53.7% female.

As of the census of 2000, there were 40 people, 17 households, and 13 families living in the town. The population density was 451.1 people per square mile. There were 20 housing units at an average density of 225.6/sq. mile. The racial makeup of the town was 100.00% White.

There were 17 households out of which 29.4% had children under the age of 18 living with them, 47.1% were married couples living together, and 41.2% were non-families. 35.3% of all households were made up of individuals and 5.9% had someone living alone who was 65 years of age or older. The average household size was 2.35 and the average family size was 2.90.

In the town the population was spread out with 22.5% under the age of 18, 7.5% from 18 to 24, 37.5% from 25 to 44, 27.5% from 45 to 64, and 5.0% who were 65 years of age or older. The median age was 36 years. For every 100 females, there were 150.0 males. For every 100 females age 18 and over, there were 121.4 males.

The median income for a household in the town was $31,250, and the median income for a family was $36,250. Males had a median income of $21,667 versus $13,750 for females. The per capita income for the town was $12,853. None of the families and 33.5% of the population were living below the poverty line, including no under eighteens and none of those over 64.

The Village of Arbela's mitigation initiatives includes:

- Installation/Upgrade Sirens
- Maintain Transportation Infrastructure
- Safe Rooms and Storm Shelters

**Table 2.9 Village of Arbela Mitigation Capabilities**

| Capability | Status Including Date of Document or Policy |
|---|---|
| **Planning Capabilities** | |
| Comprehensive Plan | No |
| Builder's Plan | No |

| Capability | Status Including Date of Document or Policy |
|---|---|
| Capital Improvement Plan | No |
| Local Emergency Plan | No |
| County Emergency Plan | No |
| Local Recovery Plan | No |
| County Recovery Plan | No |
| Local Mitigation Plan | No |
| County Mitigation Plan | Yes |
| Local Mitigation Plan (PDM) | No |
| County Mitigation Plan (PDM) | No |
| Economic Development Plan | No |
| Transportation Plan | Yes |
| Land-use Plan | No |
| Flood Mitigation Assistance (FMA) Plan | No |
| Watershed Plan | No |
| Fire wise or other fire mitigation plan | No |
| School Mitigation Plan | No |
| Critical Facilities Plan (Mitigation/Response/Recovery) | No |
| **Policies/Ordinance** | |
| Zoning Ordinance | No |
| Building Code | No |
| Floodplain Ordinance | No |
| Subdivision Ordinance | No |
| Tree Trimming Ordinance | No |
| Nuisance Ordinance | No |
| Storm Water Ordinance | No |
| Drainage Ordinance | No |
| Seismic Construction Ordinance | No |
| **Capability** | |
| Site Plan Review Requirements | No |
| Historic Preservation Ordinance | No |
| Landscape Ordinance | No |
| Iowa Wetlands and Riparian Areas Conservation Plan | Yes |
| Debris Management Plan | No |
| **Program** | |
| Zoning/Land Use Restrictions | No |
| Codes Building Site/Design | No |
| National Flood Insurance Program (NFIP) Participant | No |
| NFIP Community Rating System (CRS) Participating Community | No |
| Hazard Awareness Program | No |
| National Weather Service (NWS) Storm Ready | No |
| Building Code Effectiveness Grading (BCEGs) | No |
| ISO Fire Rating | No |
| Economic Development Program | No |
| Land Use Program | No |
| Public Education/Awareness | No |
| Property Acquisition | No |
| Planning/Zoning Boards | No |
| Stream Maintenance Program | No |
| Tree Trimming Program | No |
| Engineering Studies for Streams (Local/County/Regional) | No |
| Mutual Aid Agreements | Yes |
| **Studies/Reports/Maps** | |
| Hazard Analysis/Risk Assessment (Local) | No |
| Hazard Analysis/Risk Assessment (County) | No |
| Flood Insurance Maps | No |
| FEMA Flood Insurance Study (Detailed) | No |

| Capability | Status Including Date of Document or Policy |
|---|---|
| Evacuation Route Map | No |
| Critical Facilities Inventory | No |
| Vulnerable Population Inventory | No |
| Land Use Map | No |
| **Staff/Department** | |
| Building Code Official | No |
| Building Inspector | No |
| Mapping Specialist (GIS) | No |
| Engineer | No |
| Development Planner | No |
| Public Works Official | No |
| Emergency Management Coordinator | No |
| NFIP Floodplain Administrator | No |
| Emergency Response Team | No |
| Hazardous Materials Expert | No |
| Local Emergency Planning Committee | No |
| County Emergency Management Commission | No |
| Sanitation Department | No |
| Transportation Department | No |
| Economic Development Department | No |
| Housing Department | No |
| Historic Preservation | No |
| **Non-Governmental Organizations (NGOs)** | |
| American Red Cross | No |
| Salvation Army | No |
| Veterans Groups | No |
| Environmental Organization | No |
| Homeowner Associations | No |
| Neighborhood Associations | No |
| Chamber of Commerce | No |
| Community Organizations (Lions, Kiwanis, etc. | No |
| **Local Funding Availability** | |
| Ability to apply for Community Development Block Grants | Yes |
| Ability to fund projects through Capital Improvements funding | No |
| Authority to levy taxes for a specific purpose | Yes |
| Fees for water, sewer, gas, or electric services | No |
| Impact fees for new development | No |
| Ability to incur debt through general obligation bonds | No |
| Ability to incur debt through special tax bonds | No |
| Ability to incur debt through private activities | No |
| Ability to withhold spending in hazard prone areas | No |

Source: Data Collection Questionnaire, February 2020

## [redacted]Village of Rutledge

Rutledge is a village in Scotland County Missouri, United States. The population was 109 at the 2010census. The surrounding area is also the home to three intentional communities: Dancing Rabbit Ecovillage, a growing ecovillage on 280 acres of rolling land, Sandhill Farm, and Red Earth Farms.

A post office called Rutledge has been in operation since 1888. The community has the name of one Mr. Rutledge, a land agent

As of the census of 2010, there were 109 people, 38 households, and 23 families residing in the village. The population density was 838.5 inhabitants per square mile. There were 69 housing units at an average density of 530.8 per square mile. The racial makeup of the village was 100.0% White. Hispanic or Latino of any race were 0.9% of the population.

There were 38 households of which 31.6% had children under the age of 18 living with them, 60.5% were married couples living together, and 39.5% were non-families. 31.6% of all households were made up of individuals and 15.8% had someone living alone who was 65 years of age or older. The average household size was 2.87 and the average family size was 3.83.

The median age in the village was 33.5 years. 35.8% of residents were under the age of 18; 2.7% were between the ages of 18 and 24; 23.9% were from 25 to 44; 17.4% were from 45 to 64; and 20.2% were 65 years of age or older. The gender makeup of the village was 45.0% male and 55.0% female.

As of the census of 2000, there were 103 people, 41 households, and 25 families residing in the town. The population density was 797.0 people per square mile. There were 72 housing units at an average density of 557.2/sq. mile. The racial makeup of the town was 100.00% White.

There were 41 households out of which 26.8% had children under the age of 18 living with them, 48.8% were married couples living together, 12.2% had a female householder with no husband present, and 36.6% were non-families. 36.6% of all households were made up of individuals and 17.1% had someone living alone who was 65 years of age or older. The average household size was 2.51 and the average family size was 3.38.

In the town the population was spread out with 29.1% under the age of 18, 7.8% from 18 to 24, 23.3% from 25 to 44, 20.4% from 45 to 64, and 19.4% who were 65 years of age or older. The median age was 36 years. For every 100 females, there were 94.3 males. For every 100 females age 18 and over, there were 97.3 males.

The median income for a household in the town was $14,063, and the median income for a family was $17,500. Males had a median income of $11,667 versus $17,917 for females. The per capita income for the town was $9,545. There were 25.0% of families and 43.8% of the population living below the poverty line, including 93.8% of under eighteens and 13.6% of those over 64.

The Village of Rutledge's mitigation initiatives includes:

- Installation/Upgrade Sirens
- Maintain Transportation Infrastructure
- Safe Rooms and Storm Shelter

**Table 2.11 Village of Rutledge Mitigation Capabilities**

| Planning Capabilities | |
|---|---|
| Comprehensive Plan | No |
| Builder's Plan | No |
| Capital Improvement Plan | No |
| Local Emergency Plan | No |
| County Emergency Plan | Yes |
| Local Recovery Plan | No |
| County Recovery Plan | No |
| Local Mitigation Plan | No |

| | |
|---|---|
| County Mitigation Plan | Yes |
| Local Mitigation Plan (PDM) | No |
| County Mitigation Plan (PDM) | No |
| Economic Development Plan | No |
| Transportation Plan | Yes |
| Land-use Plan | No |
| Flood Mitigation Assistance (FMA) Plan | No |
| Watershed Plan | No |
| Fire wise or other fire mitigation plan | No |
| School Mitigation Plan | No |
| Critical Facilities Plan (Mitigation/Response/Recovery) | No |
| **Policies/Ordinance** | |
| Zoning Ordinance | No |
| Building Code | No |
| Floodplain Ordinance | No |
| Subdivision Ordinance | No |
| Tree Trimming Ordinance | No |
| Nuisance Ordinance | Yes |
| Storm Water Ordinance | No |
| Drainage Ordinance | Yes |
| Seismic Construction Ordinance | No |
| **Capability** | |
| Site Plan Review Requirements | No |
| Historic Preservation Ordinance | No |
| Landscape Ordinance | No |
| Iowa Wetlands and Riparian Areas Conservation Plan | Yes |
| Debris Management Plan | No |
| **Program** | |
| Zoning/Land Use Restrictions | No |
| Codes Building Site/Design | No |
| National Flood Insurance Program (NFIP) Participant | No |
| NFIP Community Rating System (CRS) Participating Community | No |
| Hazard Awareness Program | No |
| National Weather Service (NWS) Storm Ready | No |
| Building Code Effectiveness Grading (BCEGs) | No |
| ISO Fire Rating | Yes |
| Economic Development Program | No |
| Land Use Program | No |
| Public Education/Awareness | No |
| Property Acquisition | No |
| Planning/Zoning Boards | No |
| Stream Maintenance Program | No |
| Tree Trimming Program | No |
| Engineering Studies for Streams (Local/County/Regional) | No |
| Mutual Aid Agreements | Yes |
| **Studies/Reports/Maps** | |
| Hazard Analysis/Risk Assessment (Local) | No |
| Hazard Analysis/Risk Assessment (County) | No |
| Flood Insurance Maps | No |
| FEMA Flood Insurance Study (Detailed) | No |
| Evacuation Route Map | No |
| Critical Facilities Inventory | No |
| Vulnerable Population Inventory | No |
| Land Use Map | No |
| **Staff/Department** | |
| Building Code Official | No |
| Building Inspector | No |
| Mapping Specialist (GIS) | No |

| | |
|---|---|
| Engineer | No |
| Development Planner | No |
| Public Works Official | No |
| Emergency Management Coordinator | No |
| NFIP Floodplain Administrator | No |
| Emergency Response Team | No |
| Hazardous Materials Expert | No |
| Local Emergency Planning Committee | No |
| County Emergency Management Commission | No |
| Sanitation Department | No |
| Transportation Department | No |
| Economic Development Department | No |
| Housing Department | No |
| Historic Preservation | No |
| **Non-Governmental Organizations (NGOs)** | |
| American Red Cross | No |
| Salvation Army | No |
| Veterans Groups | No |
| Environmental Organization | No |
| Homeowner Associations | No |
| Neighborhood Associations | No |
| Chamber of Commerce | No |
| Community Organizations (Lions, Kiwanis, etc. | No |
| **Local Funding Availability** | |
| Ability to apply for Community Development Block Grants | Yes |
| Ability to fund projects through Capital Improvements funding | No |
| Authority to levy taxes for a specific purpose | No |
| Fees for water, sewer, gas, or electric services | Yes |
| Impact fees for new development | No |
| Ability to incur debt through general obligation bonds | No |
| Ability to incur debt through special tax bonds | No |
| Ability to incur debt through private activities | No |
| Ability to withhold spending in hazard prone areas | No |

Source: Data Collection Questionnaire, October 2020

## Summary of Jurisdictional Capabilities

**Table 2.12** summarizes the mitigation capabilities of the Unincorporated Scotland County and Cities.

**Table 2.12 Mitigation Capabilities Summary Table**

| CAPABILITIES | Unincorporated Scotland County | City of Memphis | Village of Arbela | Village of Rutledge |
|---|---|---|---|---|
| **Planning Capabilities** | | | | |
| Comprehensive Plan | No | No | No | No |
| Builder's Plan | No | No | No | No |
| Capital Improvement Plan | No | No | No | No |
| Local Emergency Plan | No | No | No | No |
| County Emergency Plan | Yes | Yes | Yes | Yes |
| Local Recovery Plan | No | No | No | No |
| County Recovery Plan | No | No | No | No |
| Local Mitigation Plan | No | No | No | No |
| County Mitigation Plan | Yes | Yes | Yes | Yes |
| Local Mitigation Plan (PDM) | No | No | No | No |
| County Mitigation Plan (PDM) | No | No | No | No |
| Debris Management Plan | No | No | No | No |
| Economic Development Plan | No | No | No | No |
| Transportation Plan | Yes | Yes | Yes | Yes |
| Land-use Plan | No | No | No | No |
| Flood Mitigation Assistance (FMA) Plan | No | No | No | No |
| Watershed Plan | No | No | No | No |
| Fire wise or other fire mitigation plan | No | No | No | No |
| School Mitigation Plan | No | No | No | No |
| Critical Facilities Plan (Mitigation/Response/Recovery) | No | No | No | No |
| **Policies/Ordinance** | | | | |
| Zoning Ordinance | Yes | Yes | No | No |
| Building Code | Yes | Yes | No | No |
| Floodplain Ordinance | No | Yes | No | No |
| Subdivision Ordinance | No | Yes | No | No |
| Tree Trimming Ordinance | No | Yes | No | No |
| Nuisance Ordinance | No | Yes | No | Yes |
| Storm Water Ordinance | No | Yes | No | No |
| Drainage Ordinance | No | Yes | No | Yes |
| Site Plan Review Requirements | No | No | No | No |
| Historic Preservation Ordinance | No | No | No | No |
| Landscape Ordinance | No | No | No | No |

| CAPABILITIES | Unincorporated Scotland County | City of Memphis | Village of Arbela | Village of Rutledge |
|---|---|---|---|---|
| Seismic Construction Ordinance | No | No | No | No |
| **Program** | | | | |
| Zoning/Land Use Restrictions | **Yes** | Yes | No | No |
| Codes Building Site/Design | No | No | No | No |
| National Flood Insurance Program (NFIP) Participant | No | Yes | No | No |
| NFIP Community Rating System (CRS) Participating Community | No | No | No | No |
| Hazard Awareness Program | No | No | No | No |
| National Weather Service (NWS) Storm Ready | No | No | No | No |
| Building Code Effectiveness Grading (BCEGs) | No | No | No | No |
| ISO Fire Rating | Yes | Yes | Yes | Yes |
| Economic Development Program | No | No | No | No |
| Land Use Program | No | No | No | No |
| Public Education/Awareness | No | No | No | No |
| Property Acquisition | No | No | No | No |
| Planning/Zoning Boards | No | Yes | No | No |
| Stream Maintenance Program | No | No | No | No |
| Tree Trimming Program | No | Yes | No | No |
| Engineering Studies for Streams (Local/County/Regional) | No | No | No | No |
| Mutual Aid Agreements | Yes | Yes | Yes | Yes |
| **Studies/Reports/Maps** | | | | |
| Hazard Analysis/Risk Assessment (Local) | No | No | No | No |
| Hazard Analysis/Risk Assessment (County) | No | No | No | No |
| Flood Insurance Maps | No | Yes | No | No |
| FEMA Flood Insurance Study (Detailed) | No | No | No | No |
| Evacuation Route Map | No | No | No | No |
| Critical Facilities Inventory | No | No | No | No |
| Vulnerable Population Inventory | No | No | No | No |
| Land Use Map | No | Yes | No | No |
| **Staff/Department** | | | | |
| Building Code Official | No | Yes | No | No |
| Building Inspector | No | Yes | No | No |
| Mapping Specialist (GIS) | No | No | No | No |
| Engineer | No | Yes | No | No |
| Development Planner | No | No | No | No |
| Public Works Official | No | Yes | No | No |
| Emergency Management Coordinator | Yes | No | No | No |
| NFIP Floodplain Administrator | No | No | No | No |
| Emergency Response Team | No | No | No | No |
| Hazardous Materials Expert | No | No | No | No |
| Local Emergency Planning Committee | Yes | No | No | No |

| CAPABILITIES | Unincorporated Scotland County | City of Memphis | Village of Arbela | Village of Rutledge |
|---|---|---|---|---|
| County Emergency Management Commission | No | No | No | No |
| Sanitation Department | No | Yes | No | No |
| Transportation Department | No | Yes | No | No |
| Economic Development Department | No | No | No | No |
| Housing Department | No | No | No | No |
| Historic Preservation | No | No | No | No |
| **Non-Governmental Organizations (NGOs)** | | | | |
| American Red Cross | Yes | No | No | No |
| Salvation Army | No | No | No | No |
| Veterans Groups | Yes | No | No | No |
| Environmental Organization | No | No | No | No |
| Homeowner Associations | No | No | No | No |
| Neighborhood Associations | No | No | No | No |
| Chamber of Commerce | Yes | Yes | No | No |
| Community Organizations (Lions, Kiwanis, etc. | No | Yes | No | No |
| **Financial Resources** | | | | |
| Apply for Community Development Block Grants | Yes | Yes | Yes | Yes |
| Fund projects through Capital Improvements funding | Yes | No | No | No |
| Authority to levy taxes for specific purposes | Yes | Yes | No | No |
| Fees for water, sewer, gas, or electric services | No | Yes | No | No |
| Impact fees for new development | No | No | No | No |
| Incur debt through general obligation bonds | Yes | No | No | No |
| Incur debt through special tax bonds | No | No | No | No |
| Incur debt through private activities | No | No | No | No |
| Withhold spending in hazard prone areas | No | No | No | No |

Source: Data Collection Questionnaire, December 202

## Public School District Profiles and Mitigation Capabilities

The Public Schools within the planning area include the following:

Scotland County R-I School District – Memphis
Scotland County Elementary School (K-06)
Scotland County High School (07-12)

**Table 2.13 Scotland County School District Enrollment Data, April 2020**

| District Name | Building Enrollment |
|---|---|
| Scotland County R-I School District | |
| Elementary School | 343 |
| Middle School | - |
| Junior High | - |
| High School | 259 |
| | |

**Table 2.14 Summary of Mitigation Capabilities- Scotland County School District**

| Capability | Scotland County School District |
|---|---|
| **Planning Elements** | |
| Master Plan/ Date | No |
| Capital Improvement Plan/Date | No |
| School Emergency Plan / Date | Yes Summer 2019 |
| Weapons Policy/Date | Yes |
| **Personnel Resources** | |
| Full-Time Building Official (Principal) | No |
| Emergency Manager | No |
| Grant Writer | No |
| Public Information Officer | No |
| **Financial Resources** | |
| Capital Improvements Project Funding | Yes |
| Local Funds | Yes |
| General Obligation Bonds | No |
| Special Tax Bonds | No |
| Private Activities/Donations | Yes |
| State and Federal Funds/Grants | Yes |
| **Other** | |
| Public Education Programs | Yes |
| Privately or Self- Insured? | Yes |
| Fire Evacuation Training | Yes |
| Tornado Sheltering Exercises | Yes |
| Public Address/Emergency Alert System | Yes |
| NOAA Weather Radios | Yes |
| Lock-Down Security Training | Yes |
| Mitigation Programs | No |
| Tornado Shelter/Saferoom | No |
| Campus Police | No |

Source: Data Collection Questionnaire, March 2

# 3 RISK ASSESSMENT

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

The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities and school/special districts in the planning area to better understand their potential risk to the identified hazards. It will provide a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The risk assessment for Scotland County and its jurisdictions followed the methodology described in the Local Mitigation Planning Handbook (March 2013).

This chapter is divided into four main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and provides a factual basis for elimination of hazards from further consideration;
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk;
- **Section 3.3 Land Use and Development** discusses development that has occurred since the last plan update and any increased or decreased risk that resulted. This section also discusses areas of planned future development and any implications on risk/vulnerability;
- **Section 3.4 Hazard Profiles and Vulnerability Analysis** provides more detailed information about the hazards impacting the planning area. For each hazard, there are three sections: 1) Hazard Profile provides a general description and discusses the threat to the planning area, the geographic location at risk, potential Strength/Magnitude/Extent, previous occurrences of hazard events, probability of future occurrence, risk summary by jurisdiction, impact of future development on the risk; 2) Vulnerability Assessment further defines and quantifies populations, buildings, critical facilities, and other community/school or special district assets at risk to natural hazards; and 3) Problem Statement briefly summarizes the problem and develops possible solutions.

## 3.1 HAZARD IDENTIFICATION

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

The Scotland County Emergency Management Director, along with members of the MPC and the Northeast Missouri Regional Planning Commission, reviewed existing mitigation plans, researched historical disaster declaration records, and surveyed various other sources, including anecdotal information, to fairly identify hazards to be included in this plan.

### 3.1.1 Review of Existing Mitigation Plans

The MPC reviewed the hazards identified in the previously approved plan from 2015, as well as the hazards identified in the most recent State Plan. There were no significant differences between the lists of hazards included in the previously approved plan and this plan update. Levee failure was excluded from the mitigation planning process as there are no mapped levees nor associated levee protected areas within or immediately upstream of Scotland County.

### 3.1.2 Review Disaster Declaration History

Federal and state declarations may granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state governments' capacities are exceeded; a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damages and institutions or industrial sectors affected.

Table 3.1 list the federal FEMA disaster declarations in Scotland County from 1965 to present.

**Table 3.1. FEMA Disaster Declarations that included Scotland, Missouri, 1965-Present**

| Disaster Number | Description | Declaration Date Incident Period | Individual Assistance (IA) Public Assistance (PA) |
|---|---|---|---|
| DR-372 | Heavy Rains, Tornadoes & Flooding | 4/19/1973 | IA |
| DR-439 | Severe Storms Flooding | 6/10/1974 | PA |
| DR-3017 | Drought | 9/24/1976 | IA |
| DR-779 | Severe Storms, Flooding | 10/14/1986 | IA, PA |
| DR-995 | Severe Storms, Flooding | 7/9/1993 | IA, PA |
| DR-1054 | Severe Storms, Tornadoes, Hail, Flooding | 5/13/1995 | IA, PA |

| | | | |
|---|---|---|---|
| DR-1412 | Severe Storms, Tornadoes, Flooding | 4/24/2002 | IA, PA |
| DR-3232 | Hurricane Katrina Evacuation | 9/10/2005 | IA, PA |
| DR-1736 | Severe Winter Storms | 12/27/2007 | PA |
| DR-3281 | Severe Winter Storms | 12/12/2007 | IA, PA |
| DR-1773 | Severe Storms and Flooding | 6/25/2008 | IA, PA |
| DR-1809 | Severe Storms, Flooding, Tornado | 11/13/2008 | IA, PA |
| DR-3303 | Severe Winter Storm | 1/30/2009 | PA |
| DR-1934 | Severe Storms, Flooding, Tornadoes | 8/17/2010 | PA |
| DR-3317 | Severe Winter Storm | 2/3/2011 | IA, PA |
| DR-1961 | Severe Winter Storm | 3/23/2011 | IA, PA |
| DR-4130 | Severe Storms, Straight-Line Winds, Tornadoes | 7/18/2013 | PA |
| DR-4238 | Severe Storms, Tornadoes, Straight-Line Winds | 5/15/2015 | PA |
| DR-4451 | Severe Storms, Tornadoes, Flooding | 7/09/2019 | IA, PA |

Source: Federal Emergency Management Agency, https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants

### 3.1.3 Research Additional Sources

The following additional data sources were also consulted during the completion of this plan:
Missouri Hazard Mitigation Plans (2010, 2013, and 2018)
Previously approved planning area Hazard Mitigation Plan (Date)
Federal Emergency Management Agency (FEMA)
Missouri Department of Natural Resources
National Drought Mitigation Center Drought Reporter
US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
National Agricultural Statistics Service (Agriculture production/losses)
Data Collection Questionnaires completed by each jurisdiction
State of Missouri GIS data
Environmental Protection Agency
Flood Insurance Administration
Hazards US (Hazus)
Missouri Department of Transportation
Missouri Division of Fire Marshal Safety
Missouri Public Service Commission
National Fire Incident Reporting System (NFIRS)
National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI);
County and local Comprehensive Plans to the extent available
County Emergency Management
County Flood Insurance Rate Map, FEMA
Flood Insurance Study, FEMA
SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin

U.S. Army Corps of Engineers
U.S. Department of Transportation
United States Geological Survey (USGS)
Various articles and publications available on the internet (you should state that you will give citations to the sources in the body of the plan)

The only centralized source of data for many of the weather-related hazards is the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI). Although it is usually the best and most current source, there are limitations to the data which should be noted. The NCEI documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in the NCEI may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. Those using information from NCEI should be cautious as the NWS does not guarantee the accuracy or validity of the information.

The NCEI damage amounts are estimates received from a variety of sources, including those listed above in the Data Sources section. For damage amounts, the NWS makes a best guess using all available data at the time of the publication. Property and crop damage figures should be considered as a broad estimate. Damages reported are in dollar values as they existed at the time of the storm event. They do not represent current dollar values.

The database currently contains data from January 1950 to March 2014, as entered by the NWS. Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures.

1. Tornado: From 1950 through 1954, only tornado events were recorded.
2. Tornado, Thunderstorm Wind and Hail: From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
3. All Event Types (48 from Directive 10-1605): From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

Note that injuries and deaths caused by a storm event are reported on an area-wide basis. When reviewing a table resulting from an NCEI search by county, the death or injury listed in connection with that county search did not necessarily occur in that county.

## 3.1.4 Hazards Identified

The table below lists in alphabetical order the hazards that significantly impact Scotland County that were chosen by the MPC for further analysis. Not all hazards impact ever jurisdictions. An “X” in the table column indicates the jurisdiction is impacted by the hazards, and an empty cell indicates the hazard is not applicable to the jurisdiction. Each of the hazards listed have an equal likelihood of occurrence throughout the county and its communities, with the exception of dam failure, and flooding failure which by natural are located in low-lying areas downstream from dams, and rivers.

**Table 3.2. Hazards Identified for Each Jurisdiction**

| Jurisdiction | Dam Failure | Drought | Earthquake | Extreme Temperatures | Flooding (River and Flash) | Land Subsidence/Sinkholes | Severe Winter Weather | Thunderstorm/Lightning/Hail/ High Wind | Tornado | Wildfire | Pandemic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Scotland County | x | x | x | x | x | x | x | x | x | x | x |
| | | | | | | | | | | | |
| Memphis | - | x | x | x | x | x | X | - | x | x | x |
| Rutledge | - | x | x | x | - | - | x | x | x | X | x |
| Arbela | - | x | x | x | - | - | x | x | x | x | x |
| | | | | | | | | | | | |
| Scotland County R-1 | - | x | x | x | - | - | x | x | x | - | x |

## 3.1.5 Multi-Jurisdictional Risk Assessment

For this multi-jurisdictional plan, the risk assessment assesses each jurisdiction's risk where they deviate from risk's facing the entire county. Scotland County is not geographically large at 439 square miles, and is fairly uniform in terms of climate and topography, as well as construction characteristics and development trends. Accordingly, overall hazards and vulnerability do not vary greatly across the planning area.

This is an update to the April 2015 plan. For this update, all hazards were assessed on a county-wide basis. Some hazards, like flooding, vary in risk across the planning area. Those variations were discussed by the MPC and included in the profile where appropriate. The hazards that vary across the planning area, in terms of risk, are dam failure, flash flood, levee failure, Land Subsidence/Sinkholes and floods.

The county is essentially rural with more densely populated areas in and around Memphis. There is only one school throughout the County. Memphis is situated along Highway 136. Row crops and silage across the county are susceptible to drought, floods, hail, and high winds. Livestock is not as big a concern but ranching is adversely affected by flooding, drought, and extremes of heat and cold. Where appropriate, these extremes will be explained in greater detail in the vulnerability sections of each hazard.

Each hazard identified in Section 3.1, Hazard Identification, is profiled individually in this section in alphabetical order for easier reference. The level of information presented in the profiles varies by hazard based on the information available. With each update of this plan, new information will be incorporated to provide for better evaluation and prioritization of the hazards that affect Scotland County.

The sources used to collect information for these profiles include those mentioned in Section 3.1.3. and those cited individually in each hazard section. Detailed profiles for each of the identified hazards include information on the following characteristics of the hazard.

**Hazard Description**

This section consists of a general description of the hazard and the types of impacts it may have on a community. It also includes a ranking to indicate typical warning times and duration of hazard events.

**Historical Statistics**

This section describes the geographic extent or location of the hazard in the planning area and includes the information on historic incidents and their impacts based upon the sources described in Section 3.1.4, Hazard Identification and the information provided by the MPC. Where available, maps are utilized to indicate the areas of the planning region that are vulnerable to the subject hazard.

**Probability of Future Occurrence**

The frequency of past events is used to gauge the likelihood of future occurrences. Where possible, the probability and severity of occurrence was calculated based on historical data. Probability was determined by dividing the number of events observed by the number of years and multiplying by 100. The gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests 10 percent chance of drought in any given year.

**Magnitude of Severity**

The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected, the resilience of the community, and the effectiveness of the emergency response and disaster recovery efforts.

## 3.2 ASSETS AT RISK

In this section of the plan, the Scotland County population, structures, critical facilities and infrastructure and other important assets that may be at risk to hazards are assessed. There were no changes to the planning area since the previously approved plan was adopted.

**Missouri Mitigation Viewer**

With the 2018 Hazard Mitigation Plan Update, SEMA now provides online access to risk assessment data and associated mapping for the 114 counties in the State, including the independent City of St. Louis. Through the web-based Missouri Hazard Mitigation Viewer, local planners or other interested parties can obtain all State Plan datasets.
The Missouri Hazard Mitigation Viewer includes a Map Viewer with a legend of clearly labeled features, a north arrow, a base map that is either aerial imagery or a street map, risk assessment data symbolized the same as in the 2018 State Plan for easy reference, search and query capabilities, ability to zoom to county level data and capability to download PDF format maps. The Missouri Hazard Mitigation Viewer can be found at this link:

- http://bit.ly/MoHazardMitigationPlanViewer2018
- https://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view - User Guide

Assets at Risk available from the Mitigation Viewer include:

- State Owned Facilities
- State Leased Facilities
- Department of Higher Education Facilities
- State Owned Bridges

**Flood Risk Datasets**

Data sources include:

- FEMA Flood Insurance Rate Maps (FIRM)
  https://msc.fema.gov/portal/home

- FEMA National Flood Hazard Layer
  https://hazards.fema.gov/femaportal/wps/portal/NFHLWMS

- FEMA Hazus Program
  https://www.fema.gov/hazus

- SEMA Flood Mapping Project Status for Missouri Counties
  http://bit.ly/MOSEMAOutreach

- 2010 US Census Population and Housing Unit Counts
  https://www.census.gov/geo/maps-data/data/tiger-data.html

The Flood Risk Datasets, will fall into the following categories:

Good: If a digital FIRM (DFIRM) is not available for the flood risk analysis, use the census block exposure data out of Hazus or available as a Tiger/Line (note links above). If this method is chosen, apply corporate boundaries of jurisdictions in the plan to the GIS data available to parse out assets at risk for each jurisdiction. If this method is chosen, use this exposure data for all hazards so that the analysis is consistent.

Better: If a DFIRM is available for the flood risk assessment AND parcel data is available in GIS format w/ associated building values—but not in a format that can be imported into Hazus, analysis can be done to show parcels and associated values in the planning area compared against the actual regulatory floodplain. The limitation with this is that your potential loss estimates will not be based on a depth/damage function as they are in Hazus. But, this is still a much more accurate picture of what is vulnerable to flooding than using the Hazus estimated floodplain and census block. If you use this method for the flood risk assessment, it is best to use the parcel data for the total exposure for all hazards so that the analysis is consistent. Contents values are not usually included w/ parcel data structure values. However, using the formulas that Hazus uses, they can be calculated. Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%).

Best: If DFIRM with depth grids are available, as produced during the Risk MAP process, AND parcel data is available in GIS format AND parcel data is in a format compatible w/ Hazus' user-defined data, this gives the best analysis. This provides the actual parcels and associated values in the planning area against the actual regulatory floodplain and will also take into account the depth-damage function in Hazus.

## 3.2.1 Total Exposure of Population and Structures

For the 2018 State Plan, SEMA utilized a structure inventory dataset developed by the University of Missouri GIS Department (MSDIS) to determine the number of structures exposed to risks. MSDIS created a point and/or footprint dataset for every roof line in every county in the state of Missouri. This dataset is attributed with the type of structure such as Residential, Commercial, etc. This dataset, along with additional State Mitigation Planning Resources was utilized throughout this section.

### Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2010 Census Bureau data. Building counts and building exposure values are based on parcel data developed by the State of Missouri Geographic Information Systems (GIS) database. This data, organized by County, is available on Google Drive through the link provided on the previous page. Contents exposure values were calculated by factoring a multiplier to the building exposure values based on usage type. The multipliers were derived from the Hazus and are defined below in **Table 3.3**. Land values have been purposely excluded from consideration because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Another reason for excluding land values is that state and federal disaster assistance programs generally do not address loss of land (other than crop insurance). It should be noted that the total valuation of buildings is based on county assessors' data which may not be current. In addition, government-owned properties are usually taxed differently or not at all, and so may not be an accurate representation of true value. Note that public school district assets and special districts assets are included in the total exposure tables assets by community and county.

**Table 3.3** shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated county and each incorporated city. For multi-county communities, the population and building data may include data on assets located outside the planning area. Finally, Table 3.4 provides the building count total for the county and each city in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

**Table 3.3. Maximum Population and Building Exposure by Jurisdiction**

| Jurisdiction | 2018 Annual Population Estimate | Building Count | Building Exposure ($) | Contents Exposure ($) | Total Exposure ($) |
|---|---|---|---|---|---|
| Scotland County | 2,953 | 6,414 | $247,829 | $136,109 | $383,666 |
| Memphis | 1,860 | 223 | $96,099 | $148,490 | $148,490 |
| Rutledge | 111 | 22 | $1,217 | $1,154 | $2,370 |
| Arbela | 42 | 7 | $103 | $25 | $128 |
| **Totals** | 4,966 | 6,666 | $344,975 | $189,678 | $534,653 |

Source: U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2018; Building Count and Building Exposure, Missouri GIS Database from SEMA Mitigation Management; Contents Exposure derived by applying multiplier to Building Exposure based on Hazus MH 2.1 standard contents multipliers per usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%). For purposes of these calculations, government, school, and utility were calculated at the commercial contents rate.

**Table 3.4. Building Counts by Usage Type for Scotland County**

| Jurisdiction | Agriculture | Commercial | Education | Government | Industrial | Residential | Total |
|---|---|---|---|---|---|---|---|
| Scotland County | 1 | 6,290 | 109 | 3 | 1 | 9 | 6,393 |
| Memphis | | 29 | 173 | 7 | 10 | 4 | 223 |
| Rutledge | | 7 | 13 | 1 | 1 | | 22 |
| Arbela | | 4 | 3 | | | | 7 |
| **Totals** | | 6,330 | 298 | 11 | 13 | 13 | 6,666 |

Source: Missouri GIS Database, SEMA Mitigation Management Section; Public School Districts and Special Districts

School districts assets are included in the tables above. However, more discrete school district data is provided below and was taken from the School District Data Collection Questionnaire, data provided by Missouri's Department of Elementary and Secondary Education (DESE) and district-maintained websites. The number of enrolled students at the participating public school districts is provided in **Table 3.5** below. Additional information includes the number of buildings, building values (building exposure) and contents value (contents exposure). These numbers will represent the total enrollment and building count for the public school districts regardless of the county in which they are located.

**Table 3.5. Population and Building Exposure by Jurisdiction-Public School Districts**

| Public School District | Enrolment | Building Count | Building Exposure ($) | Contents Exposure ($) | Total Exposure ($) |
|---|---|---|---|---|---|
| Scotland Count R-1 | 602 | 2 | $71,431,080 | Not Available | $71,431,080 |

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx.,

## 3.2.2 Critical and Essential Facilities and Infrastructure

This section will include information from the Data Collection Questionnaire and other sources concerning the vulnerability of participating jurisdictions' critical, essential, high potential loss, and transportation/lifeline facilities to identified hazards. Definitions of each of these types of facilities are provided below.

- Critical Facility: Those facilities essential in providing utility or direction either during the response to an emergency or during the recovery operation.
- Essential Facility: Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.
- High Potential Loss Facilities: Those facilities that would have a high loss or impact on the community.
- Transportation and lifeline facilities: Those facilities and infrastructure critical to transportation, communications, and necessary utilities.

**Table 3.6** includes a summary of the inventory of critical and essential facilities and infrastructure in the planning area. The list was compiled from the Data Collection Questionnaire as well as the following sources:

- Interviews with County Emergency Management Director
- Interviews with City Government Employees
- Hazus
- 2018 Missouri State Hazard Mitigation Plan and Hazard Mitigation Viewer

## Table 3.6. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

| Jurisdiction | Airport Facility | Bus Facility | Childcare Facility | Communications Tower | Electric Power Facility | Emergency Operations | Fire Service | Government | Housing | Shelters | Highway Bridge | Hospital/Health Care | Military | Pandemic | Natural Gas Facility | Nursing Homes | Police Station | Potable Water Facility | Rail | Sanitary Pump Stations | School Facilities | Stormwater Pump Stations | Tier II Chemical Facility | Wastewater Facility | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Scotland County | X | - | - | x | - | - | x | x | - | - | x | x | - | X | x | x | - | - | - | - | - | - | - | - | 9 |
| Memphis | X | - | X | X | X | - | X | X | X | - | - | X | - | X | - | X | X | x | - | X | X | - | - | X | 15 |
| Rutledge | - | - | - | - | - | - | X | X | - | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | 3 |
| Arbela | - | - | - | - | - | - | - | X | - | - | - | - | - | X | - | - | - | - | - | - | - | - | - | - | 2 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Totals** | 2 | 0 | 1 | 2 | 1 | 0 | 3 | 4 | 1 | 0 | 1 | 2 | 0 | 4 | 1 | 2 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 29 |

Source: Missouri 2018 State Hazard Mitigation Plan and Hazard Mitigation Viewer; Data Collection Questionnaires; Hazus, etc.

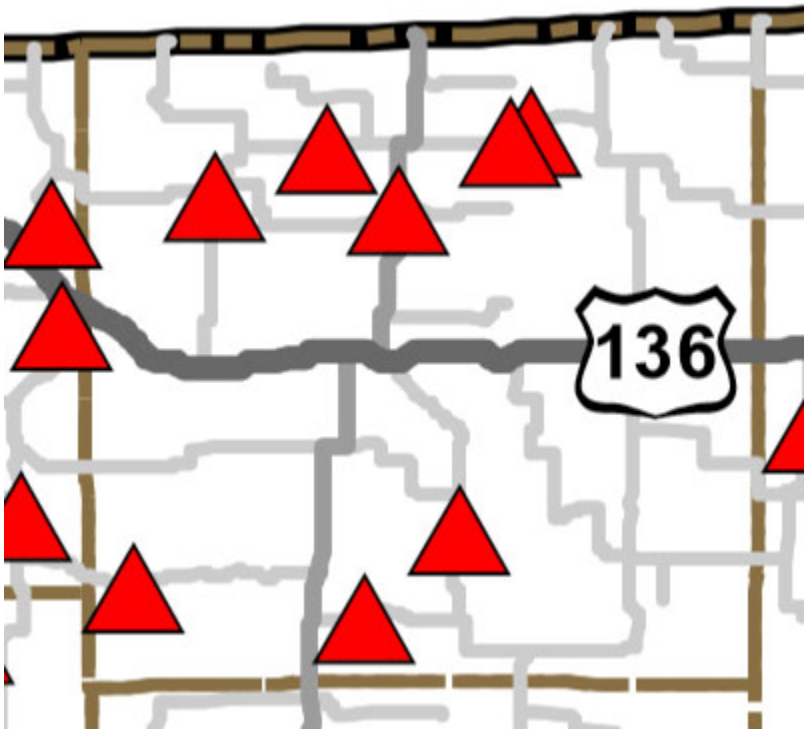
Table 3.8 and figure 3.1 below show Scotland County bridges. The table shows all bridges and the map shows bridges listed as Structurally Deficient Bridges.

The term “scour critical” refers to one of the database elements in the National Bridge Inventory. This element is quantified using a “scour index”, which is a number indicating the vulnerability of a bridge to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation determined to be unstable for the observed or evaluated scour condition.

**Table 3.7. Scotland County Bridges**

| County | Bridge Counts | | | | Bridge Area (Square Meters) | | | |
|---|---|---|---|---|---|---|---|---|
| | All | Good | Fair | Poor | All | Good | Fair | Poor |
| SCOTLAND (199) | 198 | 110 | 71 | 17 | 31,923 | 20,778 | 8,238 | 2,908 |

**Figure 3.1. Scotland County Structurally Deficient Bridges**




Source: https://www.modot.org/sites/default/files/documents/Statewide_Poor_Bridges_2019_with_insets.pdf

## 3.2.3 Other Assets

Assessing the vulnerability of the planning area to disaster also requires data on the natural, historic, cultural, and economic assets of the area. This information is important for many reasons.

- These types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- Knowing about these resources in advance allows for consideration immediately following a hazard event, which is when the potential for damages is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

Scotland County is home to several threatened and endangered species including the bats listed in the **Table 3.8** below.

**Table 3.8. Threatened and Endangered Species in Scotland County**

| Common Name | Scientific Name | Status |
|---|---|---|
| Gray Bat | Myotis Grisescens | Endangered |
| Indiana Bat | Myotis Sodalis | Endangered |
| Northern Long-eared Bat | Myotis Septentrionalis | Threatened |

Source: U.S. Fish and Wildlife Service, http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html; see also https://ecos.fws.gov/ipac/

Natural Resources: The Missouri Department of Conservation (MDC) provides a database of lands it owns, leases, or manages for public use. These assets are listed in Table 3.9 below for the Scotland County planning area.

**Table 3.9. Parks in Scotland County**

| Park / Conservation Area | Address | City |
|---|---|---|
| Ella Ewing Lake | From South Gorin, take Route U east 1 mile, and Route RA south 1.50 miles. | South Gorin |
| Indian Hills CA | From Memphis, take Highway 15 south 8 miles, then Route T west 3.50 miles, and south 1 mile at the area sign. | Memphis |
| Memphis (Lake Show Me) | From Memphis, take Highway 136 west 2 miles, then Lake Showme Drive (gravel) south 1 mile. | Memphis |
| City of Memphis Pool & Park | 125 W. Jefferson | Memphis |

Source: http://mdc7.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=guest&txtAreaNm=s

Historic Resources: The National Register of Historic Places is the official list of registered cultural resources worthy of preservation. It was authorized under the National Historic Preservation Act of 1966 as part of a national program. The purpose of the program is to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering, and culture.

The table below lists the Scotland County properties that are included in the National Register of Historic Places.

**Table 3.10. Scotland County Properties on the National Register of Historic Places**

| Property | Address | City | Date Listed |
|---|---|---|---|
| Bible Grove Consolidated School District | South Side of Route T | Bible Grove | 05/05/2000 |
| Downing House | 311 S. Main | Memphis | 06/27/1979 |
| Rutledge School | 142 2nd Street | Rutledge | 01/31/2017 |

Source: Missouri Department of Natural Resources – Missouri National Register Listings by County http://dnr.mo.gov/shpo/mnrlist.htm

Economic Resources: Table 3.12 below shows non-government (private) employers with 10 or more employees operating within Scotland County.

**Table 3.11. Major Non-Government Employers in Scotland County**

| Employer Name | Main Locations | Product or Service | Employees |
|---|---|---|---|
| Pepsi Cola | Memphis | Soft Drink Manufacture | 35 |
| Scotland County Hospital | Memphis | Medical | 200 |
| Scotland County Nursing Home | Memphis | Medical | 40 |
| All States Manufacturing | Memphis | Machine Bases | 28 |

Source: Data Collection Questionnaires; local Economic Development Commissions

According to the USDA's 2012 Census of Agriculture, there are 674 farms in Scotland County for a total of 244,169 acres. This compares to 99,171 farms in Missouri and 28,166,137 acres. The average size farm in Scotland County is 362 acres while the state average is at 285 acres. The number of farms in Scotland County in 2012 is a 6% decrease in the number from 2007.

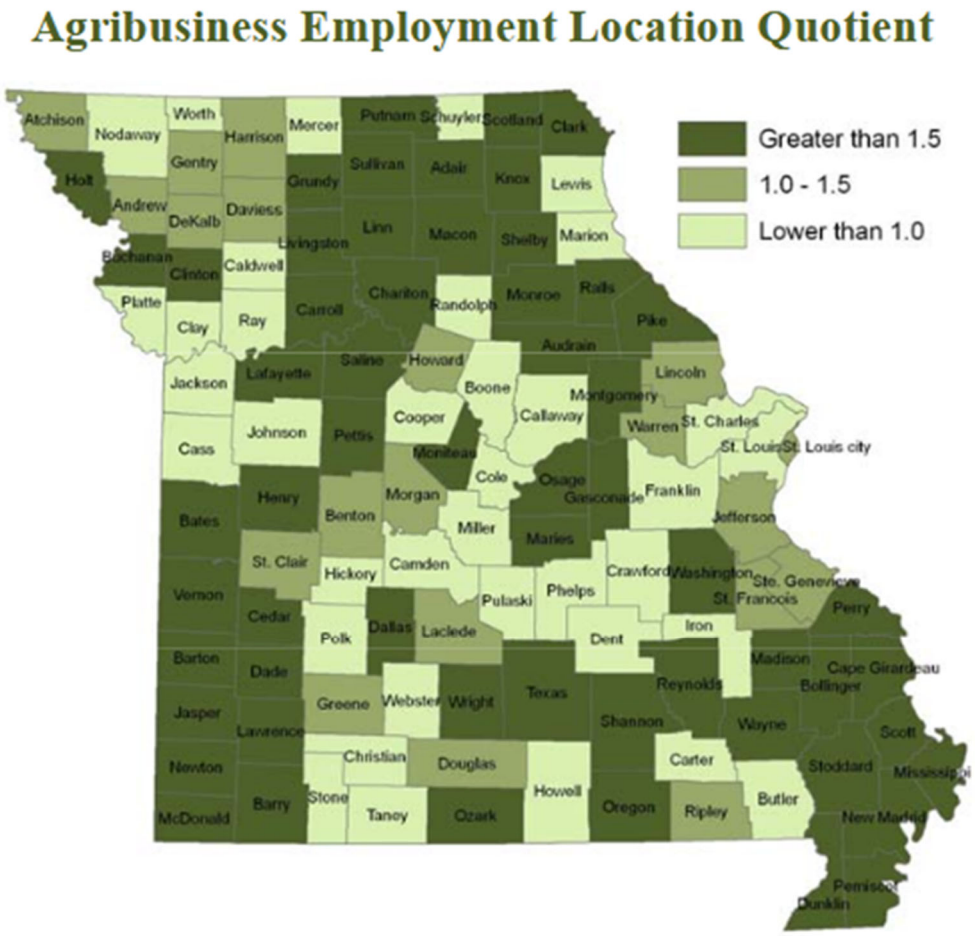
## Table 3.12. Agriculture-Related Jobs in Scotland County

### Hired Farm Labor – Workers and Payroll: 2012

[For meaning of abbreviations and symbols, see introductory text.]

| Item | | Scotland |
|---|---|---|
| Hired farm labor | farms | 124 |
| | workers | 264 |
| | $1,000 payroll | 1,253 |
| Farms with- | | |
| 1 worker | farms | 64 |
| | workers | 64 |
| 2 workers | farms | 31 |
| | workers | 62 |
| 3 or 4 workers | farms | 19 |
| | workers | (D) |
| 5 to 9 workers | farms | 9 |
| | workers | 65 |
| 10 workers or more | farms | 1 |
| | workers | (D) |
| Workers by days worked: | | |
| 150 days or more | farms | 53 |
| | workers | 79 |
| Farms with- | | |
| 1 worker | farms | 40 |
| | workers | 40 |
| 2 workers | farms | 5 |
| | workers | 10 |
| 3 or 4 workers | farms | 7 |
| | workers | (D) |
| 5 to 9 workers | farms | 1 |
| | workers | (D) |
| 10 workers or more | farms | - |
| | workers | - |
| Less than 150 days | farms | 86 |
| | workers | 185 |
| Farms with- | | |
| 1 worker | farms | 39 |
| | workers | 39 |
| 2 workers | farms | 27 |
| | workers | 54 |
| 3 or 4 workers | farms | 12 |
| | workers | 38 |
| 5 to 9 workers | farms | 8 |
| | workers | 54 |
| 10 workers or more | farms | - |
| | workers | - |
| Reported only workers working 150 days or more | farms | 38 |
| | workers | 53 |
| | $1,000 payroll | 518 |
| Reported only workers working less than 150 days | farms | 71 |
| | workers | 142 |
| | $1,000 payroll | 255 |
| Reported both - workers working 150 days or more and workers working less than 150 days | farms | 15 |
| | 150 days or more, workers | 26 |
| | less than 150 days, workers | 43 |
| | $1,000 payroll | 481 |
| Total migrant workers (see text) | farms | - |
| | workers | - |
| Migrant farm labor on farms with hired labor | farms | - |
| | workers | - |
| Migrant farm labor on farms reporting only contract labor | farms | - |
| | workers | - |
| Unpaid workers (see text) | farms | 266 |
| | workers | 656 |

**Figure 3.2. Agribusiness Employment Location Quotient**



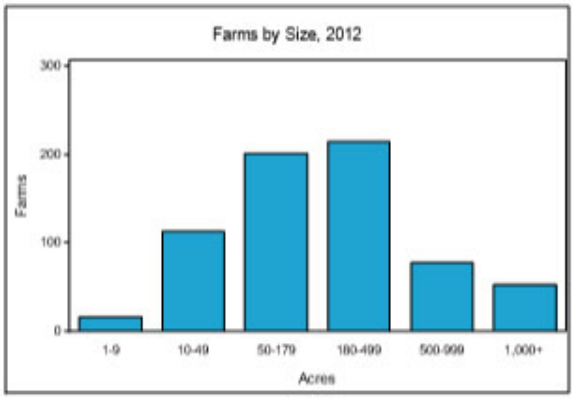

Source: https://www.missourieconomy.org/pdfs/missouri_farms_and_agribusiness.pdf

**Figure 3.3. 2012 Census of Agriculture, Scotland County**

2012 CENSUS OF AGRICULTURE
COUNTY PROFILE

## Scotland County
## Missouri

| | 2012 | 2007 | % change |
|---|---|---|---|
| **Number of Farms** | 674 | 716 | - 6 |
| **Land in Farms** | 244,169 acres | 231,697 acres | + 5 |
| **Average Size of Farm** | 362 acres | 324 acres | + 12 |
| **Market Value of Products Sold** | $82,186,000 | $53,203,000 | + 54 |
| Crop Sales $36,718,000 (45 percent)<br>Livestock Sales $45,468,000 (55 percent) | | | |
| Average Per Farm | $121,937 | $74,306 | + 64 |
| **Government Payments** | $4,627,000 | $4,444,000 | + 4 |
| Average Per Farm Receiving Payments | $9,804 | $8,154 | + 20 |



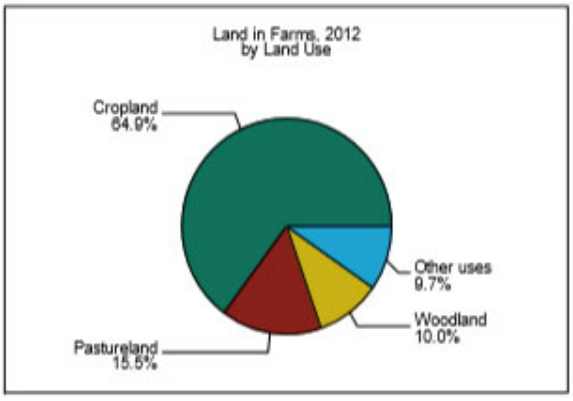



**Figure 3.4. Scotland County Agriculture Data**

2012 CENSUS OF AGRICULTURE
COUNTY PROFILE

# Scotland County – Missouri

## Ranked items among the 114 state counties and 3,079 U.S. counties, 2012

| Item | Quantity | State Rank | Universe [1] | U.S. Rank | Universe [1] |
|---|---|---|---|---|---|
| **MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD ($1,000)** | | | | | |
| Total value of agricultural products sold | 82,186 | 42 | 114 | 1,346 | 3,077 |
| Value of crops including nursery and greenhouse | 36,718 | 45 | 114 | 1,349 | 3,072 |
| Value of livestock, poultry, and their products | 45,468 | 28 | 114 | 968 | 3,076 |
| **VALUE OF SALES BY COMMODITY GROUP ($1,000)** | | | | | |
| Grains, oilseeds, dry beans, and dry peas | 34,258 | 44 | 114 | 1,014 | 2,926 |
| Tobacco | - | - | 12 | - | 436 |
| Cotton and cottonseed | - | - | 7 | - | 635 |
| Vegetables, melons, potatoes, and sweet potatoes | 23 | 90 | 109 | 2,417 | 2,802 |
| Fruits, tree nuts, and berries | 21 | 82 | 107 | 2,133 | 2,724 |
| Nursery, greenhouse, floriculture, and sod | 27 | 94 | 107 | 2,364 | 2,678 |
| Cut Christmas trees and short rotation woody crops | - | - | 55 | - | 1,530 |
| Other crops and hay | 2,389 | 34 | 113 | 1,183 | 3,049 |
| Poultry and eggs | 18 | 80 | 113 | 2,116 | 3,013 |
| Cattle and calves | 15,494 | 54 | 114 | 992 | 3,056 |
| Milk from cows | 9,432 | 7 | 96 | 517 | 2,038 |
| Hogs and pigs | 20,434 | 13 | 109 | 267 | 2,827 |
| Sheep, goats, wool, mohair, and milk | 77 | 74 | 110 | 1,583 | 2,988 |
| Horses, ponies, mules, burros, and donkeys | (D) | 113 | 114 | 2,877 | 3,011 |
| Aquaculture | - | - | 46 | - | 1,366 |
| Other animals and other animal products | (D) | 90 | 114 | (D) | 2,924 |
| **TOP CROP ITEMS (acres)** | | | | | |
| Soybeans for beans | 55,106 | 46 | 111 | 556 | 2,162 |
| Corn for grain | 37,531 | 38 | 108 | 718 | 2,638 |
| Forage-land used for all hay and haylage, grass silage, and greenchop | 25,089 | 64 | 114 | 760 | 3,057 |
| Corn for silage | 2,984 | 11 | 101 | 593 | 2,237 |
| Wheat for grain, all | 1,604 | 69 | 108 | 1,451 | 2,537 |
| **TOP LIVESTOCK INVENTORY ITEMS (number)** | | | | | |
| Hogs and pigs | 50,280 | 11 | 108 | 285 | 2,889 |
| Cattle and calves | 24,347 | 67 | 114 | 1,166 | 3,063 |
| Layers | 845 | 90 | 113 | 2,000 | 3,040 |
| Horses and ponies | 360 | 104 | 114 | 2,372 | 3,072 |
| Sheep and lambs | 358 | 74 | 109 | 1,699 | 2,897 |

## Other County Highlights, 2012

| Economic Characteristics | Quantity |
|---|---|
| Farms by value of sales: | |
| Less than $1,000 | 207 |
| $1,000 to $2,499 | 20 |
| $2,500 to $4,999 | 35 |
| $5,000 to $9,999 | 49 |
| $10,000 to $19,999 | 47 |
| $20,000 to $24,999 | 31 |
| $25,000 to $39,999 | 55 |
| $40,000 to $49,999 | 23 |
| $50,000 to $99,999 | 62 |
| $100,000 to $249,999 | 60 |
| $250,000 to $499,999 | 44 |
| $500,000 or more | 41 |
| Total farm production expenses ($1,000) | 75,844 |
| Average per farm ($) | 112,529 |
| Net cash farm income of operation ($1,000) | 21,996 |
| Average per farm ($) | 32,636 |

| Operator Characteristics | Quantity |
|---|---|
| Principal operators by primary occupation: | |
| Farming | 316 |
| Other | 358 |
| Principal operators by sex: | |
| Male | 621 |
| Female | 53 |
| Average age of principal operator (years) | 55.9 |
| All operators by race [2]: | |
| American Indian or Alaska Native | 3 |
| Asian | - |
| Black or African American | - |
| Native Hawaiian or Other Pacific Islander | - |
| White | 1,046 |
| More than one race | 5 |
| All operators of Spanish, Hispanic, or Latino Origin [2] | 1 |

See "Census of Agriculture, Volume 1, Geographic Area Series" for complete footnotes, explanations, definitions, and methodology.
- Represents zero. (D) Withheld to avoid disclosing data for individual operations.
[1] Universe is number of counties in state or U.S. with item. [2] Data were collected for a maximum of three operators per farm.

# 3.3 LAND USE AND DEVELOPMENT

## 3.3.1 Development Since Previous Plan Update

Population growth in Scotland County has been on the increase since 2010. The Unincorporated Scotland County and each participating jurisdiction saw only a very slight increase due to natural population increase and there is not a particular event causing the increase in population.

The population table below shows a significant and steady increase in population across all communities during the period between 2010 and ACS 2017 Five-Year Estimate. This is contrary to the change in housing unit table, also below, that shows a significant increase in housing across all cities and the county except for Memphis which shows a slight decrease. This can be explained due to errors in the ACS estimates.

**Table 3.13. County Population Growth, 2010-2018**

| Jurisdiction | Total Population 2010 | Total Population 2018 | 2010-2018 # Change | 2000-2018 % Change |
|---|---|---|---|---|
| Scotland County | 4,843 | 4,966 | 123 | 2.53% |
| Memphis | 1,822 | 1,860 | 38 | 2.08% |
| Rutledge | 109 | 111 | 2 | 1.83% |
| Arbela | 41 | 42 | 1 | 2.44% |

Source: U.S. Bureau of the Census, Decennial Census, Annual Population Estimates, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the Census bureau

Population growth or decline is generally accompanied by increases or decreases in the number of housing units. All jurisdictions show an increase in housing. When American Factfinder was utilized for this information it shows Scotland County as having a significant increase in housing units. After visiting with the county it was verified they did not have a significant increase in housing units.

**Table 3.14. Change in Housing Units, 2010-2017**

| Jurisdiction | Housing Units 2010 | Housing Units 2017 | 2010-2017 # Change | 2000-2017 % Change |
|---|---|---|---|---|
| Scotland County | 1,880 | 2,367 | 487 | 25.90% |
| Memphis | 994 | 974 | 20 | -2.01% |
| Rutledge | 38 | 69 | 31 | 81.58% |
| Arbela | 20 | 34 | 14 | 70% |

Source: U.S. Bureau of the Census, Decennial Census, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the U.S. Census Bureau

U.S. Census information is compiled every 10 years, with the last Census completed in 2010 estimates were used for the above data. According to the American Fact Finder estimates show that in 2017 the number of housing units were expected to increase in all jurisdictions within Scotland County. Vulnerability to hazards will be affected based on population, and where new housing units have been built. Due to city ordinances, vulnerability is not expected to increase as ordinances for new builds have been set to protect citizens.

## 3.3.2 Future Land Use and Development

### *Scotland County and participating jurisdictions*

Scotland County and the participating jurisdictions are in a very rural area of Northeast Missouri and it is very difficult to attract new development due to the inability to attract employers to the area. The County or participating jurisdictions did not indicate any future growth on the data questionnaires.

### *School District's Future Development*

Enrollment in the county's only school district, Scotland County R-1 for the 2019-2020 school year stands at 602 students. One elementary and a high school serve the students with the schools located in Memphis. There are no plans in the next five years for any additions or renovations for K - 12.

## 3.4 HAZARD PROFILES, VULNERABILITY, AND PROBLEM STATEMENTS

Each hazard will be analyzed individually in a hazard profile. The profile will consist of a general hazard description, location, strength/magnitude/extent, previous events, future probability, a discussion of risk variations between jurisdictions, and how anticipated development could impact risk. At the end of each hazard profile will be a vulnerability assessment, followed by a summary problem statement.

### Hazard Profiles

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

Each hazard identified in this section will be profiled individually for easier reference. The level of information presented in the profiles will vary by hazard based on the information available. With each update of this plan, new information will be incorporated to provide better evaluation and prioritization of the hazards that affect the planning area. Detailed profiles for each of the identified hazards include information categorized as follows:

- **Hazard Description:** This section consists of a general description of the hazard and the types of impacts it may have on a community or school/special district.
- **Geographic Location:** This section describes the geographic areas in the planning area that are affected by the hazard. Where available, use maps to indicate the specific locations of the planning area that are vulnerable to the subject hazard. For some hazards, the entire planning area is at risk.
- **Strength/Magnitude/Extent:** This includes information about the strength, magnitude, and extent of a hazard. For some hazards, this is accomplished with description of a value on an established scientific scale or measurement system, such as an EF2 tornado on the Enhanced Fujita Scale. This section should also include information on the typical or expected strength/magnitude/extent of the hazard in the planning area. Strength, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the strength/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Strength/magnitude/extent defines the characteristics of the hazard regardless of the people and property it affects.
- **Previous Occurrences:** This section includes available information on historic incidents and their impacts. Historic event records form a solid basis for probability calculations. Tables are a good way to convey this data when available. When data is available, tables showing random events for the past 20 years are included.
- **Probability of Future Occurrence:** The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability can be determined by dividing the number of recorded events by the number of years of available data and multiplying by 100. This gives the percent chance of the event happening in any given year. For events occurring more than once annually, the probability should be reported as 100% in any given year, with a statement of the average number of events annually. For hazards such as drought that may have gradual onset and extended duration, probability can be based on the number of months in drought in a given time-period and expressed as the probability for any given month to be in drought.

- **Changing Future Conditions Considerations:** In addition to the probability of future occurrence changing future conditions were considered, including the effects of long-term changes in weather patterns and climate on the identified hazards.

## Vulnerability Assessments

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

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

**Requirement §201.6(c)(2)(ii)(B) :[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

**Requirement §201.6(c)(2)(ii): (As of October 1, 2008) [The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged in floods.**

The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments should be based on the best available data. The vulnerability assessments can also be based on data that was collected for the 2018 State Hazard Mitigation Plan Update. With the 2018 Hazard Mitigation Plan Update, SEMA is pleased to provide online access to the risk assessment data and associated mapping for the 114 counties in the State, including the independent City of St. Louis. Through the web-based Missouri Hazard Mitigation Viewer, local planners or other interested parties can obtain all State Plan datasets. This effort removes from local mitigation planners a barrier to performing all the needed local risk assessments by providing the data developed during the 2018 State Plan Update.

The Missouri Hazard Mitigation Viewer includes a Map Viewer with a legend of clearly labeled features, a north arrow, a base map that is either aerial imagery or a street map, risk assessment data symbolized the same as in the 2018 State Plan for easy reference, search and query capabilities, ability to zoom to county level data and capability to download PDF format maps. The Missouri Hazard Mitigation Viewer can be found at this link: http://bit.ly/MoHazardMitigationPlanViewer2018.

The vulnerability assessments in the Scotland County plan will also be based on:

- Written descriptions of assets and risks provided by participating jurisdictions;
- Existing plans and reports;
- Personal interviews with planning committee members and other stakeholders; and
- Other sources as cited.

Within the Vulnerability Assessment, the following sub-headings will be addressed:

**Vulnerability Overview:**

This section consists of a general overview narrative of the planning area's vulnerability to the hazard. Within this section, the magnitude/severity of the hazard is discussed. The magnitude of the impact of a hazard event (past and perceived) is related directly to the vulnerability of the people, property, and the environment it affects. This is a function of when the event occurs, the location affected, the resilience of the community and the effectiveness of the emergency response and disaster recovery efforts.

**Potential Losses to Existing Development:**

This section provides the potential losses to existing development. Where data is available, this section provides estimated financial losses as well as the methodology used. For hazards with an overall "Low" rating, potential losses may not be discussed.

**Previous and Future Development:**

This section provides information on how vulnerability to this hazard will be impacted by planned future development as well as information for jurisdictions to consider in planning future development.

**Hazard Summary by Jurisdiction:**

For hazard risks that vary by jurisdiction, this section will provide an overview how the hazard varies, followed by a table indicating the probability, magnitude, warning time, and duration rankings for each jurisdiction with the resulting hazard score and level.

## Problem Statements

Each hazard analysis must conclude with a brief summary of the problems created by the hazard in the planning area, and possible ways to resolve those problems. Jurisdiction-specific information in those cases where the risk varies across the planning area will be included.

## 3.4.1 Flooding (Riverine and Flash)

### Hazard Profile

#### *Hazard Description*

A flood is partial or complete inundation of normally dry land areas. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, or ice. There are several types of riverine floods, including headwater, backwater, interior drainage, and flash flooding. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms "base flood" and "100- year flood" refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Flooding caused by dam failure is discussed in Section 3.4.2. It will not be addressed in this section.

A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP) and can also happen in areas not associated with floodplains.

Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation.

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow.

Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with rainfall trends and rainfall extremes all demonstrate the high probability, yet generally unpredictable nature of flash flooding in the planning area.

Although flash floods are somewhat unpredictable, there are factors that can point to the likelihood of flash floods occurring. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. This, along with knowledge of the watershed characteristics, modeling techniques, monitoring, and advanced warning systems has increased the warning time for flash floods.

### *Geographic Location*

Riverine flooding can occur in any low-lying areas of Scotland County which is adjacent to rivers and creeks during periods of heavy rain when ground is saturated. Many rural roads within the County are dependent upon low water crossings which are not navigable during periods of high water. During times of flooding, these low water crossings can present a risk to life and property if an attempt to cross is made.

According to the National Mapping System, major rivers and creeks in Scotland County include Little Fox River, North Wyaconda River, Bear Creek, South Wyaconda River, North Fork Fabius River, Middle Fabius River, Bridge Creek, North Fork, South Fabius River, Carter Creek and North Fabius River. The following pages show 100-year Flood Zone maps for Scotland County and its communities.

**Figure 3.5. RiskMap, DFIRM and Hazus based Depth Grids used in Hazus Analysis**

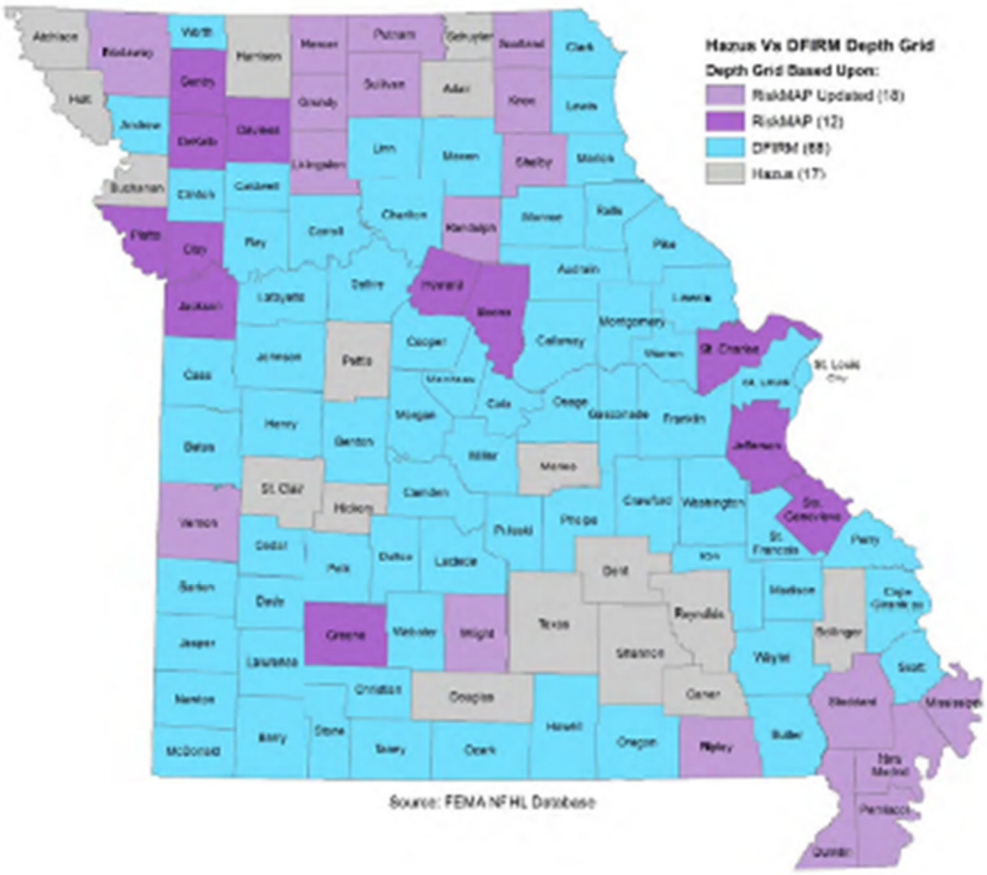


**Figure 3.6. City of Memphis**

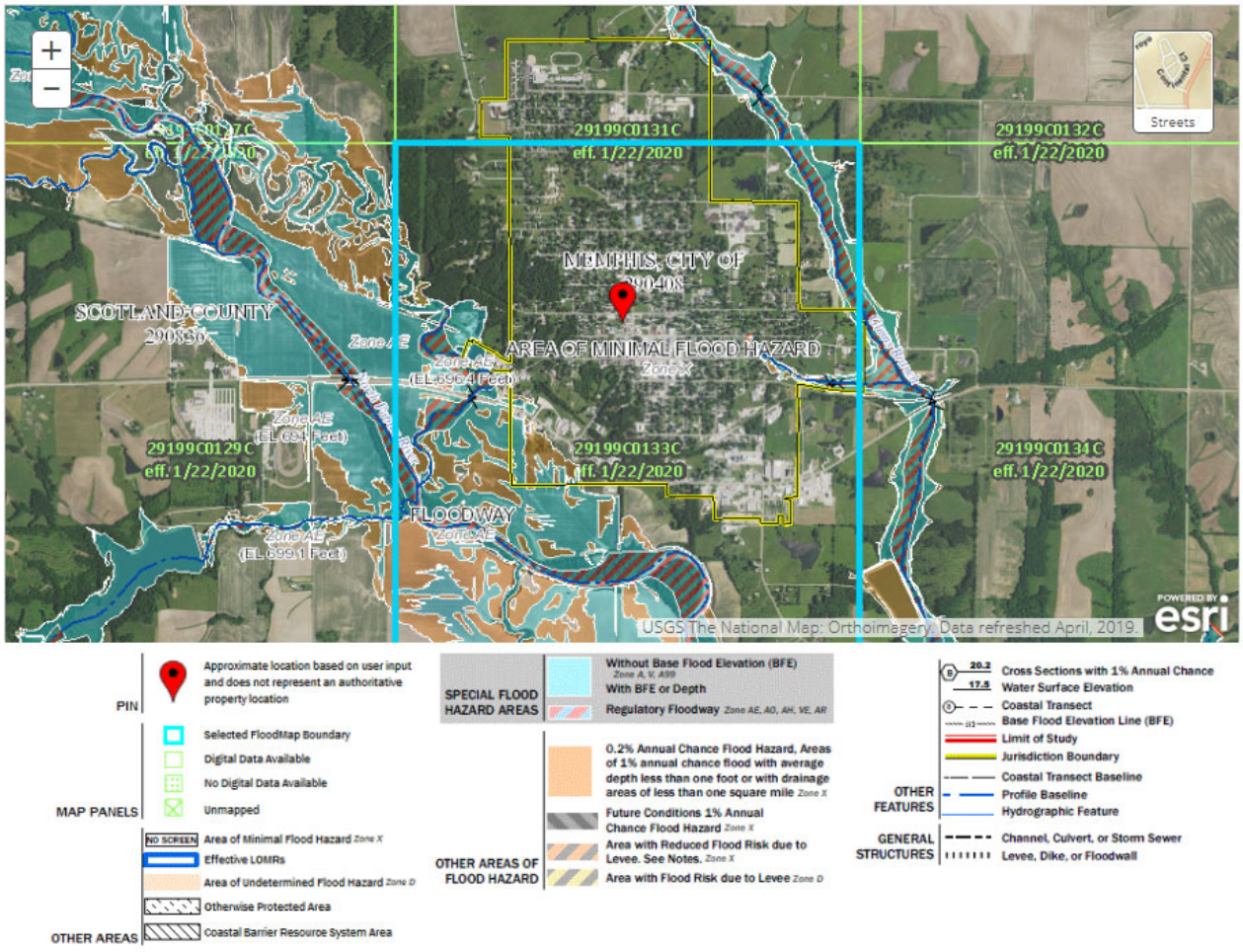



**Figure 3.7. Village of South Gorin**

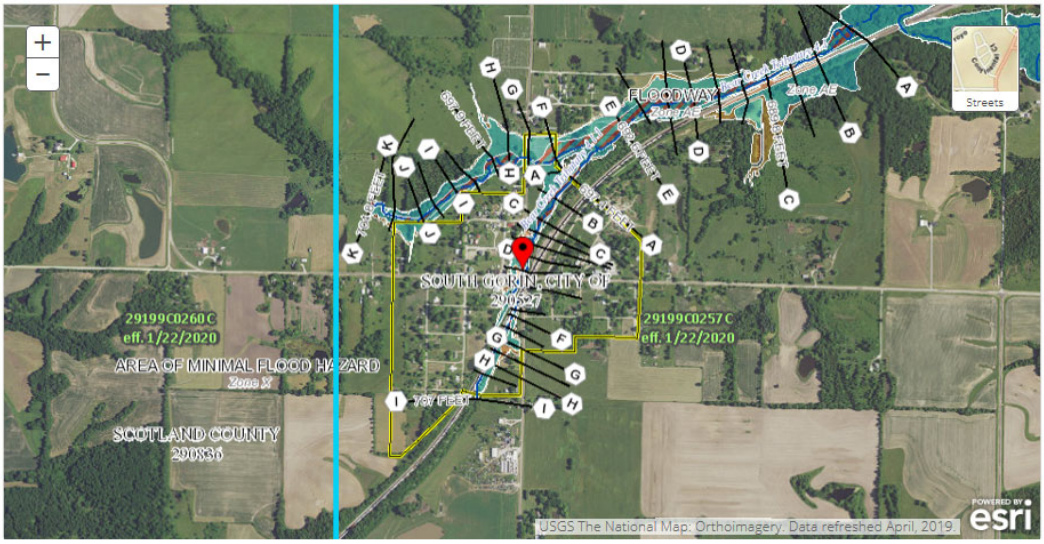


**Figure 3.8. Village of Granger**


**Figure 3.9. City of Rutledge**

**Figure 3.10. Village of Arbela**

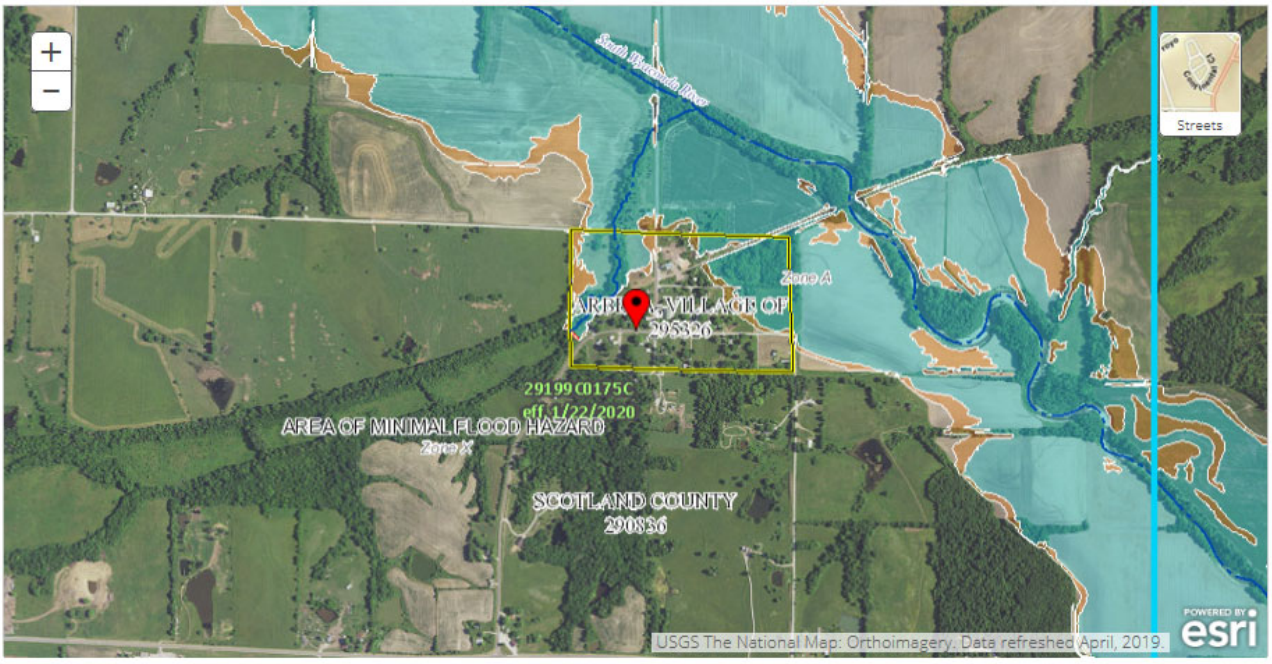



**Figure 3.11. Scotland County R-1 School District**

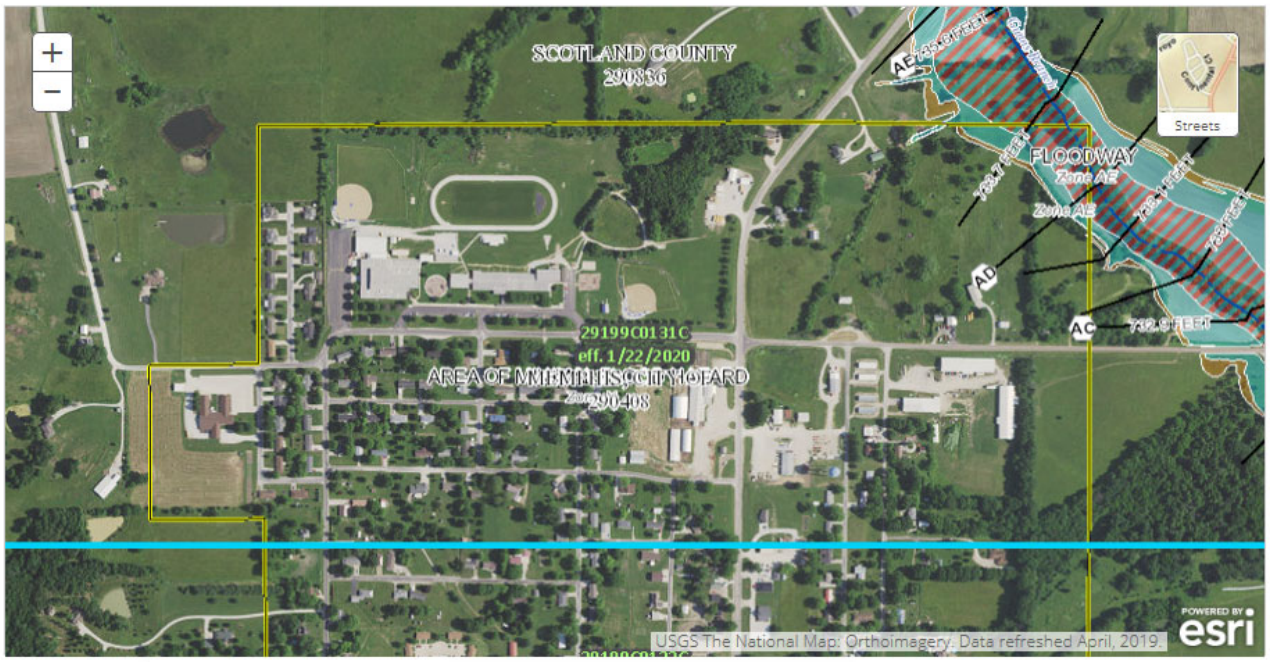
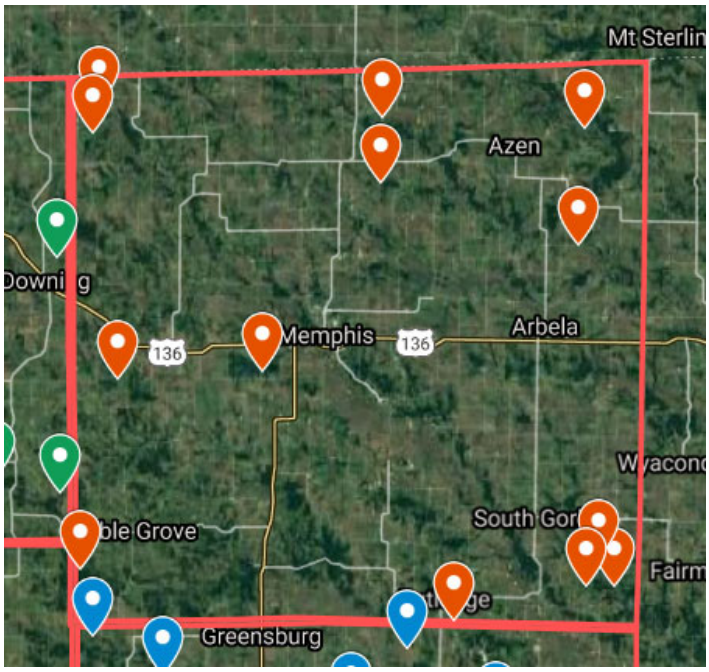


**Figure 3.12. Low Water Crossings in Scotland County**




The following National Centers for Environmental Information table shows 2 flood events from the last 21 years. The data includes events for flooding and flashing flooding. Twenty years of history is generally adequate for a trend analysis. Although only 2 events are recorded for Scotland County during the past 21 years, this is considered adequate to establish risk in Scotland County.

**Table 3.15. Scotland County NCEI Flood Events by Location, 1999-2019**

| Location | # of Events |
|---|---|
| Unincorporated Scotland County | 1 |
| Memphis | 1 |

Source: National Centers for Environmental Information, March 1, 2020

Special Flood Hazard Areas (SFHA's) are areas where flash flooding occurs and those locations in the planning area that are low-lying. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events. Flash flood events that occurred in those areas are listed in the table below. Scotland County has not SFHA's.

**Table 3.16. Scotland County NCEI Flash Flood Events by Location, 1999-2019**

| Location | # of Events |
|---|---|
| Unincorporated County | 17 |
| Memphis | 5 |
| South Gorin | 1 |

Source: National Centers for Environmental Information, March 1, 2020

***Strength/Magnitude/Extent***

Missouri has a long and active history of flooding over the past century, according to the 2018 State Hazard Mitigation Plan. Flooding along Missouri's major rivers generally results in slow-moving disasters. River crest levels are forecast several days in advance, allowing communities downstream sufficient time to take protective measures, such as sandbagging and evacuations. Nevertheless, floods exact a heavy toll in terms of human suffering and losses to public and private property. By

contrast, flash flood events in recent years have caused a higher number of deaths and major property damage in many areas of Missouri.

According to the U.S. Geological Survey, two critical factors affect flooding due to rainfall: rainfall duration and rainfall intensity – the rate at which it rains. These factors contribute to a flood's height, water velocity and other properties that reveal its magnitude.

### *National Flood Insurance Program (NFIP) Participation*

NFIP participation for the communities in the planning area is shown below. Information in the chart was taken between January 1, 1978 and March 1, 2020. Sanctioned (S) communities are those communities that are not currently participating in the NFIP and where a Flood Hazard Boundary Map of Flood Insurance Rate Map has been issued.

Scotland County, Gorin, Granger, Rutledge and Arbela do not currently participate in NFIP due to no significant damages from past flooding events.

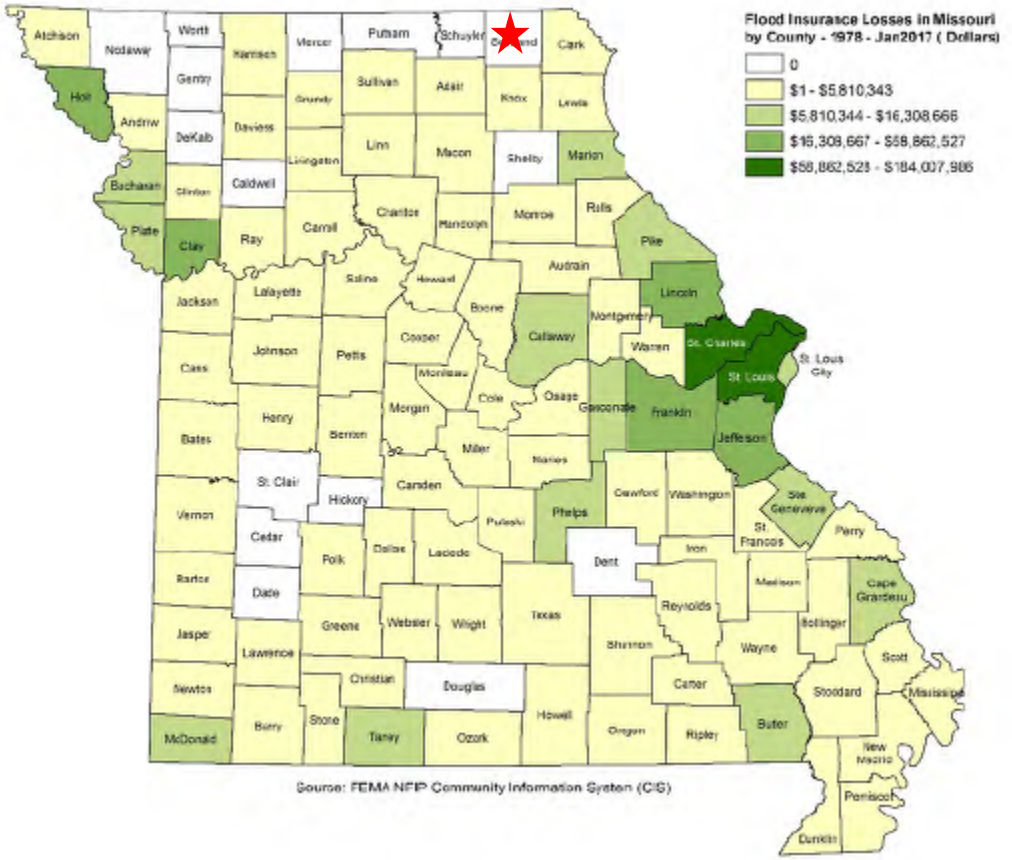
**Table 3.17. NFIP Participation in Scotland County**

| Community ID # | Community Name | NFIP Participant (Y/N/Sanctioned) | Current Effective Map Date | Regular-Emergency Program Entry Date |
|---|---|---|---|---|
| | Scotland County | S | | |
| 290408A | Memphis | Y | 05/24/77 | 01/22/20 |
| | Gorin | N | | |
| | Granger | N | | |
| | Rutledge | N | | |
| | Arbela | S | | |

Source: NFIP Community Status Book, Date; BureauNet, http://www.fema.gov/national-flood-insurance-program/national- flood-insurance-program-community-status-book; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program

There are no NFIP policies in force in Scotland County.

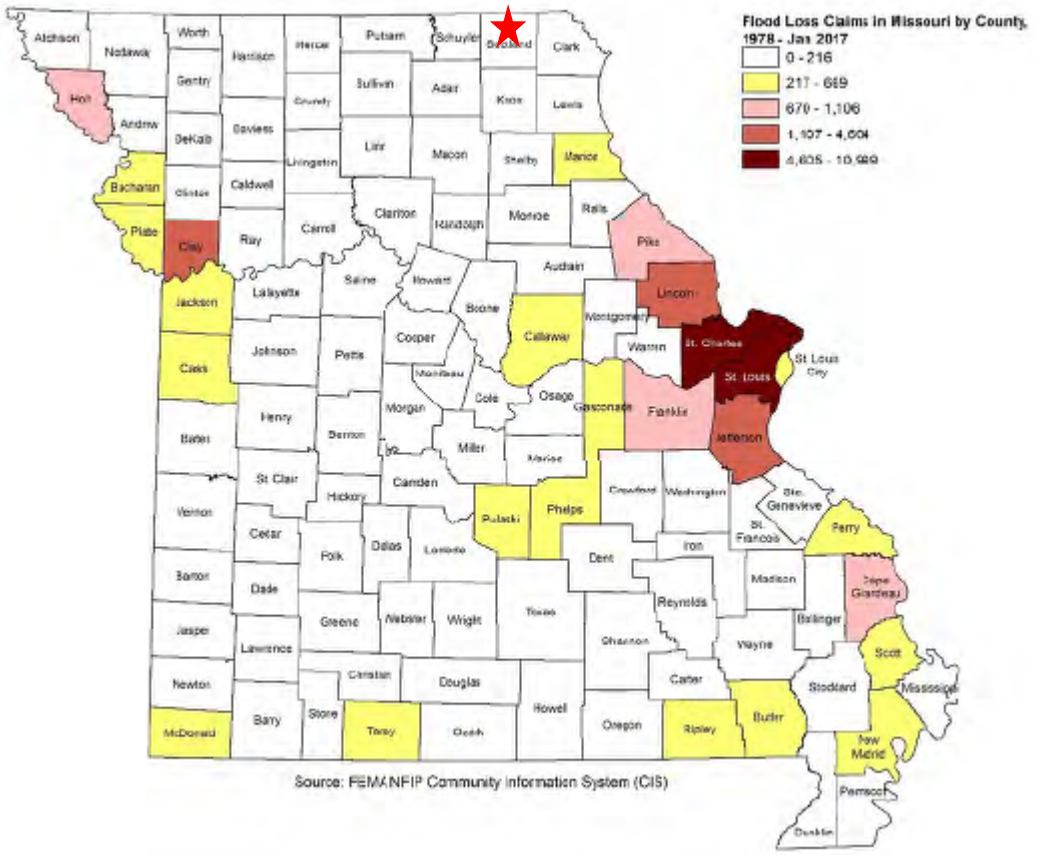
**Figure 3.13. Map of Dollars Paid Historically for Flood Insurance Losses in Missouri by County, 1978 – January 2017**




Source: 2018 Missouri State Hazard Mitigation Plan, * Red star shows Scotland County

Figure 3.14 shows during the period of 1978 – Janaury 2017, Scotland County has no flood insurance payments during this time.

**Figure 3.14. Flood Loss Claims in Missouri by County, 1978 – January 2017**




Source: 2018 Missouri State Hazard Mitigation Plan *Red Star shows Scotland County

### *Repetitive Loss/Severe Repetitive Loss Properties*

Repetitive Loss Properties are those properties with at least two flood insurance payments of $1,000 each have been paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of zero repetitive loss properties.

There are no validated Severe Repetitive Loss Properties in Scotland County.

**Severe Repetitive Loss (SRL)**

A SRL property is defined it as a single family property (consisting of one-to-four residences) that is covered under flood insurance by the NFIP; and has (1) incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage with the amount of each claim payment exceeding $5,000 and with cumulative amounts of such claims payments exceeding $20,000; or (2) for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

There are no validated Severe Repetitive Loss Properties in Scotland County.

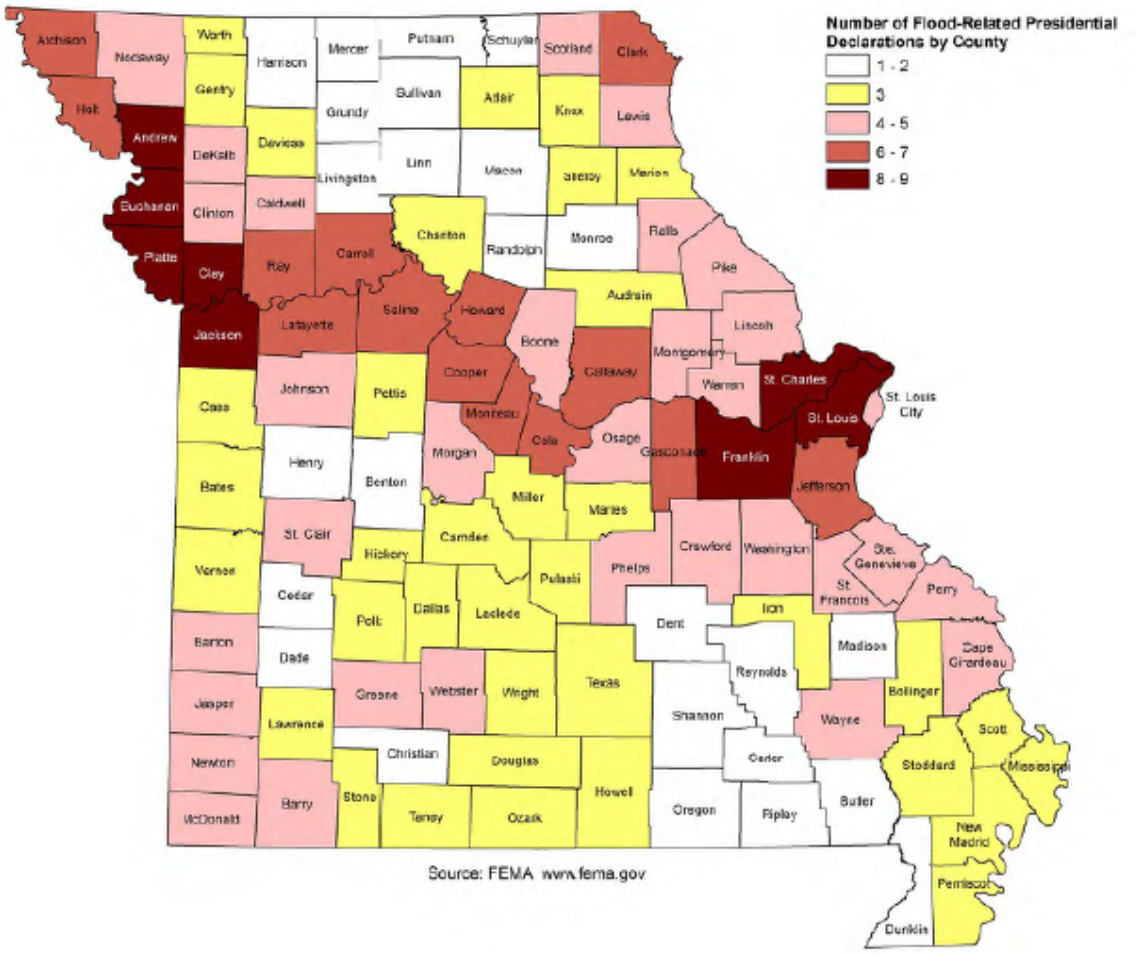
### *Previous Occurrences*

**Table 3.18. Scotland County Presidential Declared Flood Events 1999- 2019**

| Declaration Number | Declaration Date | Disaster Description | Total Estimated Damage |
|---|---|---|---|
| FEMA-4238-DR | 08/10/2015 | Severe Storms and Flooding | $51,384,706 |
| FEMA-4451-DR | 07/09/2019 | Severe Storms, Flooding and Tornadoes | $7,7370,721 |
| FEMA-1809-DR | 11/13/2008 | Severe Storms, Flooding and Tornadoes | $21,572,803 |
| FEMA-1934-DR | 09/20/2010 | Severe Storms, Flooding and Tornadoes | $17,450,052 |
| FEMA-1773-DR | 09/12/2008 | Severe Storms and Flooding | $28,697,245 |

Source: FEMA.GOV, March 2020

**Figure 3.15. Number of Flood-Related Presidential Declarations by County**




Source: 2018 Missouri State Hazard Mitigation Plan, *Red star shows Scotland County

NCEI information for the last 21 years for flash flood and riverine events are shown in Table 3.19 and 3.20.

**Table 3.19. NCEI Scotland County Flash Flood Events Summary, 1999 to 2019**

| Year | # of Events | # of Deaths | # of Injuries | Property Damages | Crop Damages |
|---|---|---|---|---|---|
| 2001 | 2 | 0 | 0 | $0 | $0 |
| 2002 | 4 | 0 | 0 | $0 | $0 |
| 2007 | 1 | 0 | 0 | $5,000 | $0 |
| 2008 | 3 | 0 | 0 | $50,000 | $0 |
| 2009 | 1 | 0 | 0 | $0 | $0 |
| 2010 | 7 | 0 | 0 | $220,000 | $0 |
| 2011 | 4 | 0 | 0 | $25,000 | $0 |
| 2015 | 4 | 0 | 0 | $0 | $0 |
| 2019 | 1 | 0 | 0 | $0 | $0 |

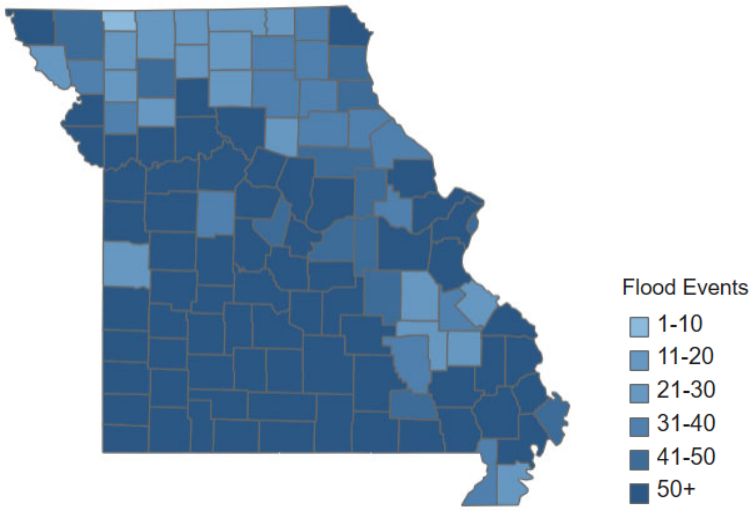
Source: NCEI, data accessed March 2020

**Table 3.20. NCEI Scotland County Riverine Flood Events Summary, 1999 to 2019**

| Year | # of Events | # of Deaths | # of Injuries | Property Damages | Crop Damages |
|---|---|---|---|---|---|
| 2010 | 1 | 0 | 0 | $100,000 | $0 |
| 2014 | 1 | 0 | 0 | $0 | $0 |

Source: NCEI, March 2020

**Figure 3.16. Historical Flood Impact for Scotland County**




Source: https://www.fema.gov/data-visualization-floods-data-visualization *Red star shows Scotland County

### *Probability of Future Occurrence*

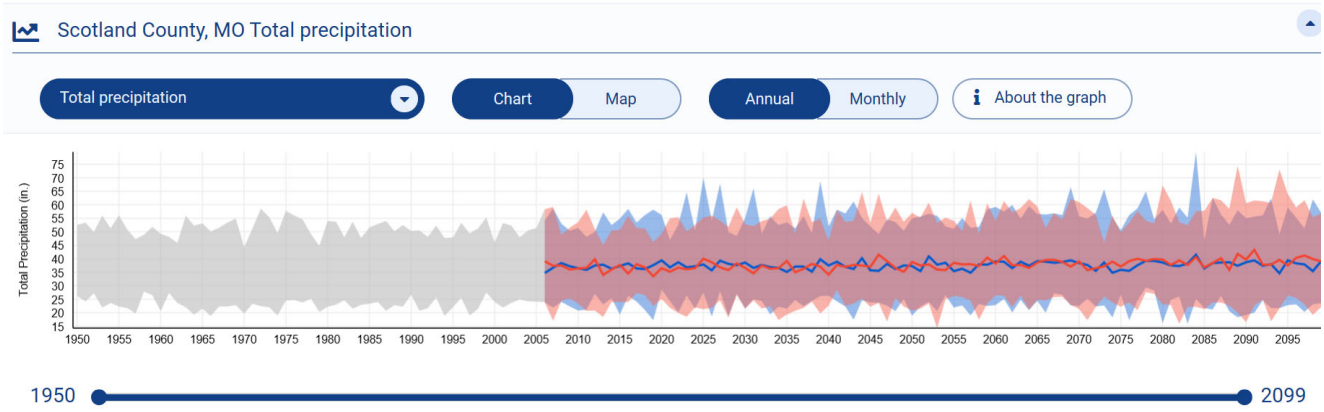
For flooding events, flash flooding is the most likely to occur. The flash flood chart above shows 27 flash floods occurred during the 21-year period between 1999 and 2019. This is 27 floods divided into 21 years for 1.35 floods per year, or a probability of a flash flood occurring somewhere in Scotland County during any given year. This probability is just a measurement tool, as noted in the chart above some years had multiple floods while other years had none.

Riverine flooding is less likely to occur. The above riverine flooding table shows 2 flood events over a 21-year period. Applying the same formula used above, this would be a 10% probability of a riverine flood occurring somewhere in Scotland County.

### *Changing Future Conditions Considerations*

Scotland County should begin to consider the possibility that traditional climate patterns are changing. According to the 2018 State Plan, if departure from normal with respect to increased precipitation intensity continues, frequency of floods in Missouri is likely to increase as well. Over the last half century, average annual precipitation in most of the Midwest has increased by 5 to 10 percent. But rainfall during the four wettest days of the year has increased about 35 percent, and the amount of water flowing in most streams during the worst flood of the year has increased by more than 20 percent.

**Figure 3.17. U.S. Climate Resilience Toolkit- Annual Total Precipitation for Scotland County**




Source: US Climate Resilience Toolkit, https://toolkit.climate.gov/tools/climate-explorer

It is likely (66-100% probability) that the frequency of heavy precipitation or the proportion of total rainfall from heavy storms will increase in the 21st century across the globe. More specifically, it is "very likely" (90-100% probability) that most areas of the United States will exhibit an increase of at least 5% in the maximum 5-day precipitation by late 21st century. As the number of heavy rain events increase, more flooding and pooling water can be expected.

The expected increases in rainfall frequency and intensity are likely to put additional stress on natural hydrological systems and community storm water systems. Heavier snowfalls in the winter will lead to intensified spring flooding, and groundwater levels will remain high even in non-floodplain areas. Such changes in climate patterns can lead to the development of compounding events that interact to create extreme conditions. Flooding caused by high groundwater levels typically recedes more slowly than riverine flooding, slowing the response and recovery process. Groundwater-fed rivers and streams are also likely to experience heightened flooding when groundwater levels are high. Jurisdictions updating or installing storm water management systems should consider potentially larger future discharge amounts when sizing culverts and drainage ways; storage capacity can also be increased by building retention basins to hold excess storm water. Communities already prone to flooding should be prepared for a potential increase in facility closures and/or damages, as well as an increase in public demand for flood response and assistance. Natural features that experience repeated flooding may manifest changes in the form of stream bank instability and changing shoreline, floodplain, and wetland boundaries. Communities may also wish to plan for the potential loss of cropland and damage to both private property and public infrastructure such as bridges.

The environmental impacts of flooding include erosion, surface and groundwater contamination, and poor quality water. The threat of more frequent flood events may thus be a concern particularly for communities who depend on lakes, rivers, or trout streams for tourism. Rural communities may experience increases in well contamination and road washouts, while urban areas may be particularly vulnerable to flash flooding as heavy rain events quickly overwhelm the ability of a more impermeable environment to absorb excess storm water.

More climate information is available from the following sources:

- 2018 State Plan, see Chapter 3, Section 3.3.1, Changing Future Conditions Considerations, page 3.100
- US Climate Resilience Toolkit; https://toolkit.climate.gov/tools/climate-explorer
- National Climate Assessment; https://nca2014.globalchange.gov/

## Vulnerability

### *Vulnerability Overview*

Flooding presents a danger to life and property, often resulting in injuries, and in some cases, fatalities. Floodwaters themselves can interact with hazardous materials. Hazardous materials stored in large containers could break loose or puncture as a result of flood activity. Examples are bulk propane tanks. When this happens, evacuation of citizens is necessary.

Public health concerns may result from flooding, requiring disease and injury surveillance. Community sanitation to evaluate flood-affected food supplies may also be necessary. Private water and sewage sanitation could be impacted, and vector control (for mosquitoes and other entomology concerns) may be necessary.

When roads and bridges are inundated by water, damage can occur as the water scours materials around bridge abutments and gravel roads. Floodwaters can also cause erosion undermining road beds. In some instances, steep slopes that are saturated with water may cause mud or rock slides onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly clean-up for home and business owners as well as present a health hazard. Refer back to the section of the plan where scour critical bridges were identified.

For Scotland County, according to the 2018 State Plan, this can mean building exposure for a 100-year flood to range between $556,304 and $305,094,849 and impact as many as 588 buildings and up to 753 residents.

### *Potential Losses to Existing Development*

Flash flooding can occur almost anywhere in Scotland County where the terrain is hilly and the ground provides little absorption. These area are generally well-known and development avoided when access is affected. Riverine flooding occurs along Bear Creek and South Wyaconda River. The areas along these areas prone to flooding are agrarian in nature and sparsely inhabited.

### *Impact of Previous and Future Development*

Obviously, development of the flood plain along Bear Creek and South Wyaconda River will increase exposure to flooding. To date, development has been slight and has been along the perimeters of the flood plain but not in it. Continued development in other areas of the county can contribute to flash flooding if proper attention is not given to collecting pools and absorption basins. Scotland County experiences a very slight increase in residents so development currently is not an issue.

***Hazard Summary by Jurisdiction***

The main origin of Scotland County flooding is Bear Creak and South Wyaconda River. As part of the Bear Creek and Wyaconda Fox River watersheds. The watersheds flows directly through the county and south into the adjoining county. This flooding minimally affects residents and communities within the county.

Several communities are situated on or near small creeks. Although no reports were found of these small creeks causing flooding, an inventory may be useful in the future if future development occurs. Arbela and Gorin are the closet communities to Bear Creek which causes flooding but this flooding does not affect the communities.

Scotland County R-1 School District doesn't have any buildings in the floodplain and is not in any danger of flooding.

## Problem Statement

Risk to Scotland County due to flash floods and riverine floods are relatively insignificant due to geography. During the past 21 years, there are 2 recorded riverine flood events. During the same period, there were 27 flash flood events, one of which records damages of $100,000. There are no severe repetitive loss properties in the planning area. The damages to flood could be reduced by reducing or eliminating development in the flood plains.

## 3.4.2 Dam Failure

### Hazard Profile

#### *Hazard Description*

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, affecting both life and property. Dam failure can be caused by any of the following:

1. Overtopping: Inadequate spillway design, debris blockage of spillways or settlement of the dam crest.
2. Piping: Internal erosion caused by embankment leakage, foundation leakage and deterioration of pertinent structures appended to the dam.
3. Erosion: Inadequate spillway capacity causing overtopping of the dam, flow erosion, and inadequate slope protection.
4. Structural Failure: Caused by an earthquake, slope instability or faulty construction.

Information can be obtained from:

- National Resources Conservation Service: http://www.nrcs.usda.gov
- DamSafetyAction.org: https://damsafety.org/missouri

Data for dams in Scotland County has been collected from two sources; a listing by the Missouri Department of Natural Resources (MoDNR) and the National Inventory of Dams (NID). Each has its own system of classifying dams. Neither the MoDNR nor the NID hazard potential classifications references the condition of the dam. For the Risk Analysis, data was used from all MoDNR Class I and NID Hazard dams.

**Table 3.21. MoDNR Dam Hazard Classification Definitions**

| Hazard Class | Definition |
|---|---|
| Class I | Represents the most severe threat to public safety, life and property. Contains ten or more permanent dwellings or any public building. Inspections must occur every two years. |
| Class II | Represents a moderate threat to public safety, life and property. Contains 1-9 permanent buildings or 1 or more campgrounds with permanent water, sewer, and electrical services, or one or more industrial buildings. Inspections must occur every three years. |
| Class III | Represents the least severe threat to public safety, life and property. Inspections must occur every 5 years. |

Source: Missouri Department of Natural Resources, http://dnr.mo.gov/env/wrc/docs/rules_reg_94.pdf

**Table 3.22. NID Dam Hazard Classification Definitions**

| Hazard Class | Definition |
|---|---|
| Low Hazard | ▪ Equals or exeeds 25 feet in height and exceeds 15 acre-feet in storage.<br>▪ Exceed 6 feet in height and equal to or exceeds 50 acre-feet in storage. |
| Significant Hazard | Possible loss of human life and likely significant property or environmental destruction. |
| High Hazard | Loss of at least one human life if dam fails. |

Source: National Inventory of Dams

**Figure 3.18. Dams in Scotland County- MoDNR Data**


***Geographic Location***

**Figure 3.19. High Hazard Dam Locations in Scotland County**

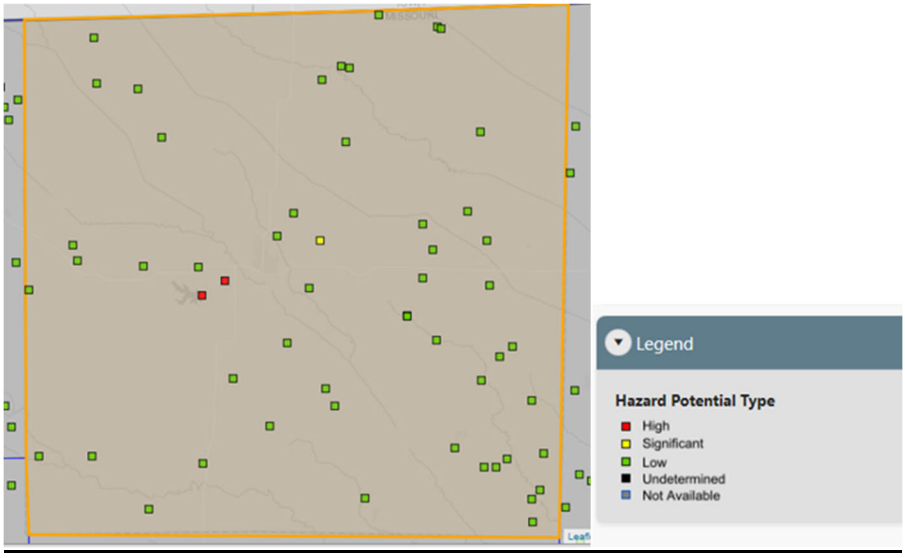



**Table 3.23. MoDNR Class I Dams in Scotland County**

| Dam Name | Class | Height | Acre-Feet Storage | State Regulated |
|---|---|---|---|---|
| Memphis Lake Dam | I | 61 | 6,225 | Yes |

**Table 3.24. NID High Hazard Dams in Scotland County**

| Dam Name | Emergency Action Plan (EAP)AP | Dam Height (Ft) | Normal Storage (Acre-Ft) | Last Inspection Date | River | Nearest Downstream City | Distance To Nearest City (Miles) | Dam Owner |
|---|---|---|---|---|---|---|---|---|
| Memphis Lake Dam | Yes | 61 | 6,225 | 3/7/2018 | North Fabius River | | | City of Memphis |
| Memphis Reservoir Dam | NR | 28 | 614 | 10/4/1978 | North Fabius River | | | City of Memphis |

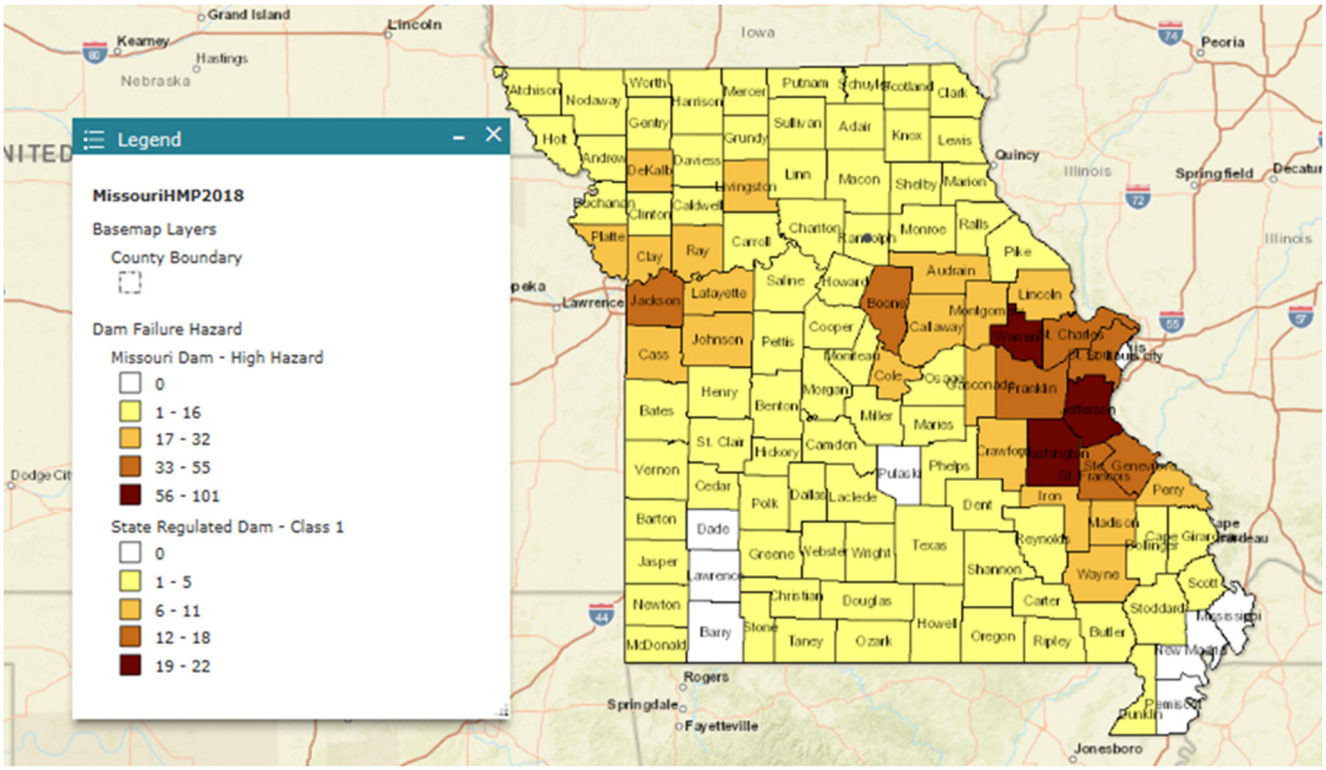
Sources: National Inventory of Dams, http://nid.usace.army.mil/cm_apex/f?p=838:12.

Upstream Dams Outside the Planning Area

The Missouri Department of Natural Resources and National Inventory of Dams was consulted to see if dams located outside of the county would impact it in the event of a failure. It was determined there are no upstream dams that would place Scotland County at risk.

Figure 3.21 shows the high hazard dams and state regulated dams in Missouri for each county.

**Figure 3.20. High Hazard Dam and State Regulated Dams**




Source: Missouri Hazard Mitigation Viewer;
http://amecei.maps.arcgis.com/apps/webappviewer/index.html?id=d97d80d5cff04996bff54b2250e47d83

***Strength/Magnitude/Extent***

The strength/magnitude of dam failure would be similar in some cases to flood events (see the flood hazard vulnerability analysis and discussion). The strength/magnitude/extent of dam failure is related to the volume of water behind the dam as well as the potential speed of onset, depth, and velocity. Note that for this reason, dam failures could flood areas outside of mapped flood hazards.

Inundation data, however, is not currently available for any of the county's dams or the surrounding areas. The future probable severity of a dam failure in Scotland County is shown below according to DNR's hazard potential levels.

| Hazard Level | Probable Risk |
|---|---|
| High | Catastrophic |
| Significant | Critical |
| Low | Negligible |

### *Previous Occurrences*

To determine previous occurrences of dam failure within Scotland County, the 2015 Scotland County Hazard Mitigation Plan was consulted as well as the 2018 Missouri State Hazard Mitigation Plan and the Stanford University's National Performance of Dams Program. Stanford's National Performance of Dams database reported no incidences for Scotland County.

### *Probability of Future Occurrence*

There are no recorded dam failures for Scotland County dams which make forecasting probability of failure difficult. However, there are two factors to impact dam failure; regulation and inspection. Regulation requires regular inspections which can determine issues that contribute to failure. Of the one MoDNR Class I dams in Scotland County it is state-regulated.

Of the 2 High Hazard NID dams in the county, one receives regular inspections and has an Emergency Action Plan. The impact of regular inspection and maintenance significantly reduces the probability of dam failure.

### *Changing Future Conditions Considerations*

If we accept the climate change scenario that forecasts more dramatic periods of precipitation, we can then infer that more stress will be placed upon dams which will be more prone to failure. A couple is infrastructure of aging, uninspected, perhaps poorly maintained dams and we have the makings of a serious problem for those living downstream.

## Vulnerability

### *Vulnerability Overview*

Vulnerability to dam failure is a factor due to the number of dams in the planning area, including 2 High Hazard Dams and one significant risk dam. As there are no recorded dam failures and most of them are located in unincorporated areas, the planning committee chose only to address the high hazard dams when funding becomes available.

### *Potential Losses to Existing Development: (including types and numbers, of buildings, critical facilities, etc.)*

The state-regulated dams if breached could account for loss of 27 farm, commercial and government structures valued at $19,094,984 with no potential lose of life.

**Table 3.25. Dam Exposure for Scotland County**

| Scotland County | No. Structures | Value of Structures | Population |
|---|---|---|---|
| Agriculture | 4 | $3,932,800 | 0 |
| Commercial | 20 | $13,718,261 | 0 |
| Government | 3 | $1,443,923 | 0 |

### *Impact of Previous and Future Development*

Scotland County is largely rural with little evidence of growth within the inundation areas of a dam.

### *Hazard Summary by Jurisdiction*

The vast majority of Scotland County is not in danger of being inundated due to a breach in a dam. No further analysis of dam failure hazard will be conducted for this plan update. Less than 15 properties will be impacted in the unincorporated areas if a dam breaches. It will be helpful for residents near the high hazard dams to get familiarized with the dam's Emergency Action Plan (EAP) and work closely with County EMD.

## Problem Statement

Some entities in Scotland County that own and control dams do not properly inspect and maintain them to ensure safety of people and property that lie within the inundation area of a dam breach Summarize the risks presented in the preceding dam failure analysis. Possible solutions include the development of a regular maintenance schedule, identification of qualified staff or consultant to assist.

## 3.4.3 Earthquakes

### Hazard Profile

#### *Hazard Description*

An earthquake is a sudden motion or trembling that is caused by a release of energy accumulated within or along the edge of the earth's tectonic plates. Earthquakes occur primarily along fault zones and tears in the earth's crust. Along these faults and tears in the crust, stresses can build until one side of the fault slips, generating compressive and shear energy that produces the shaking and damage to the built environment. Heaviest damage generally occurs nearest the earthquake epicenter, which is that point on the earth's surface directly above the point of fault movement. The composition of geologic materials between these points is a major factor in transmitting the energy to buildings and other structures on the earth's surface.

Eight earthquake seismic zones are located in the central United States, two of which are located in Missouri. The most active zone is the New Madrid Seismic Zone, which is also the most active seismic area in the United States east of the Rocky Mountains according to the U.S. Geological Survey. The New Madrid Zone is by some measures as high a risk for tremors as seismic zones in California. It runs from northern Arkansas through southeast Missouri and western Tennessee and Kentucky to the Illinois side of the Ohio River Valley. During the winter of 1811-1812 three earthquakes estimated to have been magnitude 7.5 or greater were centered in the New Madrid fault in the Bootheel region of southeast Missouri. Thousands of aftershocks continued for years.

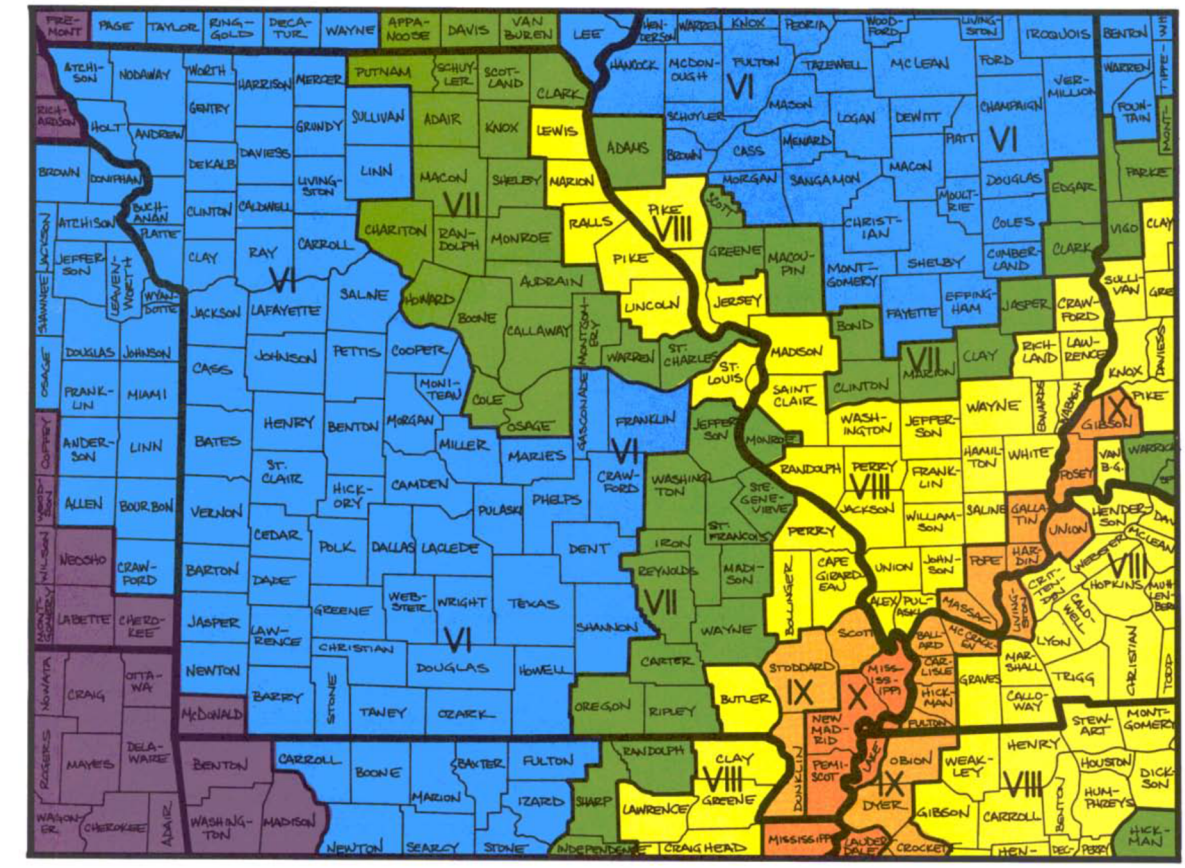
Significant earthquakes, each about magnitude 6, occurred in 1843 near Marked Tree, Arkansas, and on October 31, 1895 near Charleston, Missouri. In November 1968 a magnitude 5.5 earthquake centered in southeastern Illinois caused moderate damage to chimneys and walls at Hermann, St. Charles, St. Louis, and Sikeston, Missouri. The quake was felt in areas that include all or portions of 23 states. Other earthquakes have occurred throughout southeastern parts of Missouri. Smaller, but still destructive earthquakes are even more likely, according to the Missouri Seismic Safety Commission.

#### *Geographic Location*

Seismic activity on the New Madrid Seismic Zone of Southeastern Missouri is very significant both historically and at present. On December 16, 1811 and January 23 and February 7 of 1812, three earthquakes struck the central U.S. with magnitudes estimated to be 7.5 – 8.0. These earthquakes caused violent ground cracking and volcano-like eruptions of sediment (sand blows) over an area of >10,500 km2, and uplift of a 50km by 23 km zone (the Lake County uplift). The shaking was felt over a total area of over 10 million km2 (the largest felt area of any historical earthquake). Of all the historical earthquakes that have the U.S., an 1811- style event would do the most damage if it recurred today. If an 1811 earthquake occurred in Scotland County the earthquake intensity would not vary within the county. Damage would be to buildings of poor design and construction, slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures and some chimneys broken.

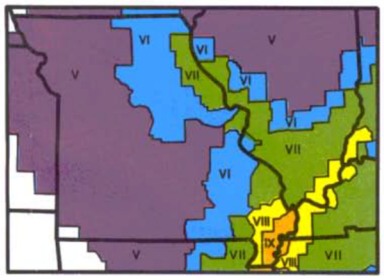
The following SEMA map (Figure 3.22) shows the highest projected Modified Mercalli intensities by county from a potential magnitude 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid Seismic Zone. The below figure indicates Scotland County and the affects that could be felt from the earthquake.

**Figure 3.21. Impact Zones for Earthquake Along the New Madrid Fault**



This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

6.7

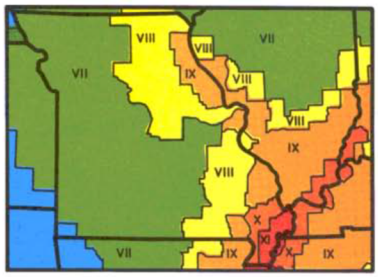


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 6.7 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

7.6

This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 8.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

8.6



Source: https://sema.dps.mo.gov/docs/EQ_Map.pdf

Scotland County lies within the Category VII meaning the effects of a New Madrid quake should be relatively minor.

**Figure 3.22. Projected Earthquake Intensities**

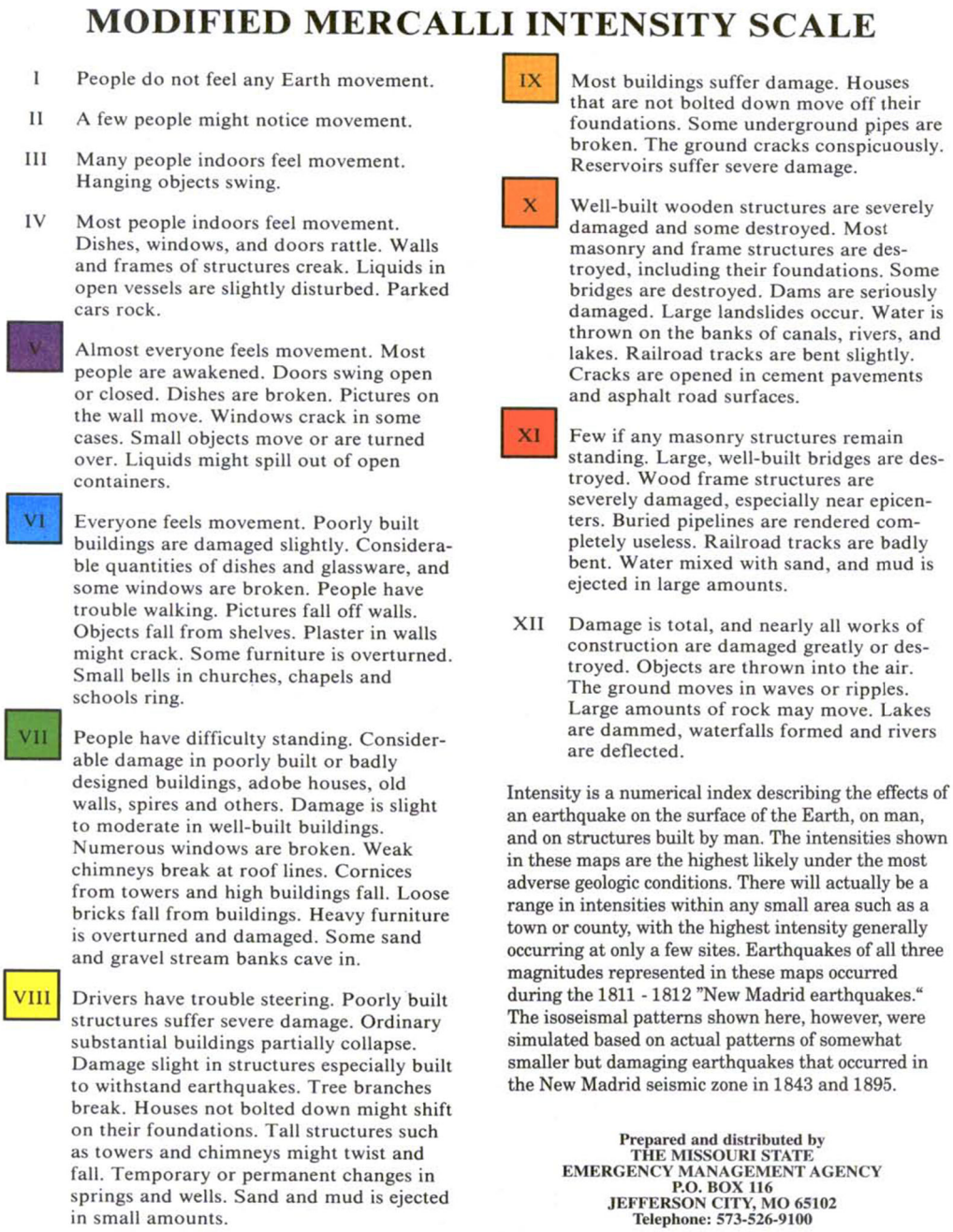
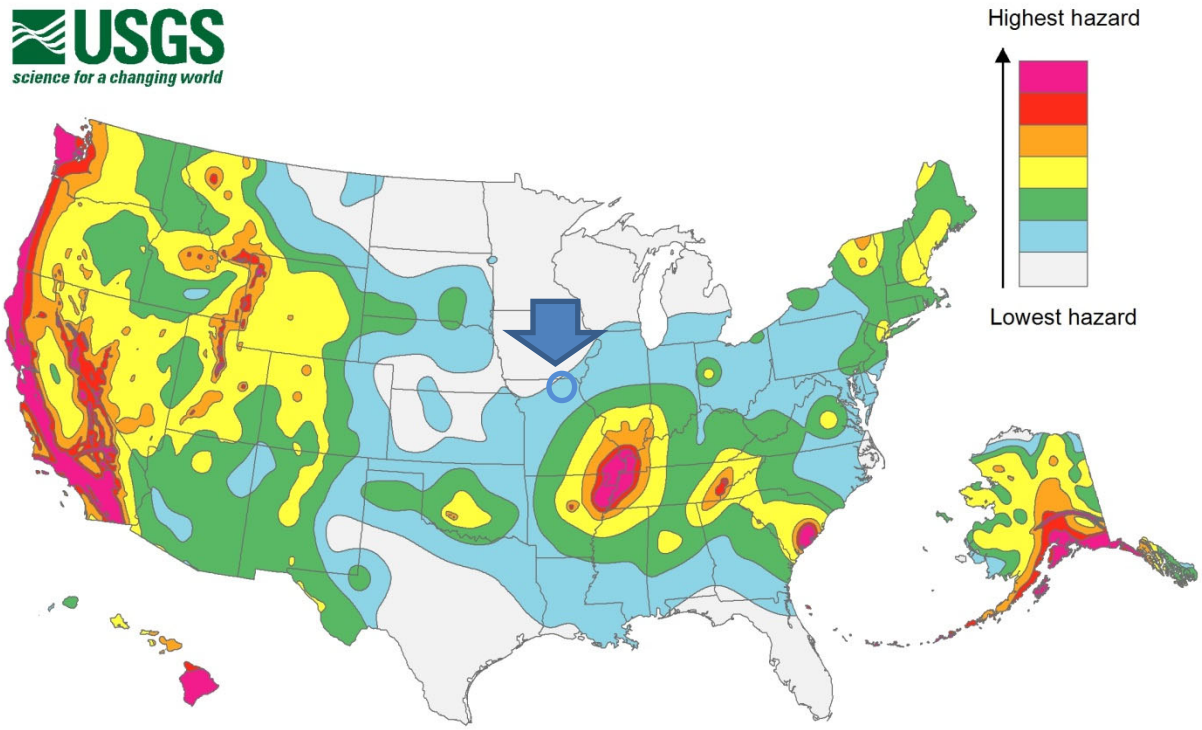


Figure 3.24 shows the seismicity in the United States. Scotland County is located within the small blue ring on the map.

**Figure 3.23. United States Seismic Hazard Map**




Source: United States Geological Survey at
https://earthquake.usgs.gov/hazards/hazmaps/conterminous/2014/images/HazardMap2014_lg.jpg

***Strength/Magnitude/Extent***

The extent or severity of earthquakes is generally measured in two ways: 1) the Richter Magnitude Scale is a measure of earthquake magnitude; and 2) the Modified Mercalli Intensity Scale is a measure of earthquake severity. The two scales are defined as follows.

*Richter Magnitude Scale*

The Richter Magnitude Scale was developed in 1935 as a device to compare the size of earthquakes. The magnitude of an earthquake is measured using a logarithm of the maximum extent of waves recorded by seismographs. Adjustments are made to reflect the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, comparing a 5.3 and a 6.3 earthquake shows that the 6.3 quake is ten times bigger in magnitude. Each whole number increase in magnitude represents a tenfold increase in measured amplitude because of the logarithm. Each whole number step in the magnitude scale represents a release of approximately 31 times more energy.

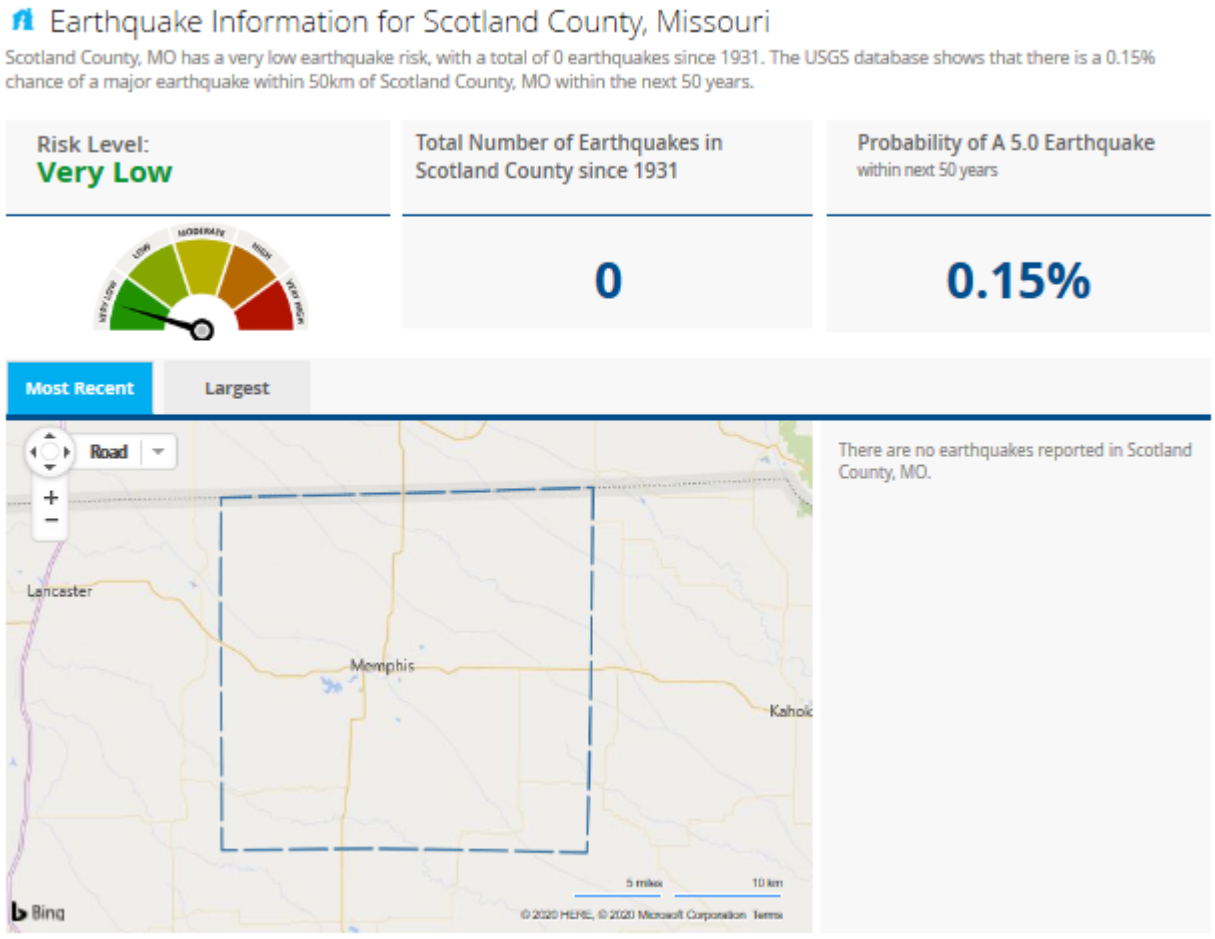
*Modified Mercalli Intensity Scale*

The intensity of an earthquake is measured by the effect of the earthquake on the earth's surface. The intensity scale is based on the responses to the quake, such as people awakening, movement of furniture, damage to chimneys, etc. The intensity scale currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 and is composed of 12 increasing levels of intensity. They range from imperceptible shaking to catastrophic destruction, and each of the twelve levels is denoted by a Roman numeral. The scale does not have a mathematical basis, but is based on observed effects. Its use gives the laymen a more meaningful idea of the severity.

***Previous Occurrences***

There have been no recorded earthquakes recorded in Scotland County since 1931 according to the information obtained from homefacts.com as shown in Figure 3.25.

**Figure 3.24. Earthquake Information for Scotland County**




Source: https://www.homefacts.com/earthquakes/Missouri/Scotland-County.html

***Probability of Future Occurrence***

The established calculation formula for probability of an earthquake in Scotland County would yield a zero probability. Homefacts.com calculates a .15% chance in any given year.

### *Changing Future Conditions Considerations*

Chapter 3, Section 3.3.1., page 3-202 of the 2018 Missouri State Hazard Mitigation Plan states, "Scientists are beginning to believe there may be a connection between changing climate conditions and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences", however no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked to climate change.

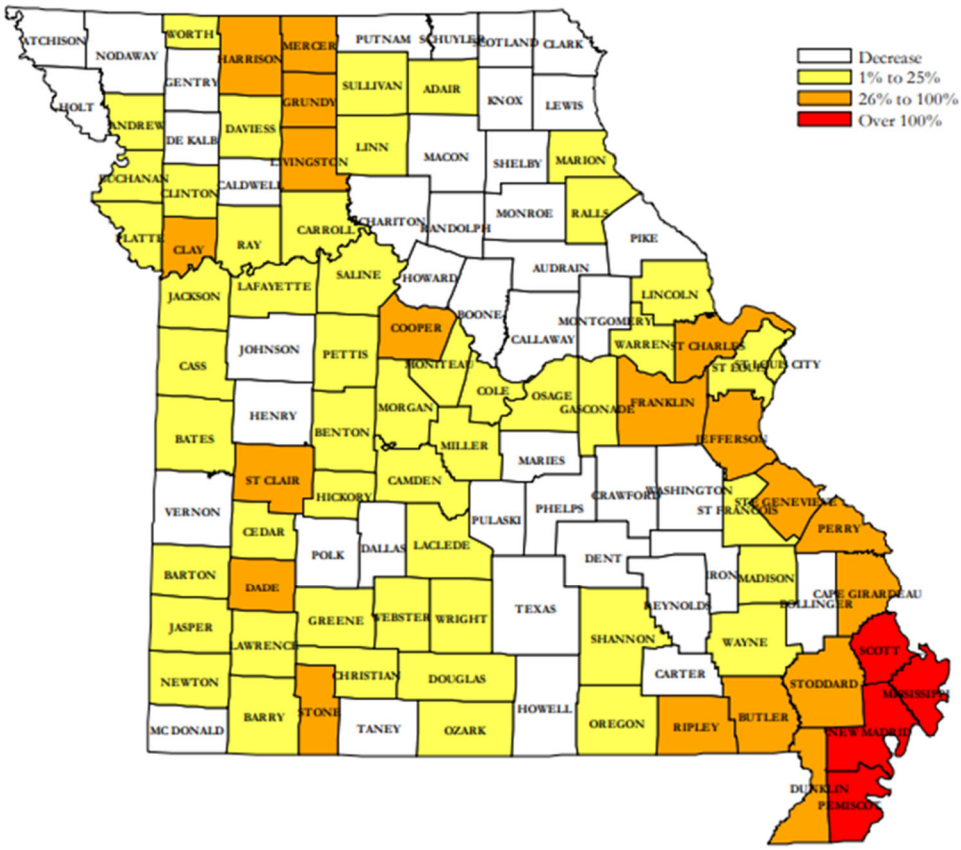
## Vulnerability

### *Vulnerability Overview*

According to the data obtained from the 2018 State Plan, Scotland County was listed as N/A for Hazard Ranking.

The State of Earthquake Coverage Report states the average premium for earthquake coverage in Scotland County during 2017 was $62, with the average premium $110k- $140k coverage at $37.

**Figure 3.25. Percent Change in Cost of Earthquake Coverage between 2009- 2017, $110 - $140k Coverage Limits**



### *Potential Losses to Existing Development*

The Hazus building inventory counts are based on the 2010 census data adjusted to 2014 numbers using the Dun & Bradstreet Business Population Report. Inventory values reflect 2014 valuations, based on RSMeans (a supplier of construction cost information) replacement costs. Population counts are 2010 estimates from the U.S. Census Bureau.

### *Impact of Previous and Future Development*

Future development is not expected to increase the risk other than contributing to the overall exposure of what could become damaged as a result of an event.

### *Hazard Summary by Jurisdiction*

Earthquake intensity is not likely to vary greatly throughout the planning area so the risk will be the same throughout. Damages could differ if there are structural variations in the planning area built-environment, however, each community has roughly the same built-environment. Memphis has several old brick buildings in the downtown area which could see more damage than other areas in the county.

## Problem Statement

Scotland County is at low probability of suffering an earthquake with only superficial damage forecast. The downtown district of Memphis could see damage to the aging buildings. Memphis could include review by a structural engineer for potential retrofits and review of local ordinance and building codes to address seismic provisions.

## 3.4.4 Land Subsidence/Sinkholes

### Hazard Profile

#### *Hazard Description*

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that naturally can be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. The sudden collapse of the land surface above them can be dramatic and range in size from broad, regional lowering of the land surface to localized collapse. However, the primary causes of most subsidence are human activities: underground mining of coal, groundwater or petroleum withdrawal, and drainage of organic soils. In addition, sinkholes can develop as a result of subsurface void spaces created over time due to the erosion of subsurface limestone (karst).

Land subsidence occurs slowly and continuously over time, as a general rule. On occasion, it can occur abruptly, as in the sudden formation of sinkholes. Sinkhole formation can be aggravated by flooding.

In the case of sinkholes, the rock below the surface is rock that has been dissolving by circulating groundwater. As the rock dissolves, spaces and caverns form, and ultimately the land above the spaces collapse. In Missouri, sinkhole problems are usually a result of surface materials above openings into bedrock caves eroding and collapsing into the cave opening. These collapses are called “cover collapses” and geologic information can be applied to predict the general regions where collapse will occur. Sinkholes range in size from several square yards to hundreds of acres and may be quite shallow or hundreds of feet deep.

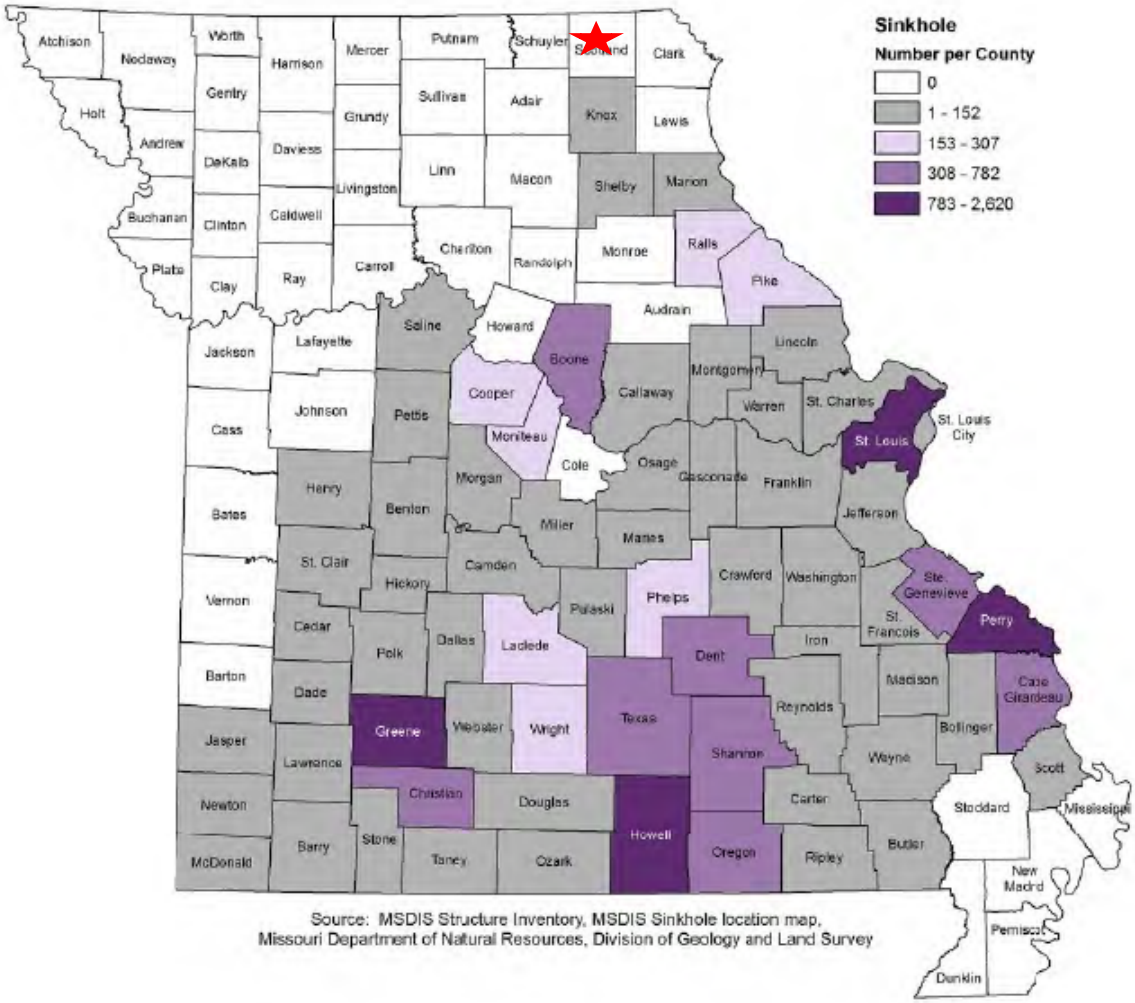
According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of Missouri is underlain by thick, carbonate rock that makes Missouri vulnerable to sinkholes. Sinkholes occur in Missouri on a fairly frequent basis. Most of Missouri‘s sinkholes occur naturally in the State‘s karst regions (areas with soluble bedrock). They are a common geologic hazard in southern Missouri, but also occur in the central and northeastern parts of the State. Missouri sinkholes have varied from a few feet to hundreds of acres and from less than one to more than 100 feet deep. The largest known sinkhole in Missouri encompasses about 700 acres in western Boone County southeast of where Interstate 70 crosses the Missouri River. Sinkholes can also vary is shape like shallow bowls or saucers whereas other have vertical walls. Some hold water and form natural ponds.

According to the 2018 State Hazard Mitigation Plan, there are 11 mines in Scotland County and 0 sinkholes.

#### *Geographic Location*

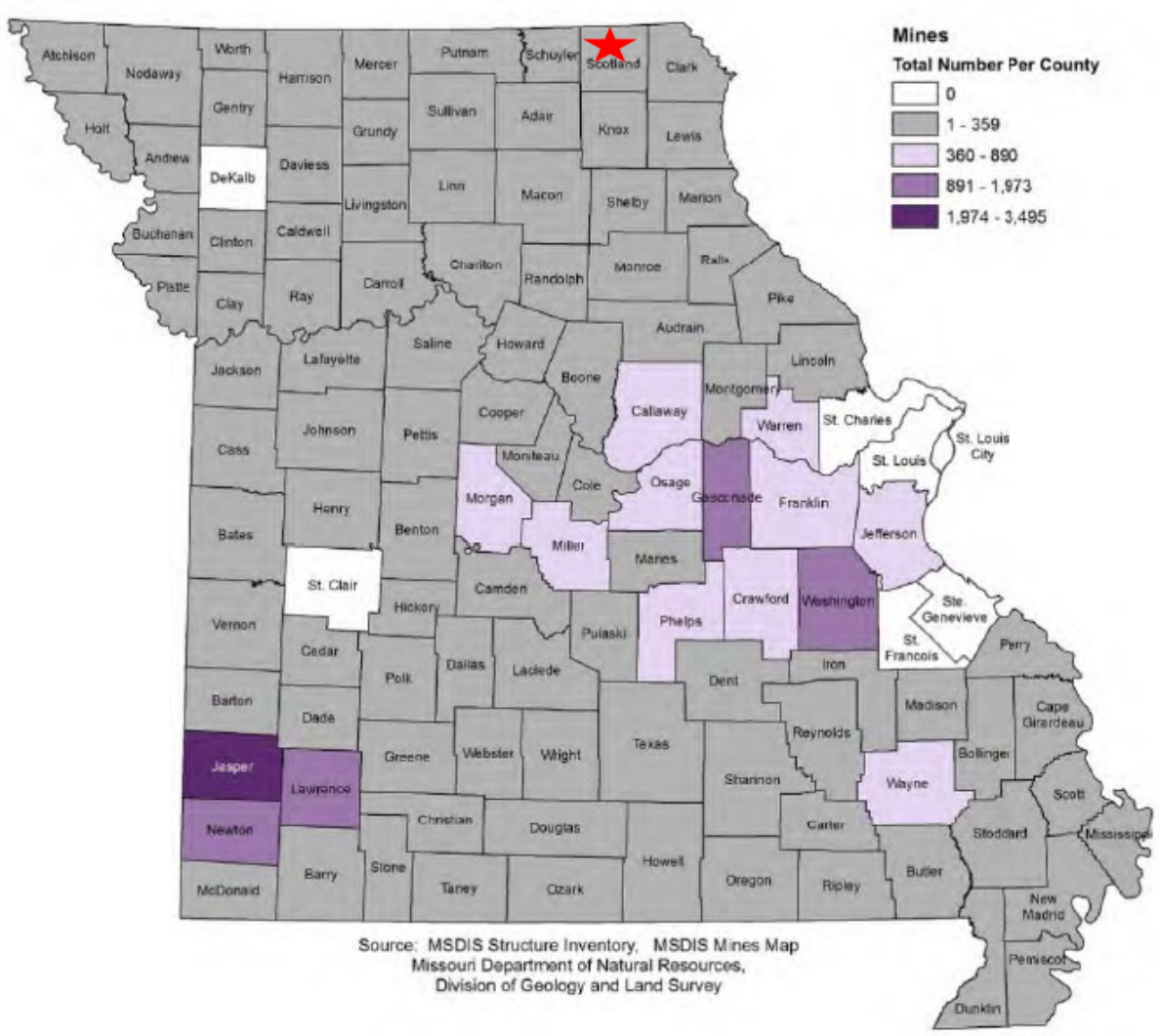
Figure 3.26 shows the number of sinkholes in Scotland County and 3.27 shows the number of mines in the County.

**Figure 3.26. Sinkholes in Scotland County**




Source: 2018 Missouri State Hazard Mitigation Plan; * Star shows Scotland County

**Figure 3.27. Mine County in Scotland County**




Source: 2018 Missouri State Hazard Mitigation Plan; * Star shows Scotland County

Table 3.26 shows there are 11 mines in Scotland County and zero sinkholes.

**Table 3.26. Scotland County Sinkholes ad Mine Counts**

| County | Number of Sinkholes Per County | Number of Mines Per County |
|---|---|---|
| Scotland | 0 | 11 |

Source: 2018 Missouri State Hazard Mitigation Plan

***Strength/Magnitude/Extent***

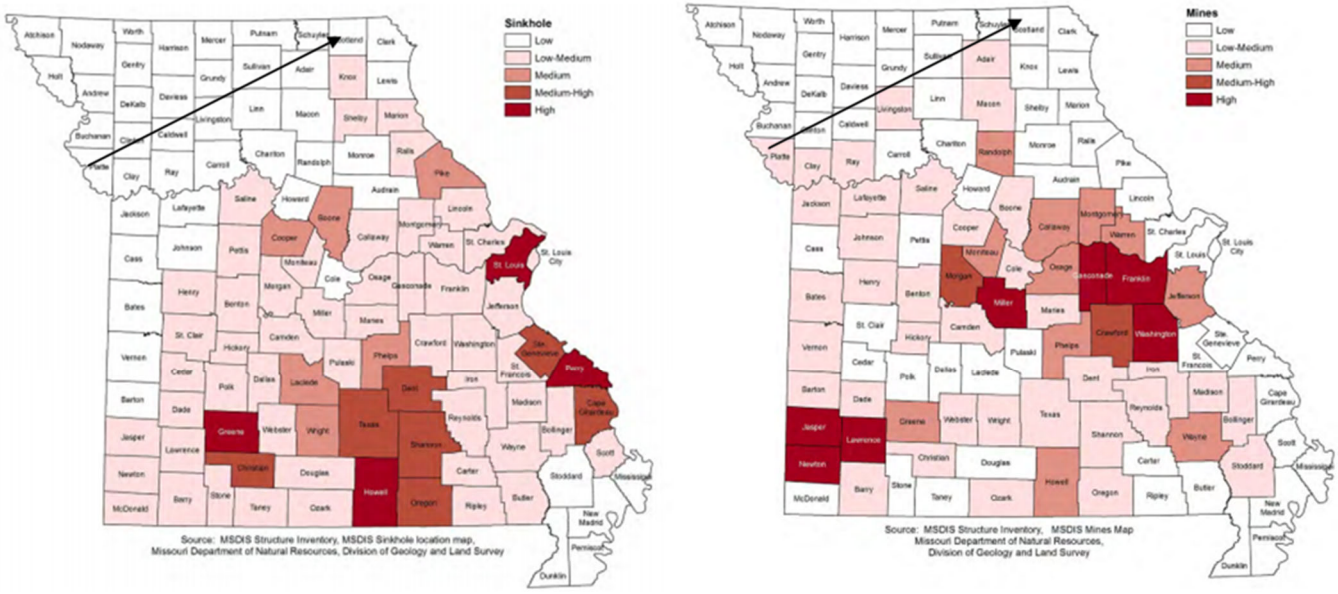
Sinkholes vary in size and location, and these variances will determine the impact of the hazard. A sinkhole could result in the loss of a personal vehicle, a building collapse, or damage to infrastructure such as roads, water, or sewer lines. Groundwater contamination is also possible from a sinkhole. Because of the relationship of sinkholes to groundwater, pollutants captured or dumped in sinkholes could affect a community's groundwater system. Sinkhole collapse could be triggered by large earthquakes. Sinkholes located in floodplains can absorb floodwaters but make detailed flood hazard studies difficult to model.

***Previous Occurrences***

As noted in the 2018 Missouri State Hazard Mitigation Plan, sinkholes are a regular occurrence in Missouri, but rarely are the events of any significance. There has not been an incident of sink hole induced damage in Scotland County.

Sinkholes in the planning area are not common occurrence due to composition of the land. While some sinkholes may be considered a slow changing nuisance; other more sudden, catastrophic collapses can destroy property, delay construction projects and contaminate ground water resources.

**Figure 3.28. Sinkhole and Mine Rating by County**




Sources: Missouri State Hazard Mitigation Plan, 2018

### *Probability of Future Occurrence*

There are no records of previous event dates in the planning area and the probabilities cannot be calculated due to limited information. As represented in the figures below, the sinkholes and mines located in Scotland County have been rated low risk.

### *Changing Future Conditions Considerations*

Sink holes in Missouri are, for the most part, naturally occurring; however, mining operations and fracking can contribute to their formation. In addition, the increased precipitation forecast by climate change advocates could conceivably cause rapid on-set of sink holes.

## Vulnerability

### *Vulnerability Overview*

Sinkholes in the planning area are not common occurrence due to composition of the land. While some sinkholes may be considered a slow changing nuisance; other more sudden, catastrophic collapses can destroy property, delay construction projects and contaminate ground water resources.

The Missouri Department of Natural Resources shows no sinkholes for the planning area.

### *Potential Losses to Existing Development*

The potential impact of sinkholes on existing structures is difficult to determine due to the lack of data on historic damages caused by sinkholes and the mapping of potential sinkholes is difficult if not impossible to predict where a sinkhole will collapse and how significant the collapse will be. Because sinkhole collapse is not predictable and previous events have not occurred in the rural area there is not significant data to estimate the future losses due to a sinkhole.

### *Impact of Previous and Future Development*

As more development occurs on unmapped rural areas the vulnerability to the hazard will increase; however, sinkholes are unpredictable and the development in rural areas is difficult to limit due to the lack of occurrence. There are currently no sinkholes in the planning area, and the Scotland County participating jurisdictions have no plans to limit construction due to sinkholes.

### *Hazard Summary by Jurisdiction*

The risk for the development is uniform throughout Scotland County and has not affected one jurisdiction specifically.

## Problem Statement

Sinkholes can develop anywhere in the County without warning and grow to varying sizes with disruption of services, especially to transportation and utilities. The most inexpensive method for remediating them is to bring in fill material. It will be helpful for Scotland County be aware of the possibility of a sinkhole occurring at anytime.

## 3.4.5 Drought

### Hazard Profile

#### *Hazard Description*

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant to Missouri, according to the State Plan, which are as follows.

- Meteorological drought is defined in terms of the basis of the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.

- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.

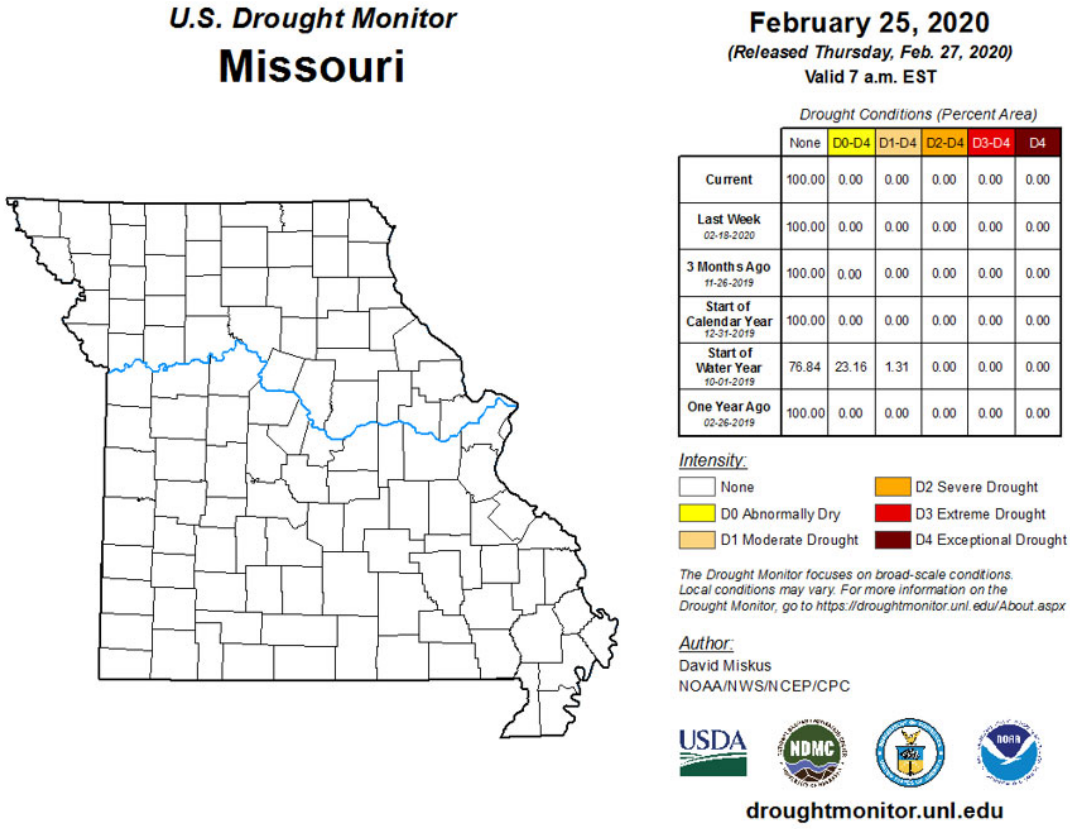
- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

- Socioeconomic drought refers to when physical water shortage begins to affect people.

#### *Geographic Location*

Droughts are regional in nature. All areas of the United States are vulnerable to the risk of drought and extreme heat. Droughts can be widespread or localized events. The extent of the droughts varies both in terms of the extent of the heat and range of precipitation. The severity of a drought depends on locations, duration, and geographical extent. Additionally, drought severity depends on the water supply, usage demands made by human activities, vegetation and agricultural operations. Drought brings several different problems that must be addressed. The quality and quantity of crops, livestock and other agricultural assets will be affected during a drought. Drought can adversely impact forested areas leading to an increased potential for extremely destructive forest and woodland fires that could threaten residential, commercial, and recreational structures. According to the 2012 Census of Agriculture, Scotland County consist of 244,169 acres land in farms, crop sales generate $36,718,000 and livestock sales generate $45,468,000. A drought would directly impact livestock production and the agriculture economy in Scotland County.

**Figure 3.29. U.S. Drought Monitor Map of Missouri on February 25, 2020**




Source: U.S. Drought Monitor, https://droughtmonitor.unl.edu/Maps/MapArchive.aspx

### *Strength/Magnitude/Extent*

The Palmer Drought Indices measure dryness based on recent precipitation and temperature. The indices are based on a "supply-and-demand model" of soil moisture. Calculation of supply is relatively straightforward, using temperature and the amount of moisture in the soil. However, demand is more complicated as it depends on a variety of factors, such as evapotranspiration and recharge rates. These rates are harder to calculate. Palmer tried to overcome these difficulties by developing an algorithm that approximated these rates and based the algorithm on the most readily available data — precipitation and temperature.

The Palmer Index has proven most effective in identifying long-term drought of more than several months. However, the Palmer Index has been less effective in determining conditions over a matter of weeks. It uses a "0" as normal, and drought is shown in terms of negative numbers; for example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought. Palmer's algorithm also is used to describe wet spells, using corresponding positive numbers.

Palmer also developed a formula for standardizing drought calculations for each individual location based on the variability of precipitation and temperature at that location. The Palmer index can therefore be applied to any site for which sufficient precipitation and temperature data is available.

### *Previous Occurrences*

Table 3.31 shows crop losses attributable to drought from January 2009 through December 2019. For the 11-year period, crop losses due to drought totaled $375,251,466. Three years showed no losses while shows $232,698,676 in losses with 2011 the second highest at $13,431,324 in 2018.

**Table 3.27. Drought Losses 2009 – 2019**

| Year | Dollars |
|---|---|
| 2009 | $0 |
| 2010 | $0 |
| 2011 | $232,698,676 |
| 2012 | $124,540,374 |
| 2013 | $3,449,970 |
| 2014 | $2,694 |
| 2015 | $0 |
| 2016 | $138,548 |
| 2017 | $529,624 |
| 2018 | $13,431,324 |
| 2019 | $460,256 |
| **Total** | **$375,251,466** |

According to the National Drought Mitigation Center's Drought Impact Reporter, during the 20-year period from January 2009 to December 2019, Scotland County had 8 drought reports and 617 impacts.

**Figure 3.30. Drought Impact on Scotland County**

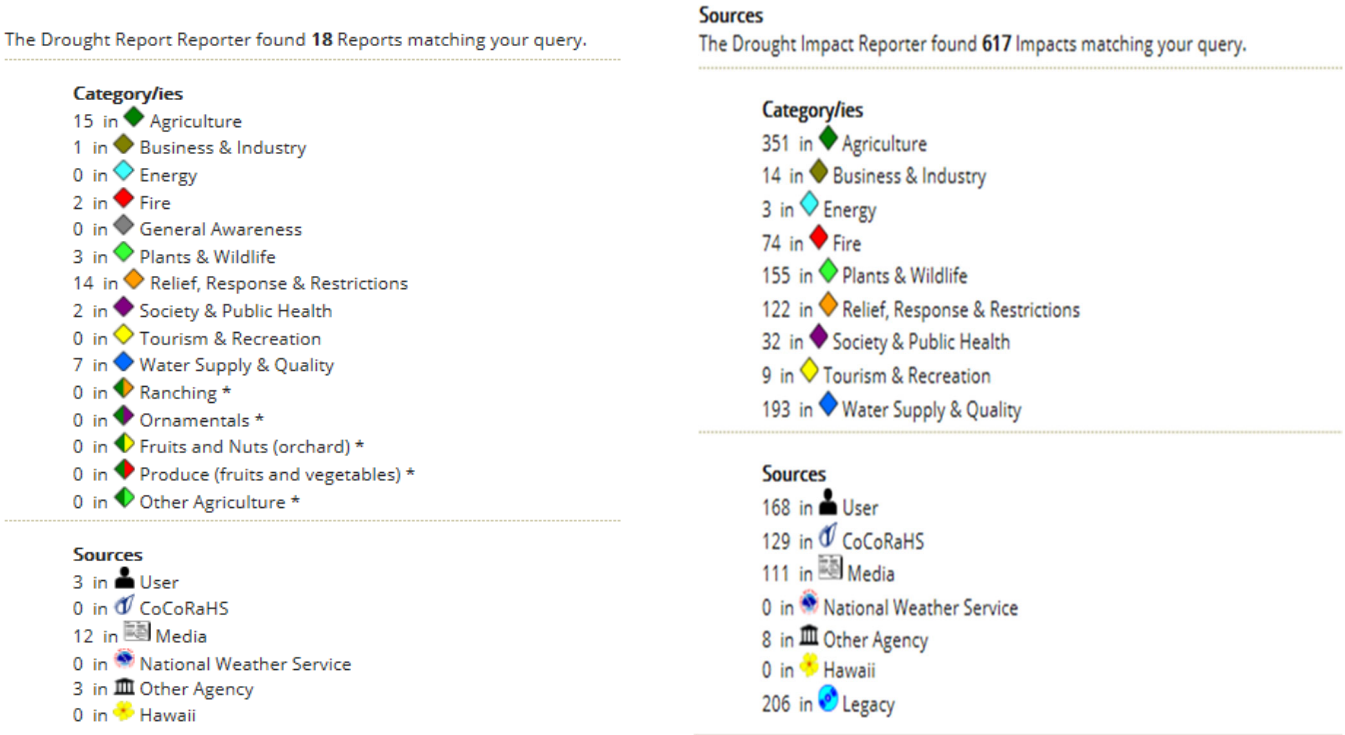
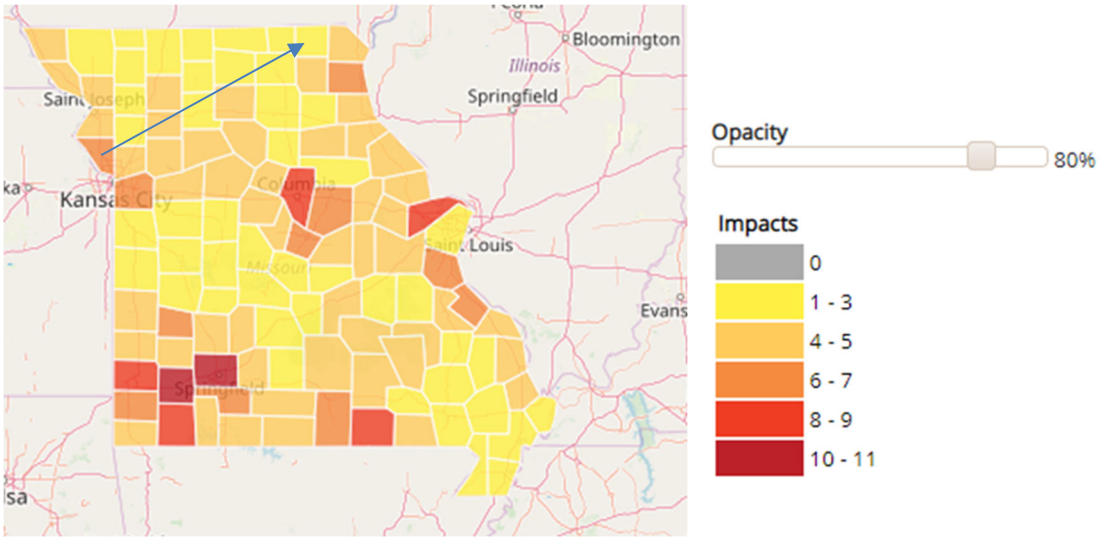


**Figure 3.31. Scotland County Drought Impact (January 1999 to December 2018)**




Source: Drought Impact Reporter, https://droughtreporter.unl.edu

### *Probability of Future Occurrence*

According to the 2018 State Plan, Scotland County has a medium-high total rating for droughts and is very likely to experience droughts in the future, with a 10.72% chance likelihood of a severe drought.

**Figure 3.32. Vulnerability of Scotland County to Drought**

| County | SOVI Index Rating | USDA RMA Total Drought Crop Claims | Average Annualized Crop Claims | USDA Claims Rating | 2012 Crop Exposure | Crop Exposure Rating | Likeli-hood of Severe Drought (%) | Drought Occurrence Rating | Total Rating | Total Rating (Text) Drought |
|---|---|---|---|---|---|---|---|---|---|---|
| Scotland | 4 | $23,735,156 | $2,637,240 | 4 | $36,718,000 | 3 | 10.72 | 5 | 16 | High |

| Factors Considered | Low (1) | Low-medium (2) | Medium (3) | Medium-high-4 | High (5) |
|---|---|---|---|---|---|
| Social Vulnerability Index | 1 | 2 | 3 | 4 | 5 |
| Crop Exposure Ratio Rating | $886,000 - $10,669,000 | $10,669,001 - $33,252,000 | $33,252,001 - $73,277,000 | $73,277,001 - $155,369,000 | $155,369,001 - $256,080,000 |
| Annualized USDA Crop Claims Paid | < $340,000 | $670,000- $669,999 | $670,000- $999,999 | $1M-$1,299,999 | > $1,300,000 |
| Likelihood of Occurrence of severe or extreme drought | 1-1.9% | 2-3.9% | 4-5.9% | 6-8.9% | 9-10.72% |
| Total Drought Vulnerability Rating | 7-8 | 9-10 | 11-12 | 13-14 | 15-17 |

Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increased chance of drought.

### *Changing Future Conditions Considerations*

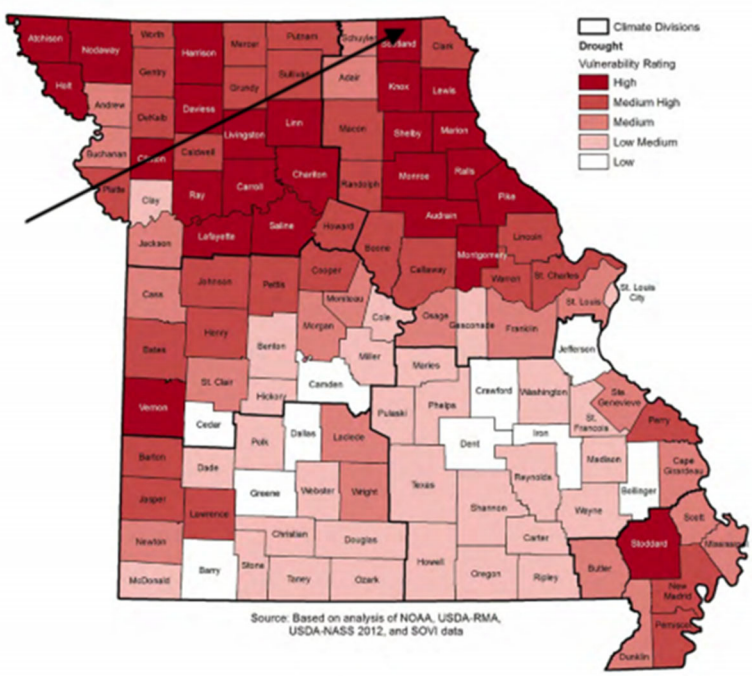
The 2018 State Plan, Severe drought, a natural part of Missouri's climate, is at risk to this agriculture-dependent state. Future increases in evaporation rates due to higher temperatures may increase the intensity of naturally-occurring droughts. The number of heavy rainfall events is predicted to increase, yet researchers currently expect little change in total rainfall amounts, indicating the periods between heavy rainfalls will be marked by an increasing number of dry days. Higher temperatures and increased evapotranspiration increase the likelihood of a drought. This could lead to agricultural drought and suppressed crop yields.

## Vulnerability

### *Vulnerability Overview*

According to the analysis from the 2018 State Plan, Scotland County is a medium vulnerability County for droughts.

**Figure 3.33. Missouri Drought Vulnerability by County**




Source: Missouri State Hazard Mitigation Plan, 2018

### *Potential Losses to Existing Development*

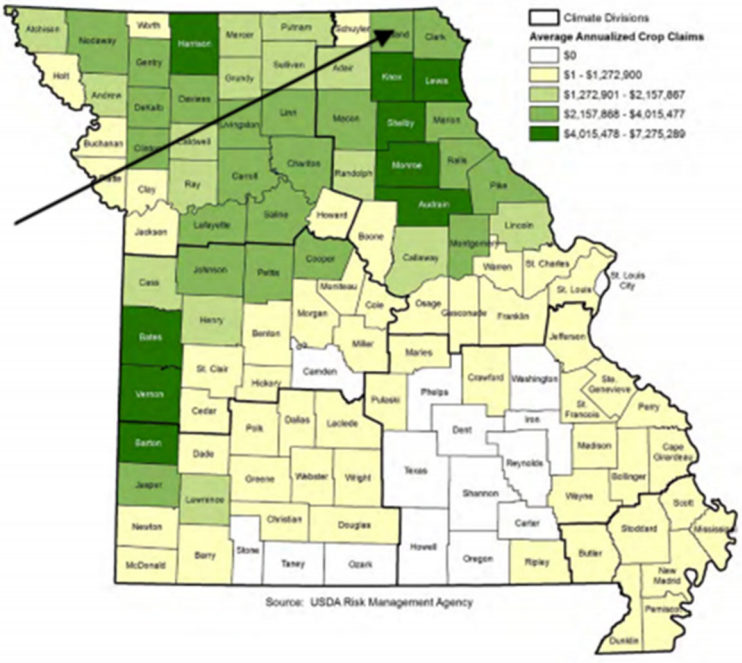
The National Drought Monitor Center at the University of Nebraska at Lincoln summarized the potential impacts of drought as follows: Drought can create economic impacts on agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn place both human and wildlife populations at higher levels of risk. Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Finally, while drought is

rarely a direct cause of death, the associated heat, dust and stress can all contribute to increased mortality.

### *Impact of Previous and Future Development*

Future development will remain vulnerable to drought. Typically, some urban and rural areas are more susceptible than others. For example, urban areas are subject to water shortages during periods of drought. Excessive demands of the populated area place a limit on water resources. In rural areas, crops and livestock may suffer from extended periods of heat and drought. As the size of farms increase more crops will be exposed to drought-related agricultural losses. Dry conditions can lead to the ignition of wildfires that could threaten residential, commercial and recreational areas.

**Figure 3.34. Annualized Drought Crop Insurance Claims Paid from 2007 - 2016**

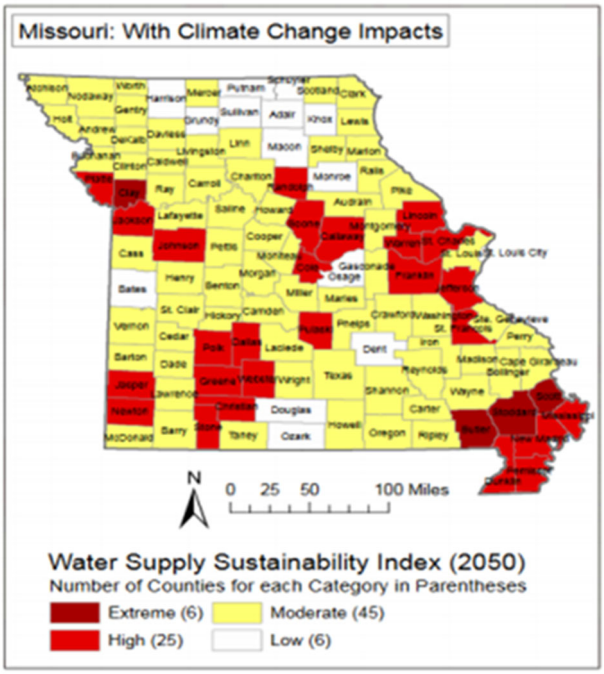



Source: Missouri State Hazard Mitigation Plan, 2018
https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

### *Changing Future Conditions Considerations*

A new analysis, performed for the Natural Resources Defense Council, examined the effects of climate change on water supply and demand in the contiguous United States. The study found that more than 1,100 counties will face higher risks of water shortages by mid-century as a result of climate change. Two of the principal reasons for the projected water constraints are shifts in precipitation and potential evapotranspiration (PET). Climate models project decreases in precipitation in many regions of the U.S., including areas that may currently be described as experiencing water shortages of some degree.

**Figure 3.35. Climate Change Impact**




Source: http://www.nrdc.org/globalWarming/watersustainability/

### *Hazard Summary by Jurisdiction*

The entire planning area will be affected by drought to some degree. The unincorporated agricultural areas of Scotland County are the most vulnerable to drought while the drought condition will also affect the cities except the magnitude would be different with only lawns, local garden and possibly infrastructure impacted. In addition, damage to crops, produce, livestock, soils and building foundations could be weakened due to shrinking and expanding soil.

## Problem Statement

Scotland County is at a high risk for a severe drought which is an extra strain placed on the water supply system. Possible solutions include the development of agreements with neighboring communities for a secondary water source and review of local ordinances/regulation for inclusion of water-use restrictions during periods of drought.

## 3.4.6 Extreme Temperatures

### Hazard Profile

#### *Hazard Description*

Extreme temperature events, both hot and cold, can impact human health and mortality, natural ecosystems, agriculture and other economic sectors. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in figure 3.36 uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipes to freeze and rupture. Extreme cold also increases the likelihood for ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.

The National Institute on Aging estimates that more than 2.5 million Americans are elderly and especially vulnerable to hypothermia, with the isolated elders being most at risk. About 10 percent of people over the age of 65 have some kind of bodily temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

Also at risk, are those without shelter, those who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

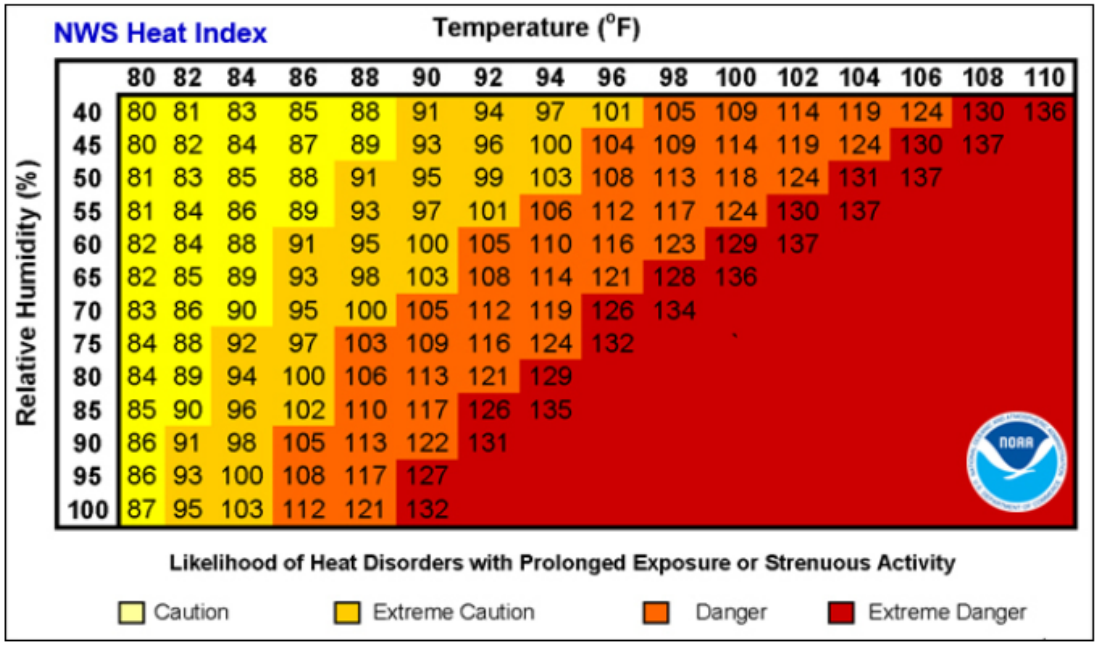
#### *Geographic Location*

The entire planning area is subject to extreme heat and all participating jurisdictions are affected.

#### *Strength/Magnitude/Extent*

The National Weather Service (NWS) has an alert system in place (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when for two or more consecutive days: (1) when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F); and the night time minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

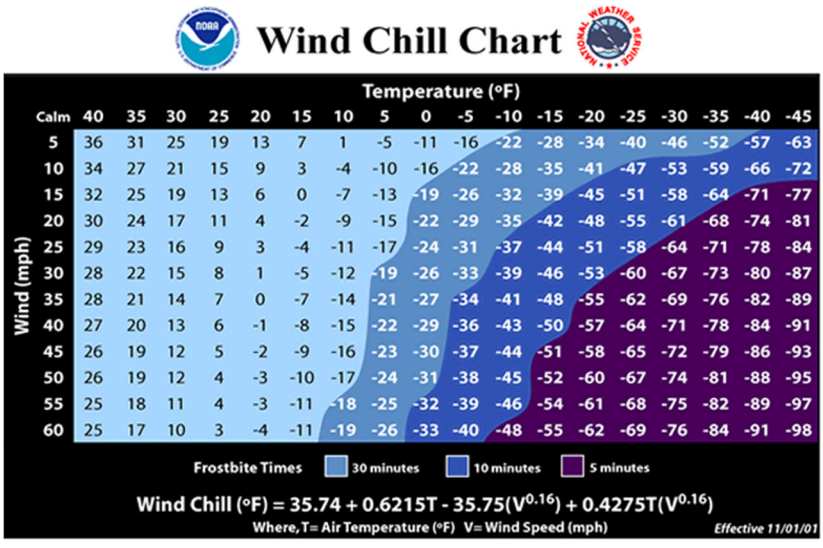
**Figure 3.36. Heat Index (HI) Chart**




Source: National Weather Service (NWS); https://www.weather.gov/safety/heat-index
Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

The NWS Wind Chill Temperature (WCT) index uses advances in science, technology, and computer modeling to provide an accurate, understandable, and useful formula for calculating the dangers from winter winds and freezing temperatures. The figure below presents wind chill temperatures which are based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

**Figure 3.37. Wind Chill Chart**

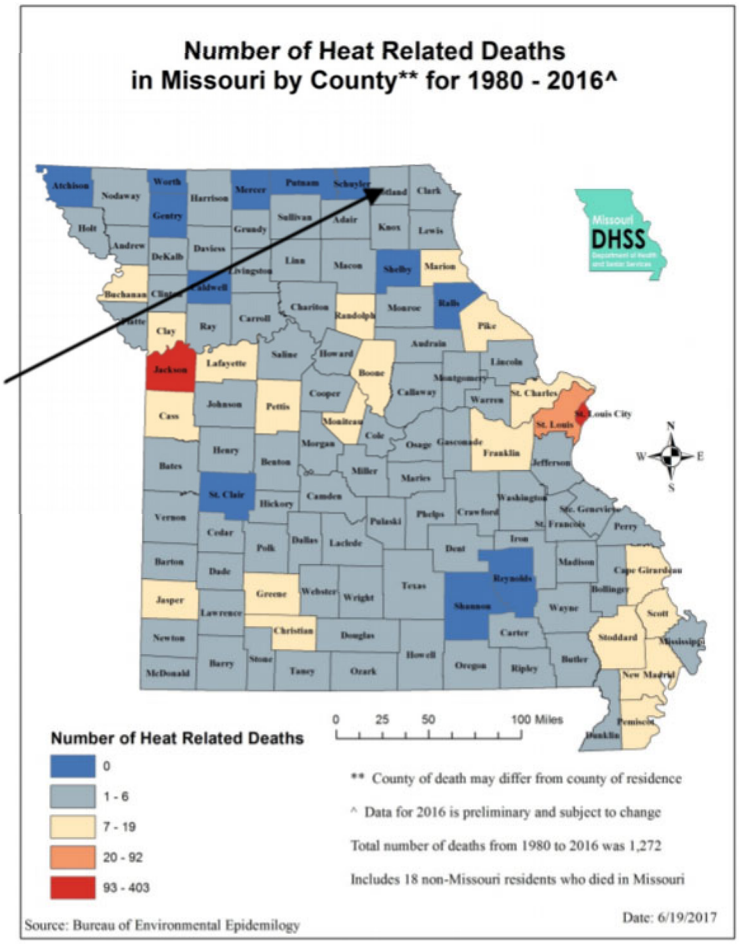



Source: https://www.weather.gov/safety/cold-wind-chill-chart

### *Previous Occurrences*

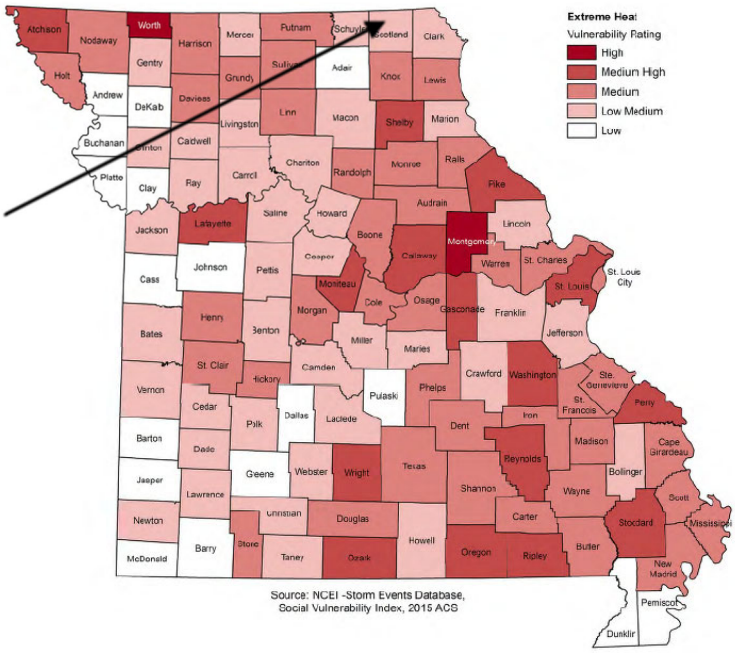
The recorded events in the National Centers for Environmental Information (NCEI) database state there have been 1 recorded events of excessive heat in the 20 year period of 2000-2019. There was 0 deaths or injuries associated with these events. The NCEI database shows 6 recorded events of extreme cold/wind chill, with 0 deaths or injuries associated with this event. Figure 3.39 illustrates between 1-6 heat related deaths in Scotland County between the time of 1980-2016, no supporting documentation could be found to include in this plan.

**Figure 3.38. Heat Related Deaths in Missouri 2000 - 2016**




*Source: https://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/stat-report.pdf*

**Figure 3.39. Agricultural Insurance Claims Due to Extreme Temperatures**




Source: Missouri State Hazard Mitigation Plan, 2018
https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

Extreme heat can cause stress to crops and animals. According to USDA Risk Management Agency, Scotland County has a medium low risk of damage to crops due to extreme temperatures. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

From 1988-2011, there were 3,496 fatalities in the U.S. attributed to summer heat. This translates to an annual national average of 146 deaths. During the same period, 0 deaths were recorded in the planning area, according to NCEI data. The National Weather Service stated that among natural hazards, no other natural disaster—not lightning, hurricanes, tornadoes, floods, or earthquakes—causes more deaths.

***Probability of Future Occurrence***

NCEI, dating back to 2000 indicates 1 year with an extreme heat event. Based on this historical data, the calculated probability of an extreme heat event in any given year is .50%. The probability was determined by taking the number of years with an extreme heat events (1) divided by the number of year (20) data was obtained for.

NCEI, dating back to 2000 indicates 6 years with an extreme heat event. In one year there were multiple extreme heat events. Based on this historical data, the calculated probability of an extreme heat event in any given year is 20%. The probability was determined by taking the number of years with an extreme heat events (4) divided by the number of year (20) data was obtained for.

### *Changing Future Conditions Considerations*

According to the 2018 Missouri State Plan, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21st century. The impacts of extreme heat events are experienced most acutely by the elderly and other vulnerable populations. High temperatures are exacerbated in urban environments, a phenomenon known as the urban heat island effect, which in turn tend to have higher concentrations of vulnerable populations. Higher demand for electricity as people try to keep cool amplifies stress on power systems and may lead to an increase in the number of power outages. Atmospheric concentrations of ozone occur at higher air temperatures, resulting in poorer air quality, while harmful algal blooms flourish in warmer water temperatures, resulting in poorer water quality.

## Vulnerability

### *Vulnerability Overview*

Those at greatest risk for heat-related illness include infants and children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas, the exposure of farm workers, as well as livestock, to extreme temperatures is a major concern.

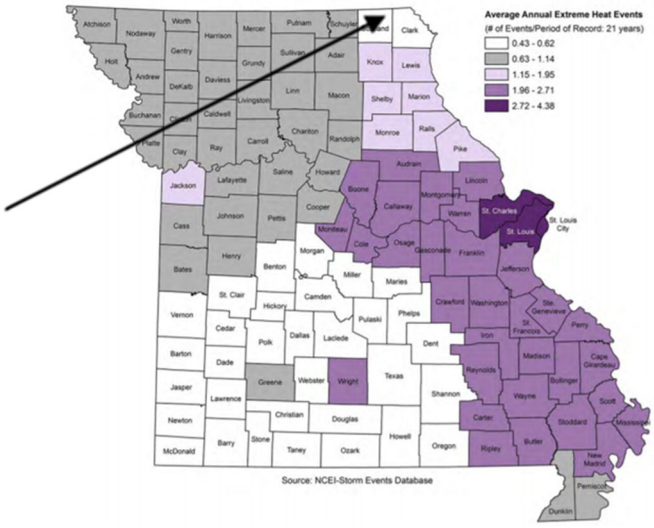
Table 3.33 lists typical symptoms and health impacts due to exposure to extreme heat.

**Table 3.28. Typical Health Impacts of Extreme Heat**

| Heat Index (HI) | Disorder |
|---|---|
| 80-90° F (HI) | Fatigue possible with prolonged exposure and/or physical activity |
| 90-105° F (HI) | Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity |
| 105-130° F (HI) | Heatstroke/sunstroke highly likely with continued exposure |

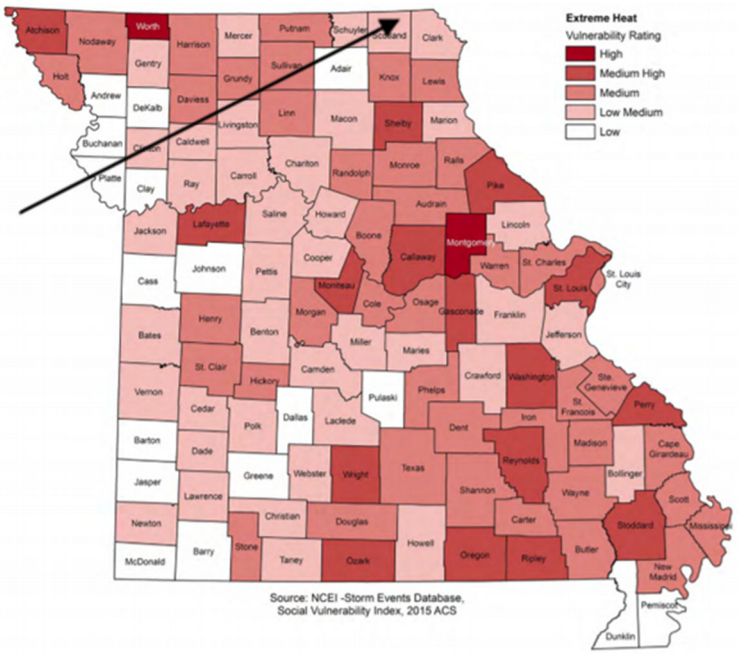
Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

**Figure 3.40. Average Annual Occurrence for Extreme Heat**



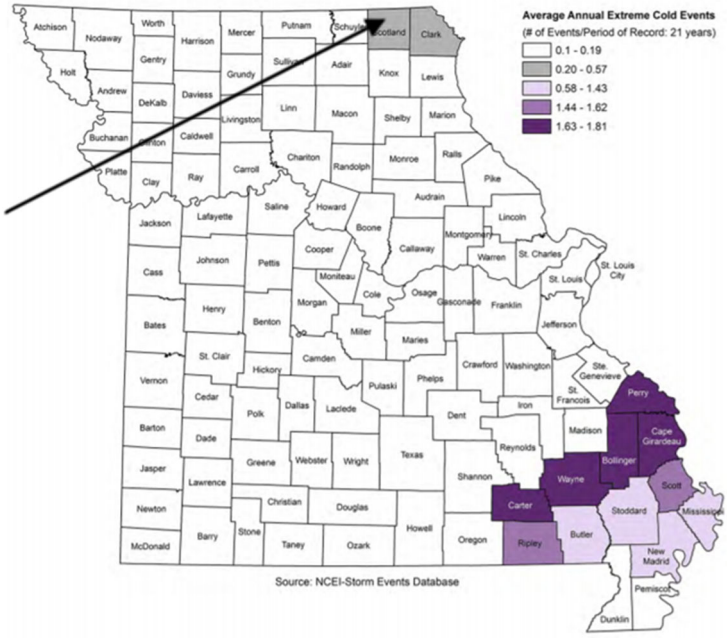

Source: Missouri State Hazard Mitigation Plan, 2018

**Figure 3.41. Vulnerability Rating for Extreme Heat**



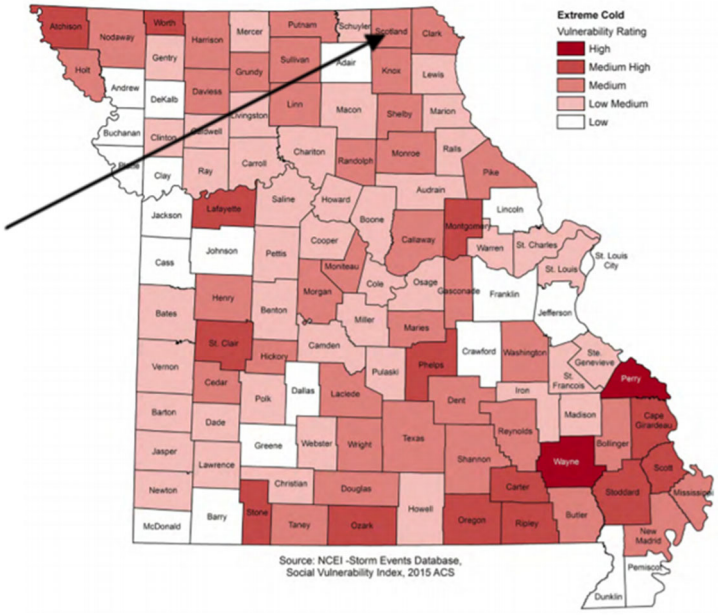

Source: Missouri State Hazard Mitigation Plan, 2018

**Figure 3.42. Vulnerability for Extreme Cold Events**




Source: Missouri State Hazard Mitigation Plan, 2018

**Figure 3.43. Vulnerability for Extreme Cold**




Source: Missouri State Hazard Mitigation Plan, 2018
https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

### *Potential Losses to Existing Development*

During extreme heat events structural, road, and electrical infrastructure are vulnerable to damages. Depending upon temperatures and duration of extreme heat, losses will vary.

### *Impact of Previous and Future Development*

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population.

According to the American Community Survey all jurisdictions in Scotland County experienced a very slight population increase and is in a very slow growth mode.

### *Hazard Summary by Jurisdiction*

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2010 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat. Table 3.35 below summarizes vulnerable populations in the participating jurisdictions. Note that school and special districts are not included in the table because students and those working for the special districts are not customarily in these age groups.

**Table 3.29. Scotland County Population Under Age 5 and Over Age 65, 2010 Census Data**

| Jurisdiction | Population Under 5 yrs | Population 65 yrs and over |
|---|---|---|
| Scotland County | 262 | 392 |
| Memphis | 100 | 425 |
| Rutledge | 13 | 22 |
| Arbela | 1 | 8 |

Source: U.S. Census Bureau includes entire population of each city or county

## Problem Statement

Scotland County has a growing population of residents over 65 years, who are at a greater risk for extreme-temperature related illnesses, injuries, and death. Possible solutions include organizing outreach to the vulnerable elderly populations, including establishing and promoting accessible heating or cooling centers in the community and creating a database in coordination with the Health Department to track those individuals at high risk.

## 3.4.7 Severe Thunderstorms Including High Winds, Hail, and Lightning

### Hazard Profile

#### *Hazard Description*

#### *Thunderstorms*

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (discussed separately in Section 3.4.1) and tornadoes (discussed separately in Section 3.4.9).

#### *High Winds*

A severe thunderstorm can produce winds causing as much damage as a weak tornado. The damaging winds of thunderstorms include downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Damaging straight-line winds are high winds across a wide area that can reach speeds of 140 miles per hour.

#### *Lightning*

All thunderstorms produce lightning which can strike outside of the area where it is raining and is has been known to fall more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is a huge discharge of electricity that shoots through the air causing vibrations and creating the sound of thunder.

#### *Hail*

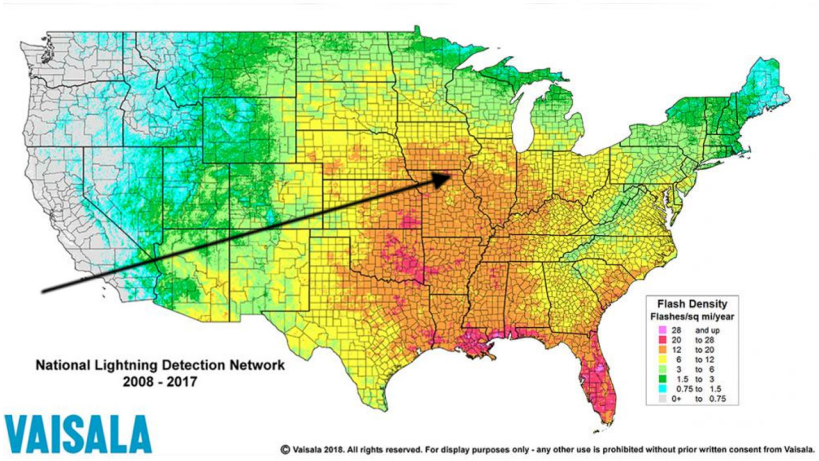
According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow before it hits the earth.

At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can do damage.

### *Geographic Location*

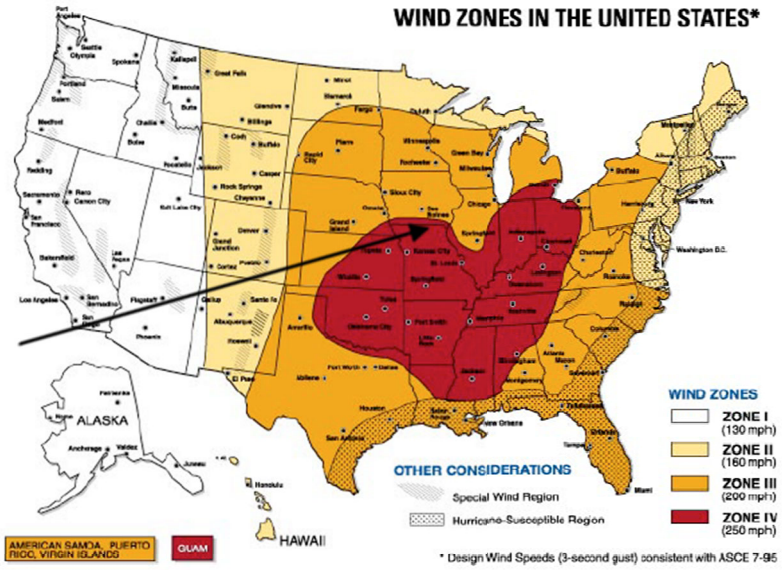
Thunderstorms/high winds/hail/lightning events are an area-wide hazard that can happen anywhere in the county. Although these events occur similarly throughout the planning area, they are more frequently reported in more urbanized areas. In addition, damages are more likely to occur in more densely developed urban areas.

**Figure 3.44. Location and Frequency of Lightning in Missouri**




Source: National Weather Service, http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx . Planning area indicated by arrow.

**Figure 3.45. Wind Zones in the United States**




Source: FEMA 320, Taking Shelter from the Storm, 3rd edition, https://www.fema.gov/pdf/library/ism2_s1.pdf Planning area indicated by arrow

### *Strength/Magnitude/Extent*

Based on information provided by the Tornado and Storm Research Organization (TORRO), Table 3.36 below describes typical damage impacts of the various sizes of hail.

**Table 3.30. Tornado and Storm Research Organization Hailstorm Intensity Scale**

| Intensity Category | Diameter (mm) | Diameter (inches) | Size Description | Typical Damage Impacts |
|---|---|---|---|---|
| Hard Hail | 5-9 | 0.2-0.4 | Pea | No damage |
| Potentially Damaging | 10-15 | 0.4-0.6 | Mothball | Slight general damage to plants, crops |
| Significant | 16-20 | 0.6-0.8 | Marble, grape | Significant damage to fruit, crops, vegetation |
| Severe | 21-30 | 0.8-1.2 | Walnut | Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored |
| Severe | 31-40 | 1.2-1.6 | Pigeon's egg > squash ball | Widespread glass damage, vehicle bodywork damage |
| Destructive | 41-50 | 1.6-2.0 | Golf ball > Pullet's egg | Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries |
| Destructive | 51-60 | 2.0-2.4 | Hen's egg | Bodywork of grounded aircraft dented, brick walls pitted |
| Destructive | 61-75 | 2.4-3.0 | Tennis ball > cricket ball | Severe roof damage, risk of serious injuries |
| Destructive | 76-90 | 3.0-3.5 | Large orange > Soft ball | Severe damage to aircraft bodywork |
| Super Hailstorms | 91-100 | 3.6-3.9 | Grapefruit | Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open |
| Super Hailstorms | >100 | 4.0+ | Melon | Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open |

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University
Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity. http://www.torro.org.uk/site/hscale.php

Straight-line winds are defined as any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour, which represent the most common type of severe weather. They are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase.

The onset of thunderstorms with lightning, high wind, and hail is generally rapid. Duration is less than six hours and warning time is generally six to twelve hours. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start structural and wildland fires, as well as damage electrical systems and equipment.

### *Previous Occurrences*

"Limitations to the use of NCEI reported lightning events include the fact that only lightning events that result in fatality, injury and/or property and crop damage are in the NCEI.

The tables below (**Table 3.31 through Table 3.34**) summarize past crop damages as indicated by crop insurance claims. The tables illustrate the magnitude of the impact on the planning area's agricultural economy.

**Table 3.31. Crop Insurance Claims Paid in Scotland County from Thunderstorms, 2009 - 2019**

| Crop Year | Crop Name | Cause of Loss Description | Insurance Paid |
|---|---|---|---|
| No Claims | | | |
| | | | |
| Total | | | |

Source: USDA Risk Management Agency, Insurance Claims, https://www.rma.usda.gov/data/cause

**Table 3.32. Crop Insurance Claims Paid in Scotland County from High Winds, 2009 - 2019**

| Crop Year | Crop Name | Cause of Loss Description | Insurance Paid |
|---|---|---|---|
| 2015 | Corn | Wind | $89,307 |
| 2015 | Corn | High Wind | $10,831 |
| 2018 | Corn | Wind | $12,668 |
| Total | | | $112,806.00 |

Source: USDA Risk Management Agency, Insurance Claims, https://www.rma.usda.gov/data/cause

**Table 3.33. Crop Insurance Claims Paid in Scotland County from Hail, 2009 - 2019**

| Crop Year | Crop Name | Cause of Loss Description | Insurance Paid |
|---|---|---|---|
| 2010 | Corn | Hail | $2,969 |
| 2010 | Corn | Hail | $5,686 |
| 2010 | Corn | Hail | $1,436 |
| 2011 | Corn | Hail | $25,093 |
| 2013 | Soybeans | Hail | $5,362 |
| 2015 | Soybeans | Hail | $5,112 |
| 2017 | Soybeans | Hail | $53,474 |
| Total | | | $99,132 |

USDA Risk Management Agency, Insurance Claims, https://www.rma.usda.gov/data/cause

**Table 3.34. Crop Insurance Claims Paid in Scotland County from Lightning, 2009 - 2019**

| Crop Year | Crop Name | Cause of Loss Description | Insurance Paid |
|---|---|---|---|
| No Claims | | | |
| Total | | | |

USDA Risk Management Agency, Insurance Claims, https://www.rma.usda.gov/data/cause

***Probability of Future Occurrence***

Thunderstorms

Due to no reports, adequate calculations cannot be configured at this time.

High Winds

Based on NCEI data, there have been zero events in a 11 year period, based on this data the probability cannot be calculated due to no events occurring.

Lightning

Based on NCEI data, there have been 2 events in a 11 year period in Scotland County. Based on history, the probability of a hail event in any given year is 18 percent. Thus, making the probability as slight in any given year.

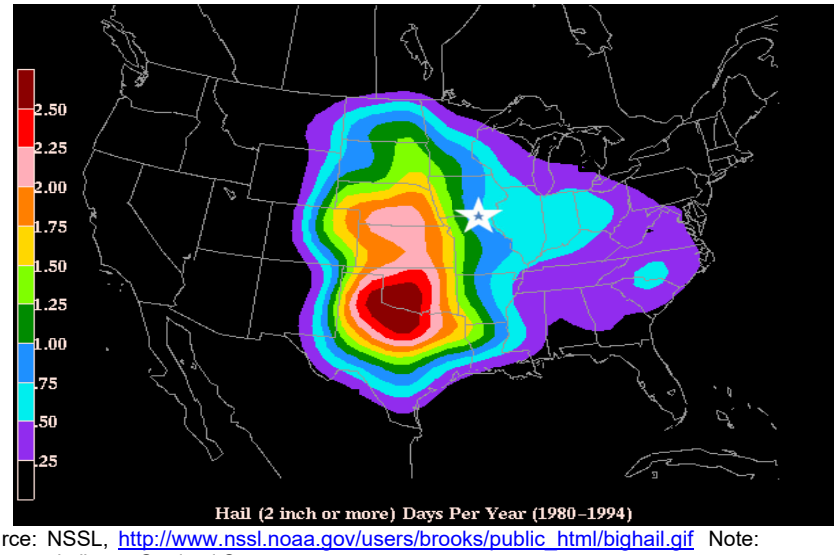
Hail

Based on NCEI data, there have been 30 events in a 11 year period, producing an average of 3 hail events each year in Scotland County. Based on history, the probability of a hail event in any given year is 100 percent. Thus, making the probability as likely in any given year.

Figure 3.46 is based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year. Scotland County is located in the region to receive between .75 and 1 hailstorm annually

.

**Figure 3.46. Annual Hailstorm Probability (2" diameter or larger), U 1980- 1994**




Source: NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif Note: White star indicates Scotland County

### *Changing Future Conditions Considerations*

According to the 2018 Missouri State Plan, predicted increases in temperature could help create atmospheric conditions that are fertile breeding grounds for severe thunderstorms and tornadoes in Missouri. Possible impacts include an increased risk to life and property in both the public and private sectors. Public utilities and manufactured housing developments will be especially prone to damages. Jurisdictions already affected should be prepared for more of these events, and should thus prioritize mitigation actions such as construction of safe rooms for vulnerable populations, retrofitting and/or hardening existing structures, improving warning systems and public education, and reinforcing utilities and additional critical infrastructure.

## Vulnerability

### *Vulnerability Overview*

Severe thunderstorm losses are usually attributed to the associated hazards of hail, downburst winds, lightning and heavy rains. Losses due to hail and high wind are typically insured losses that are localized and do not result in presidential disaster declarations. However, in some cases, impacts are severe and widespread and assistance outside state capabilities is necessary. Hail and wind also can have devastating impacts on crops. Severe thunderstorms/heavy rains that lead to flooding are discussed in the flooding hazard profile. Hailstorms cause damage to property, crops, and the environment, and can injure and even kill livestock. In the United States, hail causes more than $1 billion in damage to property and crops each year. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are also commonly damaged by hail. Hail has been known to cause injury to humans, occasionally fatal injury.

In general, assets in the County vulnerable to thunderstorms with lightning, high winds, and hail include people, crops, vehicles, and built structures. Although this hazard results in high annual losses, private property insurance and crop insurance usually cover the majority of losses. Considering insurance coverage as a recovery capability, the overall impact on jurisdictions is reduced.

Most lightning damages occur to electronic equipment located inside buildings. But structural damage can also occur when a lightning strike causes a building fire. In addition, lightning strikes can cause damages to crops, if fields or forested lands are set on fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes.

### *Potential Losses to Existing Development*

Most damages occur to electronic equipment located inside buildings, but structural damage can also occur when a lightning strike causes a building fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes. There has not been any fatalities or injuries due to lightning in Scotland County during the 10 year period reviewed. When the review period was extended to 20 years, there was 0 reported lightning events with individuals injured. There have been several insurance claims due to wind, lightning and hail due to loss of property.

Hail

There were 5 years with reported crop insurance claims for a 11 year period resulting in $99,132 in insurance payments.

High Winds

During an 11 year period there was 3 years with crop insurance claims resulting in $112,806 in insurance payments.

Lightning

The total number of Lightning crop insurance claims for a 11 year period could not be determined as claims were listed under “Other (Snow, Lightning, etc.)”

Thunderstorms

During the 11 year period there were no insurance claims due to thunderstorms.

### *Previous and Future Development*

Scotland County's trend in increased development will likely increase vulnerability to thunderstorms, high winds, hail and lightning. If there is more development of housing neighborhoods and businesses, the increased population will be vulnerable to all the hazards.

### *Hazard Summary by Jurisdiction*

Thunderstorms/high winds/ lightning/hail events are area-wide, NCEI data did not seem to indicate that any particular community had higher losses as compared to another.

## Problem Statement

Thunderstorms can damage power lines with the high winds or fallen debris such as tree limbs. Not everyone in the county utilizes social media, texting or have access to a weather radio, communities would benefit from updated sirens. Possible solutions include review of local ordinance and building codes to address high winds and/or construction techniques to include structural bracing, straps and clips, or anchor bolts.

## 3.4.8 Severe Winter Weather

### Hazard Profile

#### *Hazard Description*

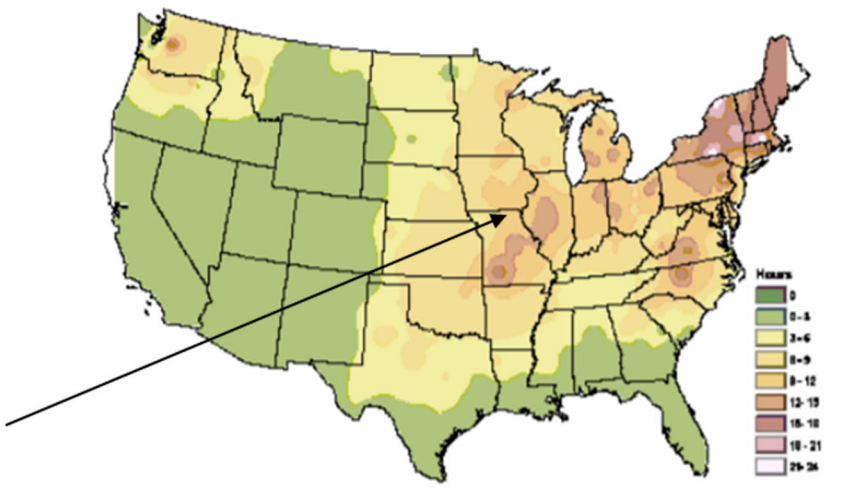
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

#### *Geographic Location*

The entire Scotland County is vulnerable to heavy snow, ice, extreme cold temperatures and freezing rain. Figure 3.48 shows the approximate location of Scotland County.

**Figure 3.47. NWS Statewide Average Number of Hours per Year with Freezing Rain**




Source: American Meteorological Society. "Freezing Rain Events in the United States." http://ams.confex.com/ams/pdfpapers/71872.pdf

***Strength/Magnitude/Extent***

Severe winter storms include heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in the planning area.

For severe weather conditions, the National Weather Service issues some or all of the following products as conditions warrant across the State of Missouri. NWS local offices in Missouri may collaborate with local partners to determine when an alert should be issued for a local area.

- Winter Weather Advisory — Winter weather conditions are expected to cause significant inconveniences and may be hazardous. If caution is exercised, these situations should not become life threatening. Often the greatest hazard is to motorists.
- Winter Storm Watch — Severe winter conditions, such as heavy snow and/or ice are possible within the next day or two.
- Winter Storm Warning — Severe winter conditions have begun or are about to begin.
- Blizzard Warning — Snow and strong winds will combine to produce a blinding snow (near zero visibility), deep drifts, and life-threatening wind chill.
- Ice Storm Warning -- Dangerous accumulations of ice are expected with generally over one quarter inch of ice on exposed surfaces. Travel is impacted, and widespread downed trees and power lines often result.
- Wind Chill Advisory -- Combination of low temperatures and strong winds will result in wind chill readings of -20 degrees F or lower.
- Wind Chill Warning -- Wind chill temperatures of -35 degrees F or lower are expected. This is a life-threatening situation.

### *Previous Occurrences*

**Table 3.35. NCEI Scotland County Winter Weather Events Summary, 2009-2019**

| Type of Event | Inclusive Dates | Magnitude | # of Injuries | Property of Damages | Crop Damages |
|---|---|---|---|---|---|
| Extreme Cold | 01/14/2009 | | | $0.00 | $0.00 |
| Winter Weather | 02/20/2009 | | | $0.00 | $0.00 |
| Winter Storm | 12/07/2009 | | | $0.00 | $0.00 |
| Blizzard | 12/09/2009 | | | $0.00 | $0.00 |
| Winter Weather | 12/25/2009 | | | $0.00 | $0.00 |
| Winter Storm | 01/06/2010 | | | $0.00 | $0.00 |
| Ice Storm | 01/20/2010 | | | $0.00 | $0.00 |
| Winter Weather | 01/25/2010 | | | $0.00 | $0.00 |
| Winter Weather | 02/07/2010 | | | $0.00 | $0.00 |
| Winter Storm | 02/21/2010 | | | $0.00 | $0.00 |
| Winter Weather | 03/20/2010 | | | $0.00 | $0.00 |
| Winter Weather | 12/11/2010 | | | $0.00 | $0.00 |
| Winter Weather | 12/24/2010 | | | $0.00 | $0.00 |
| Winter Weather | 01/10/2011 | | | $0.00 | $0.00 |
| Winter Weather | 01/17/2011 | | | $0.00 | $0.00 |
| Blizzard | 02/01/2011 | Up to 2 feet of snow | | $0.00 | $0.00 |
| Winter Weather | 02/24/2011 | | | $0.00 | $0.00 |
| Winter Weather | 02/27/2011 | | | $0.00 | $0.00 |
| Winter Weather | 01/11/2012 | | | $0.00 | $0.00 |
| Winter Storm | 12/20/2012 | | | $0.00 | $0.00 |
| Winter Weather | 01/27/2013 | | | $0.00 | $0.00 |
| Winter Storm | 02/26/2013 | | | $0.00 | $0.00 |
| Winter Weather | 03/24/2013 | | | $0.00 | $0.00 |
| Winter Weather | 12/13/2013 | | | $0.00 | $0.00 |
| Winter Storm | 12/21/2013 | | | $0.00 | $0.00 |
| Winter Weather | 01/04/2014 | | | $0.00 | $0.00 |
| Winter Storm | 02/01/2014 | | | $0.00 | $0.00 |
| Winter Storm | 02/04/2014 | | | $0.00 | $0.00 |
| Winter Weather | 02/17/2014 | | | $0.00 | $0.00 |
| Winter Weather | 03/01/2014 | | | $0.00 | $0.00 |
| Winter Weather | 11/15/2014 | | | $0.00 | $0.00 |
| Winter Storm | 02/01/2015 | | | $0.00 | $0.00 |
| Winter Weather | 02/04/2015 | | | $0.00 | $0.00 |
| Winter Storm | 12/28/2015 | | | $0.00 | $0.00 |
| Winter Weather | 12/24/2017 | | | $0.00 | $0.00 |
| Winter Weather | 04/01/2018 | | | $0.00 | $0.00 |
| Blizzard | 11/25/2018 | 4 to 13 inches of snow | | $0.00 | $0.00 |
| Winter Storm | 01/11/2019 | | | $0.00 | $0.00 |
| Winter Storm | 01/18/2019 | | | $0.00 | $0.00 |
| Extreme Cold | 01/29/2019 | | | $0.00 | $0.00 |
| Winter Weather | 10/30/2019 | | | $0.00 | $0.00 |

**Table 3.36. Presidential Declarations for Winters Storm in Scotland County**

| Declaration Date | Disaster No. | Incident Type | Counties Declared | Type of Assitance |
|---|---|---|---|---|
| 02/06/2002 | DR-1403 | Ice Storm | Scotland | IA |
| 12/12/2007 | DR-3281 | Severe Winter Storm | All Counties | PA |
| 12/27/2007 | DR-1736 | Severe Winter Storm | Scotland | PA |
| 01/30/2009 | DR-3803 | Severe Winter Storm | All Counties | PA |
| 03/23/2011 | DR-1961 | Severe Winter Storm | Scotland | PA |

Winter storms, cold, frost and freeze take a toll on crop production in the planning area. Table 3.44 shows the USDA's Risk Management Agency payments for insured crop losses in the planning area as a result of cold conditions and snow for the past 10 years.

**Table 3.37. Crop Insurance Claims Paid in Scotland County as a Result of Cold Conditions and Snow 2009 - 2019**

| Crop Year | Crop Name | Cause of Loss Description | Insurance Paid ($) |
|---|---|---|---|
| 2009 | Soybeans | Cold Wet Weather | $20,040 |
| 2009 | Soybeans | Cold Wet Weather | $6,540 |
| 2009 | Soybeans | Freeze | $33,969 |
| 2009 | Soybeans | Freeze | $12,215 |
| 2009 | Wheat | Cold Wet Weather | $5,074 |
| 2009 | Wheat | Cold Wet Weather | $3,695 |
| 2009 | Wheat | Cold Wet Weather | $5,947 |
| 2009 | Wheat | Cold Winter | $1,996 |
| 2009 | Wheat | Cold Winter | $595 |
| 2010 | Wheat | Cold Wet Weather | $2,420 |
| 2010 | Corn | Cold Wet Weather | $10,861 |
| 2010 | Corn | Cold Wet Weather | $2,218 |
| 2011 | Wheat | Cold Wet Weather | $7,116 |
| 2011 | Wheat | Cold Wet Weather | $3,319 |
| 2011 | Corn | Cold Wet Weather | $66,470 |
| 2011 | Corn | Cold Wet Weather | $5,226 |
| 2011 | Corn | Cold Wet Weather | $117,252 |
| 2012 | Soybeans | Cold Wet Weather | $3,149 |
| 2012 | Wheat | Cold Wet Weather | $15,304 |
| 2013 | Wheat | Cold Wet Weather | $6,858 |
| 2013 | Wheat | Cold Wet Weather | $2,026 |
| 2013 | Wheat | Cold Wet Weather | $503 |
| 2013 | Corn | Cold Wet Weather | $20,715 |
| 2014 | Soybeans | Cold Wet Weather | $13,785 |
| 2014 | Soybeans | Freeze | $1,929 |
| 2014 | Wheat | Cold Wet Weather | $365 |
| 2014 | Wheat | Cold Winter | $154,306 |
| 2014 | Wheat | Cold Winter | $5,541 |
| 2014 | Wheat | Cold Winter | $89,217 |
| 2014 | Wheat | Cold Winter | $4,019 |
| 2014 | Wheat | Freeze | $9,645 |
| 2014 | Wheat | Freeze | $1,331 |
| 2014 | Corn | Cold Wet Weather | $669 |
| 2015 | Soybeans | Cold Wet Weather | $17,690 |
| 2015 | Wheat | Cold Winter | $1,790 |
| 2015 | Wheat | Cold Winter | $29,443 |
| 2015 | Corn | Cold Wet Weather | $20,023 |
| 2015 | Corn | Cold Wet Weather | $3,241 |
| 2015 | Corn | Cold Wet Weather | $55,764 |
| 2015 | Corn | Cold Winter | $310 |
| 2016 | Soybeans | Cold Winter | $38,335 |
| 2016 | Soybeans | Cold Wet Weather | $483 |
| 2016 | Wheat | Cold Winter | $28,948 |
| 2016 | Corn | Cold Wet Weather | $29,758 |
| 2017 | Soybeans | Cold Wet Weather | $40,845 |
| 2017 | Wheat | Cold Wet Weather | $23,566 |

| | | | |
|---|---|---|---|
| 2017 | Corn | Cold Wet Weather | $474 |
| 2018 | Soybeans | Cold Wet Weather | $345,500 |
| 2018 | Soybeans | Cold Wet Weather | $10,302 |
| 2018 | Soybeans | Cold Wet Weather | $57,613 |
| 2018 | Wheat | Cold Wet Weather | $16,205 |
| 2018 | Corn | Cold Wet Weather | $571,336 |
| 2019 | Soybeans | Cold Wet Weather | $35,887 |
| 2019 | Soybeans | Cold Wet Weather | $31,038 |
| 2019 | Soybeans | Cold Wet Weather | $255,729 |
| 2019 | Corn | Cold Wet Weather | $48 |
| 2019 | Corn | Cold Wet Weather | $211,471 |
| 2019 | Corn | Cold Wet Weather | $23,046 |
| **Total** | | | $2,482,887 |

Source: USDA Risk Management Agency, https://www.rma.usda.gov/data/cause

### *Probability of Future Occurrence*

The entire planning area is vulnerable to the effects of winter storm/blizzard, ice storms, winter weather, cold/wind chill and heavy snow. All effects of winters tend to make driving more treacherous and can impact the response of emergency vehicles. The probability of utility and infrastructure failure increases during winter weather due to the freezing rain accumulation on utility poles and power lines. Elderly populations are considered particularly vulnerable to the impact of winter weather.

### *Changing Future Conditions Considerations*

According to the 2018 Missouri State Plan, a shorter overall winter season and fewer days of extreme cold may have both positive and negative indirect impacts. Warmer winter temperatures may result in changing distributions of native plant and animal species and/or an increase in pests and non-native species. Warmer winter temperatures will result in a reduction of lake ice cover. Reduced lake ice cover impacts aquatic ecosystems by raising water temperatures. Water temperature is linked to dissolved oxygen levels and many other environmental parameters that affect fish, plant, and other animal populations. A lack of ice cover also leaves lakes exposed to wind and evaporation during a time of year when they are normally protected. As both temperature and precipitation increase during the winter months, freezing rain will be more likely. Additional wintertime precipitation in any form will contribute to saturation and increase the risk and/or severity of spring flooding. A greater proportion of wintertime precipitation may fall as rain rather than snow.

## Vulnerability

### *Vulnerability Overview*

Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. Ice can also become a problem on roadways if the air temperature is high enough that precipitation falls as freezing rain rather than snow.

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms when limbs fall. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular ice accumulation during winter storm events damage to power lines due to the ice weight on the lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could include cost of repair or replacement of damaged facilities, and lost economic opportunities for businesses.

Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. Standard values for loss of service for utilities reported in FEMA's 2009 BCA Reference Guide, the economic impact as a result of loss of power is $126 per person per day of lost service.

**Table 3.38. Ranges of Severe Winter Weather Vulnerability Factor Rating.**

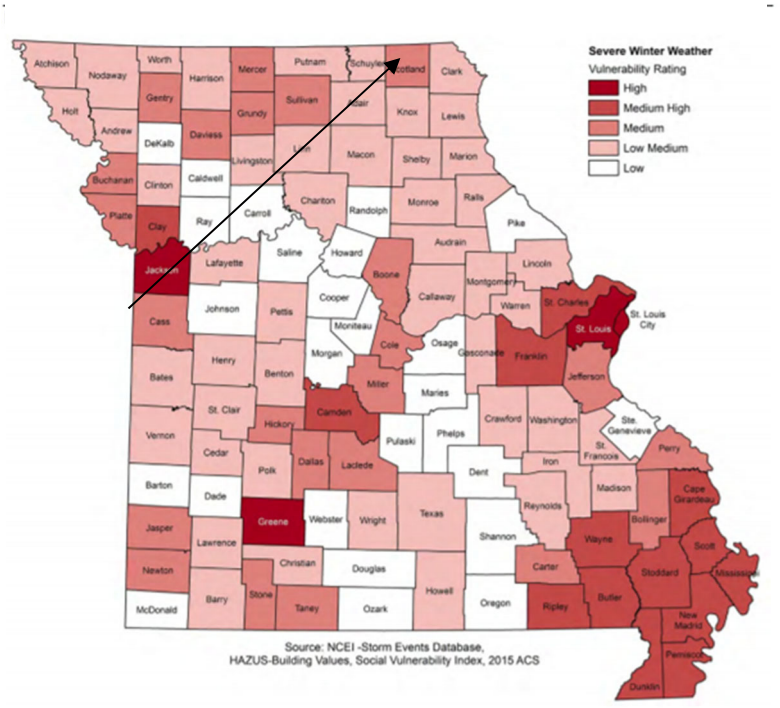
| Factors Considered | Low (1) | Low Medium (2) | Medium (3) | Medium High (4) | High (5) |
|---|---|---|---|---|---|
| **Common Factors** | | | | | |
| Housing Density (# per sq. mile) | 4.11-44.23 | 44.24-134.91 | 134.92-259.98 | 259.99-862.69 | 862.70-2836.23 |
| Building Exposure ($) | $269,532-$3,224,641 | $3,224,642-$8,792,829 | $8,792,830-$22,249,768 | $22,249,769-$46,880,213 | $46,880,214-$138,887,850 |
| Social Vulnerability | 1 | 2 | 3 | 4 | 5 |
| Likelihood of Occurrence (# of events/ yrs. of data) | 1.05-1.43 | 1.44-1.76 | 1.77-2.10 | 2.11-2.67 | 2.68-4.57 |
| Average Annual Property Loss (annual property loss/ yrs. Of data) | $0-$143,095.24 | $143,095.25-$406,666.67 | $406,666.68-$1,191,000.95 | $1,191,000.96-$3,184,761.90 | $3,184,761.91-$5,861,666.67 |

Source: 2018 Missouri State Hazard Mitigation Plan

**Table 3.39. Ranges for Severe Winter Weather Combined Vulnerability Rating**

| | Low (1) | Low-medium (2) | Medium (3) | Medium-high-4 | High (5) |
|---|---|---|---|---|---|
| Severe Winter Weather Combined Vulnerability | 7-8 | 8-10 | 10-12 | 12-15 | 15-22 |

**Figure 3.48. Vulnerability Summary for Severe Winter Weather**




***Potential Losses to Existing Development***

Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. Ice can also become a problem on roadways if the air temperature is high enough that precipitation falls as freezing rain rather than snow.

Buildings with overhanging tree limbs are more vulnerable to damage during winter storms when limbs fall. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular ice accumulation during winter storm events damage to power lines due to the ice weight on the lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could include cost of repair or replacement of damaged facilities, and lost economic opportunities for businesses.

Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. Standard values for loss of service for utilities reported in FEMA's 2009 BCA Reference Guide, the economic impact as a result of loss of power is $126 per person per day of lost service.

### *Previous and Future Development*

The next severe winter storm will most likely close schools and businesses for multiple days, and make roadways hazardous for travel. Heavy ice accumulation may damage electrical infrastructures causing prolonged power outages for large portions of the region. In addition, freezing temperatures make water lines vulnerable to freeze/thaw. Fallen tree limbs also pose a threat to various structures/infrastructures across the county.

### *Hazard Summary by Jurisdiction*

Although crop loss as a result of severe winter storm occurs more in the unincorporated portions of the planning area, the density of vulnerable populations is higher in the urban areas of the planning areas. It is considered that the magnitude of this hazard is relatively equal. The factors of probability, warning time, and duration are also equal across the planning area. Therefore, the conclusion is the hazard does not substantially vary by jurisdiction.

## Problem Statement

Scotland County is expected to experience at least one severe winter weather events annually; the county has a medium vulnerability rating. Jurisdictions should enhance their weather monitoring to be better prepared for sever weather hazards. If jurisdictions monitor winter weather, they can dispatch road crews to prepare for the hazard. County and city crews can also trim trees along power lines to minimize the potential for outages due to snow and ice. Citizens should also be educated about the benefits of being proactive to alleviate property damage as well as preparing for power outages. Education needs to occur to ensure all residents are aware of the shelters in the County, residents are educated on emergency supplies to have and the utilization of social media and texting increases.

## 3.4.9 Tornado

### Hazard Profile

#### *Hazard Description*

Essentially, tornadoes are a vortex storm with two components of winds. The first is the rotational winds that can measure up to 500 miles per hour, and the second is an uplifting current of great strength. The dynamic strength of both these currents can cause vacuums that can overpressure structures from the inside.

Although tornadoes have been documented in all 50 states, most of them occur in the central United States. The unique geography of the central United States allows for the development of thunderstorms that spawn tornadoes. The jet stream, which is a high-velocity stream of air, determines which area of the central United States will be prone to tornado development. The jet stream normally separates the cold air of the north from the warm air of the south. During the winter, the jet stream flows west to east from Texas to the Carolina coast. As the sun "moves" north, so does the jet stream, which at summer solstice flows from Canada across Lake Superior to Maine. During its move northward in the spring and its recession south during the fall, the jet stream crosses Missouri, causing the large thunderstorms that breed tornadoes.

Tornadoes spawn from the largest thunderstorms. The associated cumulonimbus clouds can reach heights of up to 55,000 feet above ground level and are commonly formed when Gulf air is warmed by solar heating. The moist, warm air is overridden by the dry cool air provided by the jet stream. This cold air presses down on the warm air, preventing it from rising, but only temporarily. Soon, the warm air forces its way through the cool air and the cool air moves downward past the rising warm air. This air movement, along with the deflection of the earth's surface, can cause the air masses to start rotating. This rotational movement around the location of the breakthrough forms a vortex, or funnel. If the newly created funnel stays in the sky, it is referred to as a funnel cloud. However, if it touches the ground, the funnel officially becomes a tornado.

A typical tornado can be described as a funnel-shaped cloud that is "anchored" to a cloud, usually a cumulonimbus that is also in contact with the earth's surface. This contact on average lasts 30 minutes and covers an average distance of 15 miles. The width of the tornado (and its path of destruction) is usually about 300 yards. However, tornadoes can stay on the ground for upward of 300 miles and can be up to a mile wide. The National Weather Service, in reviewing tornadoes occurring in Missouri between 1950 and 1996, calculated the mean path length at 2.27 miles and the mean path area at 0.14 square mile.

The average forward speed of a tornado is 30 miles per hour but may vary from nearly stationary to 70 miles per hour. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Tornadoes are most likely to occur in the afternoon and evening, but have been known to occur at all hours of the day and night.

#### *Geographic Location*

Tornadoes can occur in the entire planning area and no area is immune from tornado damage.

#### *Strength/Magnitude/Extent*

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also can generate a tremendous amount of flying debris or

"missiles," which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Tornado magnitude is classified according to the EF- Scale (or the Enhance Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF-Scale (see Table 3.48) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F Scale was implemented in the U.S. on February 1, 2007.

**Table 3.40. Enhanced F Scale for Tornado Damage**

| FUJITA SCALE | | | DERIVED EF SCALE | | OPERATIONAL EF SCALE | |
|---|---|---|---|---|---|---|
| F Number | Fastest ¼-mile (mph) | 3 Second Gust (mph) | EF Nu | 3 Second Gust (mph) | EF Number | 3 Second Gust (mph) |
| 0 | 40-72 | 45-78 | 0 | 65-85 | 0 | 65-85 |
| 1 | 73-112 | 79-117 | 1 | 86-109 | 1 | 86-110 |
| 2 | 113-157 | 118-161 | 2 | 110-137 | 2 | 111-135 |
| 3 | 158-207 | 162-209 | 3 | 138-167 | 3 | 136-165 |
| 4 | 208-260 | 210-261 | 4 | 168-199 | 4 | 166-200 |
| 5 | 261-318 | 262-317 | 5 | 200-234 | 5 | Over 200 |

Source: The National Weather Service, www.spc.noaa.gov/faq/tornado/ef-scale.html

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.41**. The damage descriptions are summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees or damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

**Table 3.41. Enhanced Fujita Scale with Potential Damage**

| Enhanced Fujita Scale | | | |
|---|---|---|---|
| Scale | Wind Speed (mph) | Relative Frequency | Potential Damage |
| EF0 | 65-85 | 53.5% | Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0). |
| EF1 | 86-110 | 31.6% | Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken. |
| EF2 | 111-135 | 10.7% | Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground. |
| EF3 | 136-165 | 3.4% | Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some |
| EF4 | 166-200 | 0.7% | Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated. |
| EF5 | >200 | <0.1% | Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur. |

Source: NOAA Storm Prediction Center, http://www.spc.noaa.gov/efscale/ef-scale.html

Enhanced weather forecasting has provided the ability to predict severe weather likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

### *Previous Occurrences*

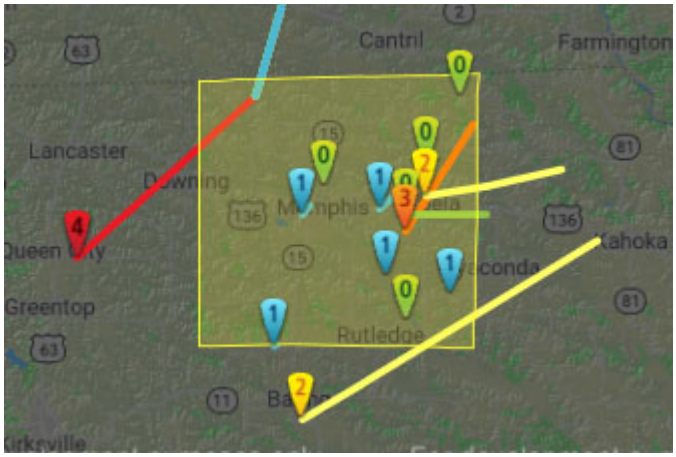
There are limitations to the use of NCEI tornado data that must be noted. For example, one tornado may contain multiple segments as it moves geographically. A tornado that crosses a county line or state line is considered a separate segment for the purposes of reporting to the NCEI. Also, a tornado that lifts off the ground for less than 5 minutes or 2.5 miles is considered a separate segment. If the tornado lifts off the ground for greater than 5 minutes or 2.5 miles, it is considered a separate tornado. Tornadoes reported in Storm Data and the Storm Events Database are in segments.

**Table 3.42. Recorded Tornadoes in Scotland County, 1993 – Present**

| Date | Beginning Location | Ending Location | Length (miles) | Width (yards) | F/EF Rating | Death | Injury | Property Damage | Crop Damages |
|---|---|---|---|---|---|---|---|---|---|
| 6/14/1998 | 2NE Rutledge | 2NE Rutledge | .20 | 25 | F0 | 0 | 0 | $0 | $0 |
| 05/10/2003 | 4ESE Rutledge | 8ENE Rutledge | 4.4 | 150 | F0 | 0 | 0 | $250,000 | $0 |
| 03/12/2006 | 2SW Arbela | 2 SE Granger | 5.5 | 8 | F0 | 0 | 0 | $5,000 | $0 |
| 10/02/2007 | 2NE Show Me Lake | 2SW Memphis | .82 | 210 | EF1 | 0 | 0 | $11,000 | $0 |
| 11/11/2015 | 3NW Gorin | 2WNW Arbela | 2.52 | 75 | EF1 | 0 | 0 | $0.00 | $0 |
| 04/27/2016 | 3WSW Spillman | 3WSW Spillman | .20 | 40 | EF0 | 0 | 0 | $200,000 | $0 |
| 10/14/2017 | 2ENE Ella Ewing Lake | 2ENE Ella Ewing Lake | .10 | 10 | EF1 | 0 | 0 | $0.00 | $0 |
| 06/26/2018 | 1NNE Memphis | 1NNE Memphis | .18 | 10 | EF0 | 0 | 0 | $0.00 | $0 |
| | **Total** | | | | | | | $466,000 | $0 |

Source: National Centers for Environmental Information, http://www.NCEI.noaa.gov/stormevents/

**Figure 3.49. Scotland County Map of Historic Tornado Events**




Source: Missouri Tornado History Project, http://www.tornadohistoryproject.com/tornado/Missouri

Data from the USDA Risk Management Agency showed in 2010 there was insurance payments in Scotland County for crop damages as a result of tornadoes in the amount of $5,891.

### *Probability of Future Occurrence*

The National Centers for Environmental Information reported 8 tornadoes in Scotland County in a 26-year time period, which calculates to a 31 percent chance of tornado in any given year. Therefore, it is a low probability that some portion of Scotland County will experience tornado activity in any given year

### *Changing Future Conditions Considerations*

According to the 2018 Missouri State Hazard Mitigation Plan, Scientists do not know how the frequency and severity of tornadoes will change. Research published in 2015 suggests that changes in heat and moisture content in the atmosphere, brought on by a warming world, could be playing a role in making tornado outbreaks more common and severe in the U.S. The research concluded that the number of days with large outbreaks have been increasing since the 1950s and that densely concentrated tornado outbreaks are on the rise. It is notable that the research shows that the area of tornado activity is not expanding, but rather the areas already subject to tornado activity are seeing the more densely packed tornadoes. Because Missouri experiences on average around 39.6 tornadoes a year, such research is closely followed by meteorologists in the state.

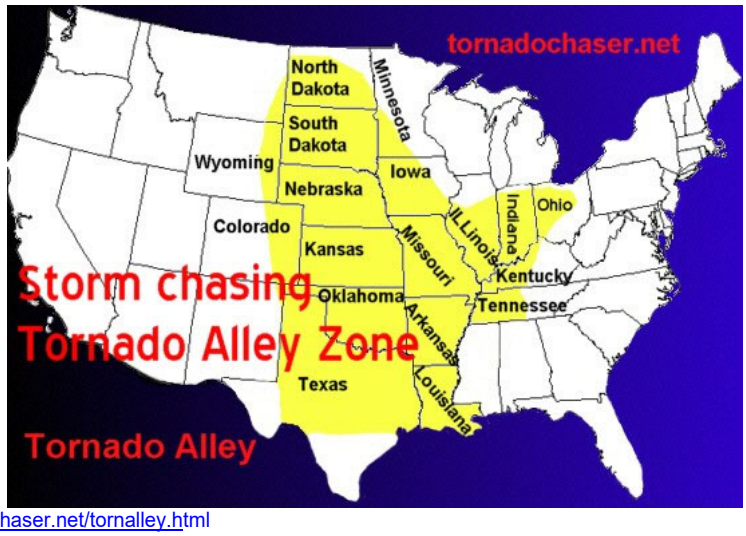
## Vulnerability

### *Vulnerability Overview*

Scotland County is located in a region of the U.S. with high frequency of dangerous and destructive tornadoes referred to as “Tornado Alley”. Figure 3.51 illustrates areas where dangerous tornadoes historically have occurred.

From the statistical data collected, six factors were considered in determining overall vulnerability to tornadoes as follows: building exposure, population density, social vulnerability, percentage of mobile homes, likelihood of occurrence, and annual property loss. Based on natural breaks in the statistical data, a rating value of 1 through 5 was assigned to each factor. These rating values correspond to the following descriptive terms: 1) Low 2) Low-medium 3) Medium 4) Medium-high 5) High.

**Figure 3.50. Tornado Alley in the U.S.**




Source: http://www.tornadochaser.net/tornalley.html

**Table 3.43. Ranges for Tornado Vulnerability Factor Ratings**

| Factors Considered | Low (1) | Low-medium (2) | Medium (3) | Medium-High (4) | High (5) |
|---|---|---|---|---|---|
| **Common Factors** | | | | | |
| Building Exposure ($) | $269,532-$3,224,641 | $3,224,642-$8,792,829 | $8,792,830-$22,249,768 | $22,249,769-$46,880,213 | $46,880,214-$138,887,850 |
| Population Density (#per sq. mile) | 4.11-44.23 | 44.24-134.91 | 134.92-259.98 | 259.99-862.69 | 862.70-2,836.23 |
| Social Vulnerability | 1 | 2 | 3 | 4 | 5 |
| Percent Mobile Homes | 0.2-4.5% | 4.51-8.8% | 8.81-14% | 14.01-21.2% | 21.21-33.2% |
| Likelihood of Occurrence (# of events/ yrs. of data) | 0.119 - 0.208 | 0.209 - 0.313 | 0.314 - 0.417 | 0.418 - 0.552 | 0.553 - 0.791 |
| Total Annualized Property Loss ($ / yrs. of data) | $974 - $281,874 | $281,875 - $991,825 | $991,826 - $2,099,000 | $2,099,001 - $5,047,474 | $5,047,475 - $42,467,109 |

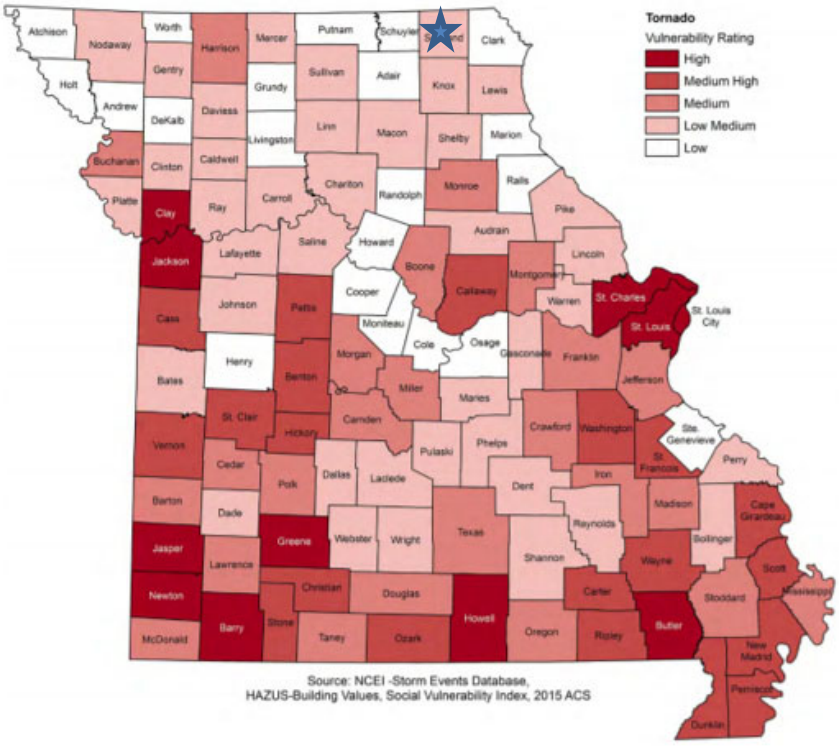
**Table 3.44. Ranges for Tornado Combined Vulnerability Rating**

| | Low (1) | Low-medium (2) | Medium (3) | Medium-High (4) | High (5) |
|---|---|---|---|---|---|
| Tornado Combined Vulnerability | 7-10 | 11-12 | 13-14 | 15-16 | 17-21 |

**Table 3.45. Building Exposure, Population Density, SOVI and Mobile Home Data**

| County | Total Building Exposure (Hazus) | Exposure Rating | Population Density | Population Rating | SOVI Index Ranking | SOVI Rating | Percent Mobile Homes | Mobile Home Rating |
|---|---|---|---|---|---|---|---|---|
| Scotland | $541,487,000 | 1 | 11.12 | 1 | Medium High | 4 | 7 | 2 |

**Figure 3.51. Vulnerability to Tornadoes**

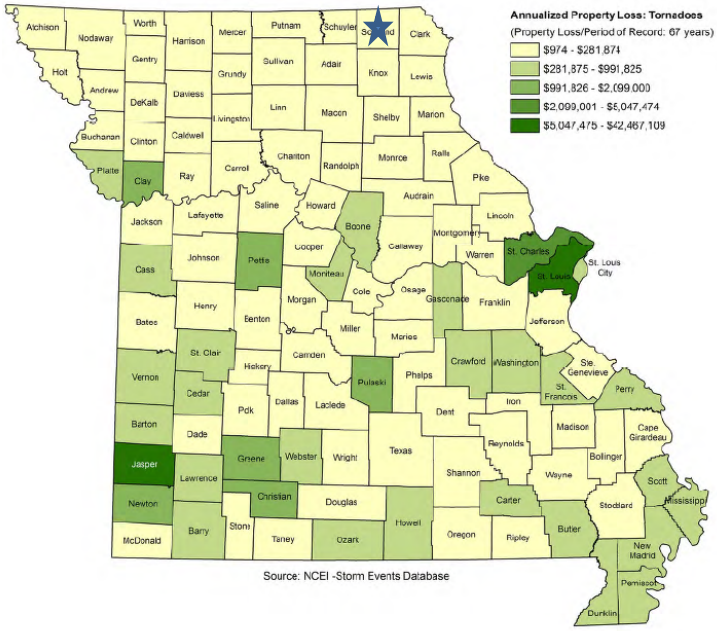



Source: 2018 Missouri State Hazard Mitigation Plan, *Star indicates Scotland County

### *Potential Losses to Existing Development*

In the past 67 years, Scotland County has had minimal property ($974- $281,874) loss from tornadoes.

**Figure 3.52. Annualized Property Loss for Tornadoes**




Source: 2018 Missouri State Hazard Mitigation Plan, *Star indicates Scotland County

### *Previous and Future Development*

Vulnerability to tornadoes is anticipated to remain the same. Future development for public buildings such as schools, government offices, as well as buildings with high occupancy and campgrounds should consider including a tornado safe room to protect occupants in the event of a tornado.

### *Hazard Summary by Jurisdiction*

Tornado events could occur anywhere in the planning area, but some jurisdictions would suffer heavier damages because of the age of the housing or the high concentration of mobile homes. Communities that have adopted building codes may also be less vulnerable to damages.

## Problem Statement

Scotland County has inadequate tornado shelters throughout the county, not everyone utilizes social media and/or texting, the rural areas do not have warning sirens, lack of awareness for available shelters and more education needs to occur. Possible solutions include promoting the use of NOAA weather radios and conducting public education and outreach activities to increase awareness of tornado risk.

## 3.4.10 Wildfire

### Hazard Profile

#### *Hazard Description*

The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

The Forestry Division of the Missouri Department of Conservation (MDC) is responsible for protecting privately owned and state-owned forests and grasslands from wildfires. To accomplish this task, eight forestry regions have been established in Missouri for fire suppression. The Forestry Division works closely with volunteer fire departments and federal partners to assist with fire suppression activities. Currently, more than 900 rural fire departments in Missouri have mutual aid agreements with the Forestry Division to obtain assistance in wildfire protection if needed.

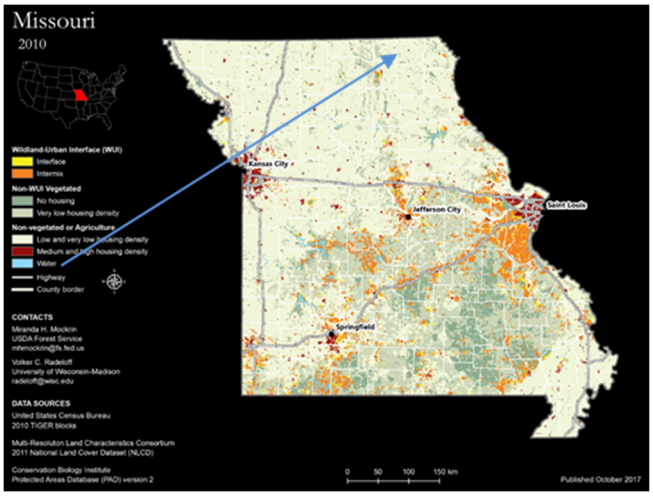
Most of Missouri fires occur during the spring season between February and May. The length and severity of wildland fires depend largely on weather conditions. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in higher fire danger. In addition, due to the recent lack of moisture throughout many areas of the state, conditions are likely to increase the risk of wildfires. Drought conditions can also hamper firefighting efforts, as decreasing water supplies may not prove adequate for firefighting. It is common for rural residents burn their garden spots, brush piles, and other areas in the spring. Some landowners also believe it is necessary to burn their forests in the spring to promote grass growth, kill ticks, and reduce brush. Therefore, spring months are the most dangerous for wildfires. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

#### *Geographic Location*

The term refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas.

At this time, Wildland-Urban Interface area has information not specifically identified for Scotland County. If this information becomes available prior to the next update of this plan, it will be incorporated.

**Figure 3.53. Wildland-Urban Interface**




Source: http://silvis.forest.wisc.edu/data/wui-change/ *Arrow indicates approximate location of Scotland County

### *Strength/Magnitude/Extent*

Wildfires damage the environment, killing some plants and occasionally animals. Firefighters have been injured or killed, and structures can be damaged or destroyed. The loss of plants can heighten the risk of soil erosion and landslides. Although Missouri wildfires are not the size and intensity of those in the Western United States, they could impact recreation and tourism in and near the fires.

Wildland fires in Missouri have been mostly a result of human activity rather than lightning or some other natural event. Wildfires in Missouri are usually surface fires, burning the dead leaves on the ground or dried grasses. They do sometimes “torch” or “crown” out in certain dense evergreen stands like eastern red cedar and shortleaf pine. However, Missouri does not have the extensive stands of evergreens found in the western US that fuel the large fire storms seen on television news stories.

While very unusual, crown fires can and do occur in Missouri native hardwood forests during prolonged periods of drought combined with extreme heat, low relative humidity, and high wind. Tornadoes, high winds, wet snow and ice storms in recent years have placed a large amount of woody material on the forest floor that causes wildfires to burn hotter and longer. These conditions also make it more difficult for fire fighters suppress fires safely.

Often wildfires in Missouri go unnoticed by the general public because the sensational fire behavior that captures the attention of television viewers is rare in the state. Yet, from the standpoint of destroying homes and other property, Missouri wildfires can be quite destructive.

### *Previous Occurrences*

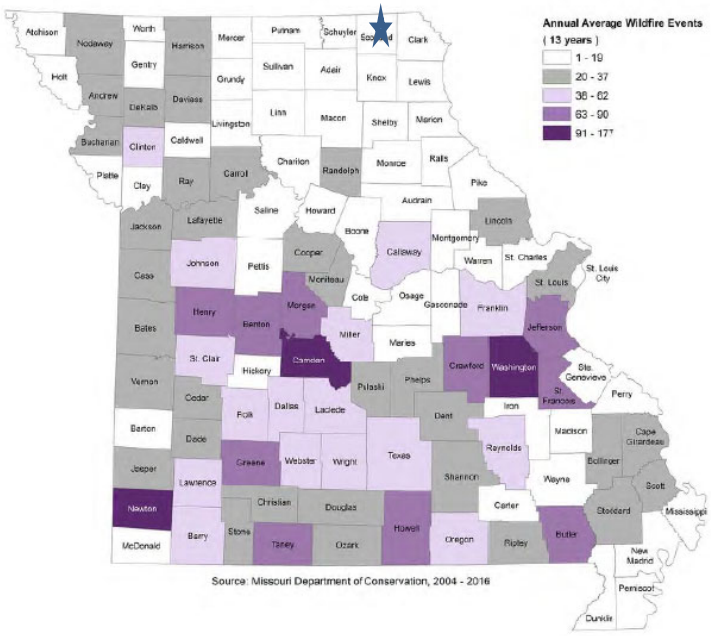
According to the Missouri Division of Fire Safety (MDFS) website, as well as the Missouri Department of Conversation Wildfire Data Search, there were 131 reported wildland or grass fires in Scotland County from 2009-2019. In total, these 131 fires burned 2,146 acres and no injuries were reported. During the eleven-year reporting period, 38 of the fires had an unknown cause for starting and burning 672 acres, 50 were started by debris and burnt 567 acres, 4 of the fires were started by equipment and burnt 13.86 acres. 1 of the fires were started by smoking and burnt 2 acres.

At this time, no information is available from school districts and special districts about previous fire events and the damages resulting from them.

### *Probability of Future Occurrence*

Wildfires in the planning area are most likely to occur every year with very little resulting damage. The wildfires occur in the unincorporated areas and are limited to undeveloped land. The jurisdictions and school districts are largely surrounded by undeveloped land but have not been affected by wildfires. In years of significant drought or excessive heat the potential for a wildfire in planning area increases.

**Figure 3.54. Likelihood of Wildfire Events with Scotland County Indicated**




Source: 2018 Missouri State Hazard Mitigation Plan, *Star indicates Scotland County

When analyzing the wildland fires, there has been an average of 11.91 fires burning 195.09 acres per year. However, it was reported these fires did not result in major damages. The probability score to be likely in any given year that a wildfire could occur in the planning area.

### *Changing Future Conditions Considerations*

According to the 2018 State Plan, higher temperatures and changes in rainfall are unlikely to substantially reduce forest cover in Missouri, although the composition of trees in the forests may change. More droughts would reduce forest productivity, and changing future conditions are also likely to increase the damage from insects and diseases. But longer growing seasons and increased carbon dioxide concentrations could more than offset the losses from those factors. Forests cover about one-third of the state, dominated by oak and hickory trees. As the climate changes, the abundance of pines in Missouri's forests is likely to increase, while the population of hickory trees is likely to decrease 0.

Additionally stated in the 2018 State Plan, higher temperatures will also reduce the number of days prescribed burning can be performed. Reduction of prescribed burning will allow for growth of understory vegetation – providing fuel for destructive wildfires. Drought is also anticipated to increase in frequency and intensity during summer months under projected future scenarios. Drought can lead to dead or dying vegetation and landscaping material close to structures which creates fodder for wildfires within both the urban and rural settings.

## Vulnerability

### *Vulnerability Overview*

With over 14 million acres, Missouri ranks seventh in the northeast region of the U.S. in forest land area. From the data obtained from the Department of Conservation, the likelihood of occurrence and the annualized acres burned were determined for Scotland County and listed in the section below.

### *Potential Losses to Existing Development*

**Table 3.46. Statistical Data for Wildfire Vulnerability for Scotland County**

| County | Number of Wildfires 2004-2016 | Likelihood of Occurrence (#/year) | Total Acres Burned | Average Annual Acreage Burned |
|---|---|---|---|---|
| Scotland | 155 | 11.92 | 2,748.07 | 211 |

**Table 3.47. Estimated Numbers and Values of Structures and Population Vulnerable to Wildfire for Scotland County**

| County | Number of Structures | Value of Structures | Population |
|---|---|---|---|
| Scotland | 30 | $11,068,308 | 57 |
| Agriculture | 7 | $6,882,400 | |
| Residential | 23 | $4,185,908 | |

**Table 3.48. Wildfire Potential Loss Estimates for Scotland County**

| County | Total WUI Acreage | Total Structure Value Within WUI | Average Value/Acre within WUI | Average Annual Acreage Burned | Potential Loss |
|---|---|---|---|---|---|
| Scotland | 463.4 | $11,068,308 | $23,885 | 211 | $5,039,695 |

According to the 2018 Missouri State Hazard Mitigation Plan, Scotland County is estimated to have on average 211 acres burned with a potential loss of $5,039,695.

### *Impact of Previous and Future Development*

Future and previous development in the wildland-urban interface would increase vulnerability to the hazard.

### *EMAP Consequence Analysis*

Table 3.58 summarizes the detrimental impacts from Wildfire.

**Table 3.49. EMAP Impact Analysis: Wildfire**

| Subject | Detrimental Impacts |
|---|---|
| Public | Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas. |
| Responders | |

**44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section presents the mitigation strategy updated by the Mitigation Planning Committee (MPC) based on the [updated] risk assessment. The mitigation strategy was developed through a collaborative group process. The process included review of [updated] general goal statements to guide the jurisdictions in lessening disaster impacts as well as specific mitigation actions to directly reduce vulnerability to hazards and losses. The following definitions are taken from FEMA's *Local Hazard Mitigation Review Guide (October 1, 2012)*.

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.

- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals.

# 4.1 Goals

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

This planning effort is an update to Scotland County's existing hazard mitigation plan approved by FEMA on April 21, 2015. Therefore, the goals from the 2015 Scotland County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their second meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. The MPC also reviewed the goals from current surrounding county plans.

Goal 1 Public Awareness- Using a variety of communications avenues to increase the citizens' awareness of and promote education about the natural hazards that they may face, vulnerability to these hazards, and how to lessen the effect of future natural hazards.

Goal 2 Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effects of future natural hazards.

Goal 3 Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

It was determined the broadly stated goals were still valid for the 2020 update.

## 4.2 Identification and Analysis of Mitigation Actions

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

During the MPC Planning meeting, the results of the risk assessment update were provided to the MPC members for review and the key issues were identified for specific hazards. Changes in risk since adoption of the previously approved plan were discussed. Actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

The MPC included problem statements in the plan update at the end of each hazard profile. The problem statements summarize the risk to the planning area presented by each hazard and include possible methods to reduce that risk. Use of the problem statements allowed the MPC to recognize new and innovative strategies for mitigate risks in the planning area.

During the Planning Meeting the mitigation strategy was reviewed. For a comprehensive range of mitigation actions to consider, the MPC reviewed the following information during the Planning Meeting:

- A list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties,
- Key issues from the risk assessments, including the problem statements concluding each hazard profile and vulnerability analysis,
- State priorities established for HMA grants, and
- Public input during meetings, responses to data collection questionnaires, and other efforts to involve the public in the plan development process.

For the Planning Meeting, individual jurisdictions, including school and special districts, developed final mitigation strategy for submission to the MPC. They were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction. They were also provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013).*This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted. The previous plan had action items listed however they were not jurisdiction specific. Due to the action items not being jurisdiction specific all items were deleted and action items were developed to be specific to each jurisdiction. Based on the status updates,

there were no completed actions, no continuing actions (either ongoing or modified), and 34 deleted actions.

**Table 4.1** provides a summary of the action statuses for each jurisdiction:

**Table 4.1. Action Status Summary**

| Jurisdiction | Completed Actions | Deleted Actions | Continuing Actions |
|---|---|---|---|
| All Jurisdictions | 0 | 34 | 0 |

**Table 4.2** provides a summary of the completed and deleted actions from the previous plan.

**Table 4.2. Summary of Completed and Deleted Actions from the Previous Plan**

| Deleted Actions | Reason for Deletion |
|---|---|
| Implement education program on personal and business emergency preparedness (turning off utilities, preparing emergency survival kits that include water, blankets, flashlights, etc.) | Action item was not jurisdiction specific. |
| Encourage cities to obtain early warning systems and improved communication systems. | Action item was not jurisdiction specific. |
| Promote use of weather radios by local residents and schools to ensure advanced warning about threatening weather. | Action item was not jurisdiction specific. |
| Partner with local radio stations to ensure that appropriate warning is provided to county residents of impending disasters. | Action item was not jurisdiction specific. |
| Enact tree trimming programs dead tree removal programs. | Action item was not jurisdiction specific. |
| Examine potential road and bridge upgrades that would reduce danger to residents during occurrences of natural disasters. | Action item was not jurisdiction specific. |
| Promote a self-inspection program at critical facilities to assure that the building infrastructure is earthquake and tornado resistant. | Action item was not jurisdiction specific. |
| Encourage businesses to develop emergency plans. | Action item was not jurisdiction specific. |
| The County of Scotland and the Cities of Arbela, Gorin, Granger, Memphis and Rutledge will work towards compliance and implementation of NFIP requirements to reduce the flood risks associated with Flood Hazard Areas. | Action item was not jurisdiction specific. |
| Use regulation to ensure that development will not put people in harm's way or increase threats to existing properties. | Action item was not jurisdiction specific. |
| Encourage minimum standards for building codes in all cities. | Action item was not jurisdiction specific. |
| Encourage local governments to develop and implement regulations for the securing of hazardous materials tanks and mobile homes to reduce hazards during flooding and high winds. | Action item was not jurisdiction specific. |
| Distribute SEMA brochures at public facilities and events. | Action item was not jurisdiction specific. |
| Distribute press releases from county and city EMD offices concerning hazards, where they strike, frequency and preparation. | Action item was not jurisdiction specific. |

| | |
|---|---|
| Inspire local residents to purchase weather radios through press releases and brochures. | Action item was not jurisdiction specific. |
| Ask SEMA mitigation specialists to present information to city councils, county commission and the Northeast Missouri Regional Planning Commission meetings. | Action item was not jurisdiction specific. |
| Cities/Counties should continually re-evaluate hazard mitigation plan and merge with other community planning. | Action item was not jurisdiction specific. |
| Distribute press releases by cities/county regarding adopted mitigation measures to keep public abreast of changes and/or new regulations. | Action item was not jurisdiction specific. |
| Foster county health department and local American Red Cross chapter to use publicity campaigns that make residents aware of proper measures to take during times of threatening conditions. | Action item was not jurisdiction specific. |
| Publicize county or citywide drills. | Action item was not jurisdiction specific. |
| Facilitate joint meetings of different organizations/agencies for mitigation planning. | Action item was not jurisdiction specific. |
| Organize joint training (or drills) between agencies, public & private entities (including schools/businesses). | Action item was not jurisdiction specific. |
| Pool different agency resources to achieve widespread mitigation planning results. | Action item was not jurisdiction specific. |
| Coordinate meetings between EMD, city/county and SEMA to familiarize officials with mitigation planning and implementation and budgeting for mitigation projects. | Action item was not jurisdiction specific. |
| Encourage communities to budget for enhanced warning systems. | Action item was not jurisdiction specific. |
| Convince all communities to develop storm water management plans | Action item was not jurisdiction specific. |
| Coordinate and integrate hazard mitigation activities where appropriate, with emergency operations plans and procedures. | Action item was not jurisdiction specific. |
| Encourage cities to require contractor storm water management plans in all new development- both residential and commercial properties. | Action item was not jurisdiction specific. |
| Advocate local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area. | Action item was not jurisdiction specific. |
| Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space. | Action item was not jurisdiction specific. |
| Work with SEMA Region I coordinator to learn about new mitigation funding opportunities. | Action item was not jurisdiction specific. |
| Structure funds for road/bridge upgrades so that hazard mitigation concerns are also met. | Action item was not jurisdiction specific. |
| Encourage local governments to budget for mitigation projects. | Action item was not jurisdiction specific. |
| Encourage cities and county to implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole. | Action item was not jurisdiction specific. |
| Implement public awareness program about the benefits of hazard mitigation projects, both public and private. | Action item was not jurisdiction specific. |
| Priorities mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property. | Action item was not jurisdiction specific. |

Source: Previously approved Scotland County Hazard Mitigation Plan; Data Collection Questionnaires.

## 4.3 Implementation of Mitigation Actions

**44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.**

Jurisdictional MPC members were encouraged to meet with others in their community to finalize the actions to be submitted for the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the 2018 Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project· During the prioritization process, the jurisdictions used worksheets to assign scores. The worksheets posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

Definitely YES = 3 points
Maybe YES = 2 points
Probably NO = 1 points
Definitely NO = 0 points

The following questions were asked for each proposed action.

S: Is the action socially acceptable?
T: Is the action technically feasible and potentially successful?
A: Does the jurisdiction have the administrative capability to successfully implement this action?
P: Is the action politically acceptable?
L: Does the jurisdiction have the legal authority to implement the action?
E: Is the action economically beneficial?
E: Will the project have an environmental impact that is either beneficial or neutral? (score "3" if positive and "2" if neutral)

Will the implemented action result in lives saved?
Will the implanted action result in a reduction of disaster damage?

The final scores are listed below in the analysis of each action. The STAPLEE final score for each action, absent other considerations, such as a localized need for a project, determined the priority. Low priority action items were those that had a total score of between 0 and 24. Moderate priority actions were those scoring between 25 and 29. High priority actions scored 30 or above. A blank STAPLEE worksheet is shown in 0

**Figure 4.1 Blank STAPLEE Worksheet**

| STAPLEE Worksheet | | |
|---|---|---|
| **Name of Jurisdiction:** | | |
| **Action or Project** | | |
| **Action/Project Number:** | Insert a unique action number for this action for future tracking purposes. This can be a combination of the jurisdiction name, followed by the goal number and action number (i.e. Joplin1.1) | |
| **Name of Action or Project:** | | |
| **Mitigation Category:** | Prevention; Structure and Infrastructure Projects; Natural Systems Protection; Education and Outreach; Emergency Services | |
| **STAPLEE Criteria**<br>**Evaluation Rating**<br>Definitely YES = 3 Maybe YES = 2<br>Probably NO = 1 Definitely NO = 0 | | **Score** |
| **S**: Is it **Socially** Acceptable | | |
| **T**: Is it **Technically** feasible and potentially successful? | | |
| **A**: Does the jurisdiction have the **Administrative** capacity to execute this action? | | |
| **P**: Is it **Politically** acceptable? | | |
| **L**: Is there **Legal** authority to implement? | | |
| **E**: Is it **Economically** beneficial? | | |
| **E**: Will the project have either a neutral or positive impact on the natural **Environment**? | | |
| Will historic structures be saved or protected? | | |
| Could it be implemented quickly? | | |
| | **STAPLEE SCORE** | |
| **Mitigation Effectiveness Criteria** | **Evaluation Rating** | **Score** |
| Will the implemented action result in lives saved? | Assign from 5-10 points based on the likelihood that lives will be saved. | |
| Will the implemented action result in a reduction of disaster damages? | Assign from 5-10 points based on the relative reduction of disaster damages. | |
| | **MITIGATION EFFECTIVENESS SCORE** | |
| | **TOTAL SCORE (STAPLEE + Mitigation Effectiveness)** | |

| ☐ **High Priority (30+ points)** | ☐ **Medium Priority (25 - 29 points)** | ☐ **Low Priority (<25 points)** |
|---|---|---|

Completed by
(Name, Title, Phone Number) _____

**ACTION WORKSHEET**

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | List the hazard or hazards that will be addressed by this action |
| **Problem being Mitigated:** | Provide a brief description of the problem that the action will address. Utilize the problem statement developed in the risk assessment. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Choose the goal statement that applies to this action |
| **Action/Project Number:** | Insert a unique action number for this action for future tracking purposes. This can be a combination of the jurisdiction name, followed by the goal number and action number (i.e. Joplin1.1) |
| **Name of Action or Project:** | |
| **Mitigation Category:** | Prevention; Structure and Infrastructure Projects; Natural Systems Protection; Education and Outreach; Emergency Services |
| **Action or Project Description:** | Describe the action or project. |
| **Estimated Cost:** | Provide an estimate of the cost to implement this action. This can be accomplished with a range of estimated costs. |
| **Benefits:** | Provide a narrative describing the losses that will be avoided by implementing this action. If dollar amounts of avoided losses are known, include them as well. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Which organization will be responsible for tracking this action? Be specific to include the specific department or position within a department. |
| **Supporting Organization/Department:** | Which organization/department will assist in implementation of this action? |
| **Action/Project Priority:** | Include the STAPLEE score and Priority (H, M, L) |
| **Timeline for Completion:** | How many months/years to complete. |
| **Potential Fund Sources:** | List specific funding sources that may be used to pay for the implementation of the action. |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | |
| **Progress Report** | |
| **Action Status:** | Indicate status as New, Continuing Not Started, or Continuing in Progress) |
| **Report of Progress:** | For Continuing actions only, indicate the report on progress. If the action is not started, indicate any barriers encountered to initiate the action. If the action is in progress, indicate the activity that has occurred to date. |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding |
| **Problem being Mitigated:** | Participation in the NFIP |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.1 |
| **Name of Action or Project:** | NFIP Participation |
| **Mitigation Category:** | Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach |
| **Action or Project Description:** | Enforce Floodplain Management requirements such as regulating new construction in the SFHA's, or Floodplain identification and mapping. |
| **Estimated Cost:** | NA |
| **Benefits:** | Protection of life and reduction of damages due to accessibility to citizens in times of need. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1 Year |
| **Potential Fund Sources:** | County Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | N/A |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding |
| **Problem being Mitigated:** | Flooding Throughout the County |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.2 |
| **Name of Action or Project:** | Flood Mitigation |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Implement flood mitigation activities to eliminate effects on Scotland County residents. |
| **Estimated Cost:** | $1,000,000 |
| **Benefits:** | Mitigation actions will limit the future harm to structures and lives in the County. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | N/A |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | All Hazards |
| **Problem being Mitigated:** | Provide early warning to residents. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.3 |
| **Name of Action or Project:** | Install/Upgrade Warning Sirens |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Installation or upgrade of warning sirens in areas of the County needing a siren or one upgraded. |
| **Estimated Cost:** | $75,000 |
| **Benefits:** | Mitigation actions will limit the future harm to structures and lives in the County. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | Medium Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding, Severe Thunderstorms, Winter Weather |
| **Problem being Mitigated:** | Accessibility for emergency services/evacuation routes. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.4 |
| **Name of Action or Project:** | Maintain Transportation Infrastructure |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the city. |
| **Estimated Cost:** | $750,000 |
| **Benefits:** | The project protects citizens from harm due to damaged transportation infrastructure. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Pandemic |
| **Problem being Mitigated:** | Protecting outbreaks affecting residents. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 2: Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effect of future natural hazards |
| **Action/Project Number:** | Scotland County 2020.5 |
| **Name of Action or Project:** | Response to Pandemic |
| **Mitigation Category:** | Emergency Services, Prevention, Public Education |
| **Action or Project Description:** | Project will provide necessary resources for the response to pandemic outbreaks. |
| **Estimated Cost:** | $500,000 |
| **Benefits:** | The project protects citizens from harm due to pandemic outbreaks. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | Medium Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Tornado, Severe Thunderstorms |
| **Problem being Mitigated:** | Lack of shelter for residents. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.6 |
| **Name of Action or Project:** | Safe Rooms and Storm Shelters |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions. |
| **Estimated Cost:** | $1,000,000 |
| **Benefits:** | The project protects citizens from harm due to tornados or severe thunderstorms. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | County Comprehensive Plan |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado |
| **Problem being Mitigated:** | Loss of electrical power to emergency shelters. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.7 |
| **Name of Action or Project:** | Generator for Shelter(s) |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Obtain a generator for shelters as funds become available. |
| **Estimated Cost:** | $65,000 |
| **Benefits:** | Generator will allow for continued use of shelters for service to citizens in the event of an outage, this would be beneficial during any hazard. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds / RHSOC |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | All Hazards |
| **Problem being Mitigated:** | Need for central emergency operation center in the event of disaster. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County 2020.8 |
| **Name of Action or Project:** | Emergency Operations Center |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services, Response |
| **Action or Project Description:** | Obtain funds to build and equip an emergency operations center. |
| **Estimated Cost:** | $1,000,000 |
| **Benefits:** | An established EOC allows a designated area to be utilized for emergency situations. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | County Commission |
| **Action/Project Priority:** | Low Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | City of Memphis |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado |
| **Problem being Mitigated:** | Lack of Generator for Shelter(s) |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | City of Memphis 2020.1 |
| **Name of Action or Project:** | Generator for Shelter(s) |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Obtain a generator for shelters as funds become available. |
| **Estimated Cost:** | $30,000 |
| **Benefits:** | Generator will allow for continued use of shelters for service to citizens in the event of an outage, this would be beneficial during any hazard. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | City Administrator |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds / RHSOC |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | City of Memphis |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding, Severe Thunderstorms, Winter Storms |
| **Problem being Mitigated:** | Accessibility for emergency services/evacuation routes |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | City of Memphis 2020.2 |
| **Name of Action or Project:** | Maintain Transportation Infrastructure |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services, Response |
| **Action or Project Description:** | Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City. |
| **Estimated Cost:** | $400,000 |
| **Benefits:** | The project protects citizens from harm due to damaged transportation infrastructures. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | City Administrator |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | City of Memphis |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | All Hazards |
| **Problem being Mitigated:** | Provide early warning to residents |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | City of Memphis 2020.3 |
| **Name of Action or Project:** | Installation/Upgrade Sirens |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded. |
| **Estimated Cost:** | $25,000 |
| **Benefits:** | With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | City Administrator |
| **Action/Project Priority:** | Medium Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | City of Kahoka |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding |
| **Problem being Mitigated:** | NFIP participation continuation |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | City of Memphis 2020.4 |
| **Name of Action or Project:** | NFIP Participation |
| **Mitigation Category:** | Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach |
| **Action or Project Description:** | Continue City of Memphis participation and good standing in the National Flood Insurance Program. |
| **Estimated Cost:** | NA |
| **Benefits:** | Protection of life and reduction of damages due to accessibility to citizens in times of need. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | City Administrator |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1 Year |
| **Potential Fund Sources:** | City Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Arbela |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | All Hazards |
| **Problem being Mitigated:** | Provide early warning to residents |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Arbela 2020.1 |
| **Name of Action or Project:** | Siren Installation |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded. |
| **Estimated Cost:** | $25,000 |
| **Benefits:** | With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Arbela |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding, Severe Thunderstorms, Winter Storms |
| **Problem being Mitigated:** | Accessibility for emergency services/evacuation routes |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Arbela 2020.2 |
| **Name of Action or Project:** | Maintain Transportation Infrastructure |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services, Response |
| **Action or Project Description:** | Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City. |
| **Estimated Cost:** | $400,000 |
| **Benefits:** | The project protects citizens from harm due to damaged transportation infrastructures. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Arbela |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Tornado, Severe Thunderstorms |
| **Problem being Mitigated:** | Lack of adequate shelter in the event of tornado |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Arbela 2020.3 |
| **Name of Action or Project:** | Safe Rooms and Storm Shelters |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions. |
| **Estimated Cost:** | $800,000 |
| **Benefits:** | The project protects citizens from harm due to tornados or severe thunderstorms. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Arbela |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding |
| **Problem being Mitigated:** | Participation in the NFIP |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Arbela 2020.4 |
| **Name of Action or Project:** | NFIP Participation |
| **Mitigation Category:** | Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach |
| **Action or Project Description:** | Begin Arbela's participation in the National Flood Insurance Program. |
| **Estimated Cost:** | NA |
| **Benefits:** | Protection of life and reduction of damages due to accessibility to citizens in times of need. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1 Year |
| **Potential Fund Sources:** | City Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | Floodplain Ordinance |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Rutledge |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | All Hazards |
| **Problem being Mitigated:** | Provide early warning to residents |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Rutledge 2020.1 |
| **Name of Action or Project:** | Warning siren installation |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Installation or the upgrade of warning sirens in areas of the City needing a siren or the siren upgraded. |
| **Estimated Cost:** | $25,000 |
| **Benefits:** | With adequate time for warning of storms, residents are able to seek cover to help minimize the loss of life. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Rutledge |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding, Severe Thunderstorms, Winter Storms |
| **Problem being Mitigated:** | Accessibility for emergency services/evacuation routes |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Rutledge 2020.2 |
| **Name of Action or Project:** | Maintain Transportation Infrastructure |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services, Response |
| **Action or Project Description:** | Project will make necessary improvements to roads, culverts, low water crossings, road elevations, bank stabilizations, bridges and the general transportation infrastructure throughout the City. |
| **Estimated Cost:** | $300,000 |
| **Benefits:** | The project protects citizens from harm due to damaged transportation infrastructures. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Rutledge |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Tornado, Severe Thunderstorms |
| **Problem being Mitigated:** | Lack of adequate shelter in the event of a tornado or thunderstorm |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Rutledge 2020.3 |
| **Name of Action or Project:** | Safe Rooms and Storm Shelters |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Build safe rooms and establish local ordinances requiring community storm shelters within sizable mobile home parks and subdivisions. |
| **Estimated Cost:** | $800,000 |
| **Benefits:** | The project protects citizens from harm due to tornados or severe thunderstorms. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Village of Rutledge |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Flooding |
| **Problem being Mitigated:** | Participation in the NFIP |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Village of Rutledge 2020.4 |
| **Name of Action or Project:** | NFIP Participation |
| **Mitigation Category:** | Natural Systems Protection, Structure and Infrastructure Projects, Emergency Services, Education and Outreach |
| **Action or Project Description:** | Begin Village of Rutledge's participation in the National Flood Insurance Program. |
| **Estimated Cost:** | NA |
| **Benefits:** | Protection of life and reduction of damages due to accessibility to citizens in times of need. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Village Clerk |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1 Year |
| **Potential Fund Sources:** | City Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | N/A |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County R-1 |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Tornado, Severe Thunderstorms, Earthquake |
| **Problem being Mitigated:** | Lack of adequate shelter in the event of a tornado for students and employees |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County R-1 2020.1 |
| **Name of Action or Project:** | Safe Rooms |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services |
| **Action or Project Description:** | Build safe rooms |
| **Estimated Cost:** | $1,000,000 |
| **Benefits:** | Protect human lives. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Scotland County R-1 Superintendent |
| **Action/Project Priority:** | High Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

| Action Worksheet | |
|---|---|
| **Name of Jurisdiction:** | Scotland County R-1 |
| **Risk / Vulnerability** | |
| **Hazard(s) Addressed:** | Tornado, Severe Thunderstorms, Earthquake |
| **Problem being Mitigated:** | Lack of intercom system throughout entire school. |
| **Action or Project** | |
| **Applicable Goal Statement:** | Goal 3: Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties. |
| **Action/Project Number:** | Scotland County R-1 2020.2 |
| **Name of Action or Project:** | Intercom System |
| **Mitigation Category:** | Prevention, Structure and Infrastructure Projects, Emergency Services, Outreach |
| **Action or Project Description:** | Upgrade intercom system. |
| **Estimated Cost:** | $150,000 |
| **Benefits:** | Protect human lives. |
| **Plan for Implementation** | |
| **Responsible Organization/Department:** | Scotland County R-1 Superintendent |
| **Action/Project Priority:** | Medium Priority |
| **Timeline for Completion:** | 1-5 Year |
| **Potential Fund Sources:** | Hazard Mitigation Grant Funds |
| **Local Planning Mechanisms to be Used in Implementation, if any:** | NA |
| **Progress Report** | |
| **Action Status:** | NEW |
| **Report of Progress:** | NEW Project |

## Table 4.3. Mitigation Action Matrix

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| | **Prevention Public Education** | | | | | | | |
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| Scotland County 2020.2 | Implement flood mitigation activities to eliminate effects on Scotland County residents | Scotland County | High | 3 | Flooding | ✓ | ✓ | |
| Scotland County 2020.3 | Installation or upgrade of warning siren in areas of the County needing a siren or one upgraded | Scotland County | Medium | 3 | All Hazards | ✓ | | |
| Scotland County 2020.4 | Maintain Transportation Infrastructure | Scotland County | High | 3 | Flooding, Severe Thunderstorms, Winter Weather | ✓ | | |
| Scotland County 2020.5 | Response to Pandemic | Scotland County | Medium | 2 | Pandemic | ✓ | ✓ | |
| Scotland County 2020.6 | Safe Room and Storm Shelters | Scotland County | High | 3 | Tornado, Severe Thunderstorm | ✓ | | |
| Scotland County 2020.7 | Generator for Shelter (s) | Scotland County | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| Scotland County 2020.8 | Emergency Operations Center | Scotland County | Low | 3 | All Hazards | ✓ | ✓ | |
| City of Memphis 2020.1 | Generator for Shelter (s) | Memphis | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| City of Memphis 2020.2 | Maintain Transportation Infrastructure | Memphis | High | 3 | Flooding, Severe Thunderstorm, Winter Storms | ✓ | | |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| City of Memphis 2020.3 | Installation/Upgrade Siren | Memphis | Medium | 3 | All Hazards | ✓ | | |
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |
| Village of Arbela 2020.1 | Installation Upgrade Sirens | Arbela | High | 3 | All Hazards | ✓ | | |
| Village of Arbela 2020.2 | Maintain Transportation Infrastructure | Arbela | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Arbela 2020.3 | Safe Rooms and Storm Shelters | Arbela | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.1 | Installation/Upgrade Sirens | Rutledge | High | 3 | All Hazards | ✓ | | |
| Village of Rutledge 2020.2 | Maintain Transportation Infrastructure | Rutledge | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Rutledge 2020.3 | Safe Rooms and Storm Shelters | Rutledge | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |
| Scotland County R-1 2020.1 | Build Safe Room | Scotland County R-1 | High | 3 | Tornado, Severe Thunderstorms, Earthquake | ✓ | | |
| Scotland County R-1 2020.2 | Upgrade intercom system | Scotland County R-1 | Medium | 3 | Tornado, Severe Thunderstorm, Earthquake | ✓ | | |
| | **Structure and Infrastructure Projects** | | | | | | | |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| Scotland County 2020.2 | Implement flood mitigation activities to eliminate effects on Scotland County residents | Scotland County | High | 3 | Flooding | ✓ | ✓ | |
| Scotland County 2020.3 | Installation or upgrade of warning siren in areas of the County needing a siren or one upgraded | Scotland County | Medium | 3 | All Hazards | ✓ | | |
| Scotland County 2020.4 | Maintain Transportation Infrastructure | Scotland County | High | 3 | Flooding, Severe Thunderstorms, Winter Weather | ✓ | | |
| Scotland County 2020.6 | Safe Room and Storm Shelters | Scotland County | High | 3 | Tornado, Severe Thunderstorm | ✓ | | |
| Scotland County 2020.7 | Generator for Shelter (s) | Scotland County | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| Scotland County 2020.8 | Emergency Operations Center | Scotland County | Low | 3 | All Hazards | ✓ | ✓ | |
| City of Memphis 2020.1 | Generator for Shelter (s) | Memphis | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| City of Memphis 2020.2 | Maintain Transportation Infrastructure | Memphis | High | 3 | Flooding, Severe Thunderstorm, Winter Storms | ✓ | | |
| City of Memphis 2020.3 | Installation/Upgrade Siren | Memphis | Medium | 3 | All Hazards | ✓ | | |
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| Village of Arbela 2020.1 | Installation Upgrade Sirens | Arbela | High | 3 | All Hazards | ✓ | | |
| Village of Arbela 2020.2 | Maintain Transportation Infrastructure | Arbela | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Arbela 2020.3 | Safe Rooms and Storm Shelters | Arbela | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.1 | Installation/Upgrade Sirens | Rutledge | High | 3 | All Hazards | ✓ | | |
| Village of Rutledge 2020.2 | Maintain Transportation Infrastructure | Rutledge | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Rutledge 2020.3 | Safe Rooms and Storm Shelters | Rutledge | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |
| Scotland County R-1 2020.1 | Build Safe Room | Scotland County R-1 | High | 3 | Tornado, Severe Thunderstorms, Earthquake | ✓ | | |
| Scotland County R-1 2020.2 | Upgrade intercom system | Scotland County R-1 | Medium | 3 | Tornado, Severe Thunderstorm, Earthquake | ✓ | | |
| | **Natural Systems Protection** | | | | | | | |
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| Scotland County 2020.2 | Implement flood mitigation activities to eliminate effects on Scotland County residents | Scotland County | High | 3 | Flooding | ✓ | ✓ | |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.1 | Installation/Upgrade Sirens | Rutledge | High | 3 | All Hazards | ✓ | | |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |
| | **Emergency Services** | | | | | | | |
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| Scotland County 2020.2 | Implement flood mitigation activities to eliminate effects on Scotland County residents | Scotland County | High | 3 | Flooding | ✓ | ✓ | |
| Scotland County 2020.3 | Installation or upgrade of warning siren in areas of the County needing a siren or one upgraded | Scotland County | Medium | 3 | All Hazards | ✓ | | |
| Scotland County 2020.4 | Maintain Transportation Infrastructure | Scotland County | High | 3 | Flooding, Severe Thunderstorms, Winter Weather | ✓ | | |
| Scotland County 2020.5 | Response to Pandemic | Scotland County | Medium | 2 | Pandemic | ✓ | ✓ | |
| Scotland County 2020.6 | Safe Room and Storm Shelters | Scotland County | High | 3 | Tornado, Severe Thunderstorm | ✓ | | |
| Scotland County 2020.7 | Generator for Shelter (s) | Scotland County | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| Scotland County 2020.8 | Emergency Operations Center | Scotland County | Low | 3 | All Hazards | ✓ | ✓ | |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| City of Memphis 2020.1 | Generator for Shelter (s) | Memphis | High | 3 | Extreme Temperature, Severe Thunderstorm, Severe Winter Weather, Tornado | ✓ | | |
| City of Memphis 2020.2 | Maintain Transportation Infrastructure | Memphis | High | 3 | Flooding, Severe Thunderstorm, Winter Storms | ✓ | | |
| City of Memphis 2020.3 | Installation/Upgrade Siren | Memphis | Medium | 3 | All Hazards | ✓ | | |
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |
| Village of Arbela 2020.1 | Installation Upgrade Sirens | Arbela | High | 3 | All Hazards | ✓ | | |
| Village of Arbela 2020.2 | Maintain Transportation Infrastructure | Arbela | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Arbela 2020.3 | Safe Rooms and Storm Shelters | Arbela | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.1 | Installation/Upgrade Sirens | Rutledge | High | 3 | All Hazards | ✓ | | |
| Village of Rutledge 2020.2 | Maintain Transportation Infrastructure | Rutledge | High | 3 | Flooding, Severe Thunderstorms, Winter Storms | ✓ | | |
| Village of Rutledge 2020.3 | Safe Rooms and Storm Shelters | Rutledge | High | 3 | Tornado, Severe Thunderstorms | ✓ | | |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |

| # | Action | Jurisdiction | Priority | Goals Addressed | Hazards Addressed | Address Current Development | Address Future Development | Continued Compliance with NFIP |
|---|---|---|---|---|---|---|---|---|
| Scotland County R-1 2020.1 | Build Safe Room | Scotland County R-1 | High | 3 | Tornado, Severe Thunderstorms, Earthquake | ✓ | | |
| Scotland County R-1 2020.2 | Upgrade intercom system | Scotland County R-1 | Medium | 3 | Tornado, Severe Thunderstorm, Earthquake | ✓ | | |
| | **Education and Outreach** | | | | | | | |
| Scotland County 2020.1 | Pursue Scotland County's participation in the National Flood Insurance Program | Scotland County | High | 3 | Flooding | | | ✓ |
| City of Memphis 2020.4 | NFIP Participation | Memphis | High | 3 | Flooding | | | ✓ |
| Village of Arbela 2020.4 | NFIP Participation | Arbela | High | 3 | Flooding | | | ✓ |
| Village of Rutledge 2020.4 | NFIP Participation | Rutledge | High | 3 | Flooding | | | ✓ |
| Scotland County R-1 2020.2 | Upgrade intercom system | Scotland County R-1 | Medium | 3 | Tornado, Severe Thunderstorm, Earthquake | ✓ | | |

# 5 PLAN MAINTENANCE PROCESS



This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

## 5.1 Monitoring, Evaluating, and Updating the Plan

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

### 5.1.1 Responsibility for Plan Maintenance

The Scotland County MPC is an advisory body and can only make recommendations to county, city, town, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

### 5.1.2 Plan Maintenance Schedule

The MPC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Scotland County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC (or other designated responsible entity) to the meeting.

In coordination with all participating jurisdictions, the Emergency Management Director will be responsible for initiating a five-year written update of the plan to be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

### 5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC during the annual meeting should review changes in vulnerability identified as follows:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions,
- Increased vulnerability due to hazard events, and/or
- Increased vulnerability as a result of new development (and/or annexation).

Future 5-year updates to this plan will include the following activities:

- Consideration of changes in vulnerability due to action implementation,
- Documentation of success stories where mitigation efforts have proven effective,
- Documentation of unsuccessful mitigation actions and why the actions were not effective,
- Documentation of previously overlooked hazard events that may have occurred since the previous plan approval,
- Incorporation of new data or studies with information on hazard risks,
- Incorporation of new capabilities or changes in capabilities,
- Incorporation of growth data and changes to inventories, and
- Incorporation of ideas for new actions and changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will adopt the following process:

- Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This entity will track and report on an annual basis to the jurisdictional MPC (or designated responsible entity) member on action status. The entity will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk.
- If the action does not meet identified objectives, the jurisdictional MPC (or designated responsible entity) member will determine necessary remedial action, making any required modifications to the plan.

Changes will be made to the plan to remedy actions that have failed or are not considered feasible. Feasibility will be determined after a review of action consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring of this plan. Updating of the plan will be accomplished by written changes and submissions, as the ( MPC or designated responsible entity) deems appropriate and necessary. Changes will be approved by the Scotland County Commissioners and the governing boards of the other participating jurisdictions.

## 5.2 Incorporation into Existing Planning Mechanisms

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

For the most part the participating jurisdictions did not incorporate the previously approved mitigation plan into other planning mechanism due to other plans already being approved.

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Those existing plans and programs were described in Chapter 2 of this plan. Based on the capability assessments of the participating jurisdictions, communities in Scotland County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- General or master plans of participating jurisdictions
- Ordinances of participating jurisdictions
- Scotland County Emergency Operations Plan
- Capital improvement plans and budgets
- Other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans
- School and Special District Plans and budgets; and
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

The MPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The MPC (or designated responsible entity) is also responsible for monitoring this integration and incorporation of the appropriate information into the five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Hazard Mitigation Plan, the Scotland County Emergency Management Director will provide the updated Mitigation Strategy with current status of each mitigation action to the County (Boards of Supervisors or Commissions) as well as all Mayors, City Clerks, and School District Superintendents. The Emergency Manager Director will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

**Table 5.1** below lists the planning mechanisms by jurisdiction into which the Hazard Mitigation Plan will be integrated.

**Table 5.1. Planning Mechanisms Identified for Integration of Hazard Mitigation Plan**

| Jurisdiction | Planning Mechanisms | Integration Process for Previous Plan | Integration Process for Current Plan |
|---|---|---|---|
| Unincorporated Scotland County | Road and Bridge Dept. Project list<br>County Emergency Operations Plan | County Commissioners attended all planning meetings and identified actions relating to transportation infrastructure. | Commissioners attended all planning meetings. Identified new actions relating to transportation infrastructure. |
| City of Memphis | Local Budget | The previous plan was not integrated into previous budgets due to the items not applicable to being added in previous plans. | The Hazard Mitigation Plan will be integrated into future budgets by consulting the HMP during the planning process. |
| Village of Arbela | Local Budget | The previous plan was not integrated into previous budgets due to the items not applicable to being added in previous plans. | The Hazard Mitigation Plan will be integrated into future budgets by consulting the HMP during the planning process. |
| Village of Rutledge | Local Budget | The previous plan was not integrated into previous budgets due to the items not applicable to being added in previous plans. | The Hazard Mitigation Plan will be integrated into future budgets by consulting the HMP during the planning process. |
| Scotland County R-1 | Master Plan | The previous plan was not integrated into previous budgets due to the items not applicable to being added in previous plans. | The Hazard Mitigation Plan will be integrated into future budgets by consulting the HMP during the planning process. |

## 5.3 Continued Public Involvement

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

The hazard mitigation plan update process provides an opportunity to publicize success stories resulting from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted in the local newspaper, as well as, on the Scotland County website following each annual review of the mitigation plan and will solicit comments from the public based on the annual review. When the MPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the planning process. Included in this group will be those who joined the MPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be actively solicited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.

# Appendix A

# Resolutions

**Scotland County**, Missouri RESOLUTION NO. ___

A RESOLUTION OF THE **SCOTLAND COUNTY,** MISSOURI ADOPTING THE **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the **SCOTLAND COUNTY** recognizes the threat that natural hazards pose to people and property within the **SCOTLAND COUNTY**; and

WHEREAS the **SCOTLAND COUNTY** has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the ***SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN*** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in **SCOTLAND COUNTY** from the impacts of future hazards and disasters; and

WHEREAS **SCOTLAND COUNTY** recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the **SCOTLAND COUNTY** will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by **SCOTLAND COUNTY** demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE COUNTY COMMISSIONERS OF SCOTLAND COUNTY, in the State of Missouri, THAT:

**SCOTLAND COUNTY** HEREBY adopts the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.**

ADOPTED by SCOTLAND COUNTY COMMISSION, this 3rd day of Dec., 2020.

Duane Ebeling

Duane Ebeling, Presiding Commissioner

Danette Clatt

Danette Clatt, Eastern District Commissioner

David Wiggins

David Wiggins, Western District Commissioner

ATTEST:

Batina Dodge

Batina Dodge, County Clerk

**CITY OF MEMPHIS**, Missouri RESOLUTION NO. 2020-1

A RESOLUTION OF THE **CITY OF MEMPHIS,** MISSOURI ADOPTING THE **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the **CITY OF MEMPHIS** recognizes the threat that natural hazards pose to people and property within the **CITY OF MEMPHIS**; and

WHEREAS the **CITY OF MEMPHIS** has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the ***SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN*** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the **CITY OF MEMPHIS** from the impacts of future hazards and disasters; and

WHEREAS the **CITY OF MEMPHIS** recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the **CITY OF MEMPHIS** will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the **CITY OF MEMPHIS** demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan*.

NOW THEREFORE, BE IT RESOLVED BY THE **CITY OF MEMPHIS**, in the State of Missouri, THAT:

THE **CITY OF MEMPHIS** HEREBY adopts the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.**

ADOPTED by the CITY OF MEMPHIS, this 5th day of November, 2020.

Aaron Dale

Aaron Dale, Mayor

ATTEST:

Angela Newman

Angela Newman, City Clerk

**VILLAGE OF ARBELA**, Missouri RESOLUTION NO. ____

A RESOLUTION OF THE **VILLAGE OF ARBELA,** MISSOURI ADOPTING THE **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the **VILLAGE OF ARBELA** recognizes the threat that natural hazards pose to people and property within the **VILLAGE OF ARBELA**; and

WHEREAS the **VILLAGE OF ARBELA** has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the ***SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN*** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in the **VILLAGE OF ARBELA** from the impacts of future hazards and disasters; and

WHEREAS the **VILLAGE OF ARBELA** recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the **VILLAGE OF ARBELA** will endeavor to integrate the *Plan* into the comprehensive planning process; and

WHEREAS adoption by the **VILLAGE OF ARBELA** demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan.*

NOW THEREFORE, BE IT RESOLVED BY THE **VILLAGE OF ARBELA**, in the State of Missouri, THAT:

THE **VILLAGE OF ARBELA** HEREBY adopts the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.**

ADOPTED by the VILLAGE OF ARBELA, this 9 day of December, 2020.

Dennis Giberson, Mayor

ATTEST:

Twila Stevenson, City Clerk

**Scotland County R1 SCHOOL DISTRICT**, Missouri RESOLUTION NO. _

A RESOLUTION OF THE **SCOTLAND COUNTY R1 SCHOOL DISTRICT,** MISSOURI ADOPTING THE **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN** AND THE EFFORT TO BECOME A DISASTER RESISTANCE COMMUNITY.

WHEREAS the **SCOTLAND COUNTY R1 SCHOOL DISTRICT** recognizes the threat that natural hazards pose to people and property within the **SCOTLAND COUNTY R1 SCHOOL DISTRICT**; and

WHEREAS the **SCOTLAND COUNTY R1 SCHOOL DISTRICT** has participated in the preparation of a multi-jurisdictional local hazard mitigation plan, hereby known as the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN**, hereafter referred to as the *Plan*, in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS the ***SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN*** identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in **SCOTLAND COUNTY R1 SCHOOL DISTRICT** from the impacts of future hazards and disasters; and

WHEREAS **SCOTLAND COUNTY R1 SCHOOL DISTRICT** recognizes that land use policies have a major impact on whether people and property are exposed to natural hazards, the **SCOTLAND COUNTY R1 SCHOOL DISTRICT** will endeavor to integrate the *Plan* into the comprehensive planning process; and

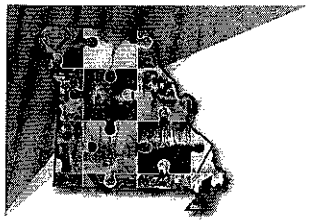
WHEREAS adoption by **SCOTLAND COUNTY R1 SCHOOL DISTRICT** demonstrates their commitment to hazard mitigation and achieving the goals outlined in the *Plan.*

NOW THEREFORE, BE IT RESOLVED BY THE SCHOOL BOARD OF SCOTLAND COUNTY R1 SCHOOL DISTRICT, in the State of Missouri, THAT: In accordance with SCOTLAND COUNTY R1 SCHOOL DISTRICT School Board Policy, HEREBY adopts the **SCOTLAND COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.**

ADOPTED by a vote of 7 in favor and 0 against and 0 abstaining, this 12 day of November 2020

Christy Aylward
, Board President

ATTEST
,Board Secretary



# *SEMA Mitigation Management*
# LOCAL MITIGATION PLAN FORMAT GUIDANCE
# KICKOFF MEETING INVITATION FOR JURISDICTIONS

**Subject: Scotland County Multi-Jurisdictional Hazard Mitigation Plan Update**

On behalf of Scotland County, you are invited to the first of three planning meetings to update the Scotland County Multi-Jurisdictional Hazard Mitigation Plan.

**Scotland County Multi-Jurisdictional Hazard Mitigation Plan Update**
**Kickoff Meeting**
**October 8, 2020**
**Meeting Time: 10:00 AM**
**Call-in Number: (844)844-0414**
**Access Code: 511868**

Scotland County is beginning the process to update the Scotland County Multi-Jurisdictional Hazard Mitigation Plan to better protect the people and property of Scotland County from the effects of natural hazard events. The existing plan was approved by FEMA in April 2015. The plan update will be prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations. These regulations establish the requirements that hazard mitigation plans must meet in order for Scotland County and the participating jurisdictions, to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because Scotland County is subject to many kinds of hazards, access to these federal programs is vital.

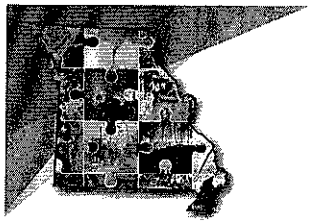
**What is a Hazard Mitigation Plan?**
A hazard mitigation plan is the result of a planning process which identifies policies and actions that can be implemented over the long term to reduce the risk and future losses resulting from hazard events. The Scotland County Multi-Jurisdictional Hazard Mitigation Plan Update will address a comprehensive list of natural hazards likely to impact the County. The identified mitigation policies and actions will be based on an assessment of hazards, vulnerabilities, and risks.

The hazard mitigation planning process is also heavily dependent on the participation of representatives from local government agencies and departments, the public, and other stakeholder groups. A Hazard Mitigation Planning Committee will be formed to support this project and will include representatives from the County, cities, school districts, private-non-profit entities, business partners, academic institutions, and other local, state, and federal agencies acting in or serving Scotland County.

**What is My Role in the Planning Process?**
The Northeast Missouri Regional Planning Commission has taken the lead in updating this plan. The point of contact is Derek Weber, Executive Director. To successfully complete this project and ensure your organization is eligible for FEMA hazard mitigation assistance funding, we need your participation and input. Jurisdictions (including county and city governments and public school districts) that do not participate in an approved Hazard Mitigation Plan are **NOT eligible** to apply for FEMA's Hazard Mitigation Assistance grants. Participation in the planning process will include:

- Contributing in the planning committee meetings;
- Providing requested data (as available);
- Reviewing and providing comments on plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan.

**What can I expect by participating in the planning committee?**
The planning committee will be provided with information on what activities are required to be performed to be included in the plan. Required activities include the following:



## *SEMA Mitigation Management*
## LOCAL MITIGATION PLAN FORMAT GUIDANCE
## KICKOFF MEETING INVITATION FOR JURISDICTIONS

- **Required Activities include:** Participating jurisdictions will be required to complete as much of the data questionnaire as possible and return, complete critical/essential facilities and non-government employer form. Review planning meeting PowerPoint including federal planning requirements. Review project timeline.
- **Risk Assessment Meeting.** Review and provide comments on the risk assessment.
- **Mitigation Strategy Meeting.** Updating of existing mitigation actions and identification and development of new mitigation strategies based upon the risk assessment.

**Additional Resources**
The following links provide additional information on hazard mitigation and the planning process.

- **Scotland County Multi-Jurisdictional Hazard Mitigation Plan, April 2015**
  http://www.nemorpc.org/wp-content/uploads/2019/02/Scotland-County-Hazard-Mitigation-Plan-3_5_2015-rd.pdf

- **The requirements and procedures for state, tribal and local mitigation plans as presented in the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201**
  https://www.fema.gov/hazard-mitigation-planning-laws-regulations-policies

- **Frequently Asked Questions regarding hazard mitigation planning**
  https://www.fema.gov/hazard-mitigation-planning-frequently-asked-questions

Please confirm your attendance or provide contact information for your designated alternate by responding to Derek Weber at (660)465-7281 Ext. 1 or derekweber@nemorpc.org.

Thank you,

Derek Weber
Executive Director
Northeast Missouri Regional Planning Commission

Scotland County
Multi-Jurisdictional Hazard Mitigation Plan Update
Conference Call Planning Meeting
October 8, 2020
10:00 A.M.

# Agenda

Welcome/Introductions — Derek Weber, Executive Director
Northeast Missouri RPC

Hazard Mitigation Planning Purpose/Grant Programs

Data Collection Questionnaires

Participation Requirements/Status

Discussion of Hazards

Update Mitigation Goals

Discuss Mitigation Action Updates

Next Steps/Timeline

Questions?

| | |
|---|---|
| To | **Scotland County Hazard Mitigation Planning Committee** |
| From | **Derek Weber, Executive Director**<br>**Northeast Missouri Regional Planning Commission** |
| Tel / E-mail | **(660)465-7281 Ext. 1 / derekweber@nemorpc.org** |
| Date | **October 8th, 2020** |
| Subject | **Minutes from Scotland County Hazard Mitigation Planning Conference Call held on October 8th 2020 at 10:00 AM** |

This document is a record of attendance and a summary of the issues discussed during the above meeting. The presentation began with an introduction on the purpose of hazard mitigation planning, grant programs linked to an approved plan, and the benefits of a multi-jurisdictional approach. The hazard mitigation planning process was reviewed to include requirements for participation and public involvement and the use of data collection questionnaires. The planning committee participated in a discussion of the hazards that have the potential to impact Scotland County, including preliminary research on each hazard. The sources for compiling a GIS layer of critical facilities were also discussed and additional sources identified by planning committee members were noted. The meeting concluded with a discussion of the next steps in the planning process. The meeting was held at the meeting was held via conference call beginning at 10:00 AM.

# Attendees

| Name | | Title | Jurisdiction |
|---|---|---|---|
| Duane | Ebeling | Presiding Commissioner | Scotland County |
| David | Wiggins | Western Dist. Commissioner | Scotland County |
| Danette | Clatt | Eastern Dist. Commissioner | Scotland County |
| Alan | Creek | City Administrator | City of Memphis |
| Angela | Newman | City Clerk | City of Memphis |
| Twila | Stevenson | City Clerk | Village of Arbela |
| Carol | McCabe | Trustee | Village of Rutledge |
| Dale | Haldeman | Mayor | Village of Rutledge |
| Ryan | Burgeson | Superintendent | Scotland County R-I |
| Derek | Weber | Executive Director | NEMO RPC |

# Introductions

Derek Weber, Executive Director with Northeast Missouri Regional Planning Commission began the meeting by welcoming and thanking the attendees for coming and having all attendees introduce themselves and the jurisdiction or entity they were representing.

# Hazard Mitigation Planning Purpose

Derek Weber, Executive Director with NEMO RPC presented information on the purpose of Hazard Mitigation Planning and the Disaster Mitigation Act of 2000. The attendees were reminded this is an update of the Scotland County Hazard Mitigation Plan, previously approved in April, 2015. The current plan expires in April 2020.

## Grant Programs Linked to Approved Plan

Derek Weber briefly discussed the FEMA Hazard Mitigation Assistance grants that require participation in an approved Hazard Mitigation Plan for jurisdictions to be eligible to apply. These include: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program

## Participation Requirements

Derek Weber also described the role of the MPC. Each jurisdiction participating in development of the plan must meet the following minimum requirements:

1. Designate a representative to serve on the Scotland County MPC.
2. Provide data for and assist in the development of the updated risk assessment that describes how various hazards impact your jurisdiction,
3. Provide data to describe current capabilities,
4. Develop/update mitigation actions (at least one) specific to your jurisdiction,
5. Provide comments on plan drafts as requested,
6. Provide documentation to show time donated to the planning effort (if a FEMA planning grant was awarded to the county); and
7. Formally adopt the mitigation plan.

Jurisdictions that choose not to participate in development of a FEMA-approved mitigation plan **will not** be eligible applicants for FEMA Hazard Mitigation Assistance Grants.

## Data Collection Questionnaires

Representatives from local governments and school districts were provided with hard copies of Data Collection Questionnaires. The Data Collection Questionnaire is designed to collect information on existing capabilities within each jurisdiction to implement mitigation initiatives as well as collect information on previous hazard events. The questionnaires are different for local units of government and schools. The Data Collection Questionnaires were reviewed as a group and then meeting participants were given time to review the forms individually and note any questions about the forms.

## Discussion/Prioritization of Hazards

Initial research information was presented on the hazards being considered for inclusion in the hazard mitigation plan. The attendees agreed to continue with all of the previous natural hazards covered in the previous plan and also add Pandemic Hazard.

## Update Mitigation Goals

Following the discussion of the risk assessment, Derek Weber, facilitated a discussion of the mitigation goals. Common categories of mitigation goals were presented as well as the 2018 State Hazard Mitigation Plan goals.

This planning effort is an update to an existing hazard mitigation plan. As a result, the goals from the previous hazard mitigation plan were reviewed. The updated goals are as follows:

1. Public Awareness- Using a variety of communication avenues to increase the citizens awareness of and to promote education about the natural hazards that they may face, their vulnerability to these hazards, and how to lessen the effect of future natural hazards.
2. Strengthen communication and coordination between local governments, emergency personnel, public agencies, and citizens to mitigate the effects of future natural hazards.
3. Investigate, implement, maintain, and enforce mitigation policies and programs that limit the impact of natural hazards: on the loss of life; on new and existing properties; on natural resources; on infrastructure; and on the local economy.

## Mitigation Actions Updates

The planning committee members informed they would be contacted to review past mitigation actions and how they wanted to proceed with new mitigation actions. Jurisdictions were informed they were required to have at least one mitigation action.

For each Continuing and New action to be included in the plan, the responsible jurisdiction must complete the STAPLEE Worksheet and record the results on either the spreadsheet OR action plan worksheet. The STAPLEE worksheet provides a framework to determine the general effectiveness in accomplishing the goals of life safety and/or reduction or prevention of damage from a hazard event. This method analyzes the Social, Technical, Administrative, Political, Legal, Economic and Environmental aspects of a project and is commonly used by public administration officials and planners for making planning decisions.

## Next Steps

The meeting concluded with a discussion of the remaining steps to complete the planning process. Participants were informed they would be contacted for completion of mitigation action items. Resolutions will need to be adopted by each jurisdiction and a sample will be emailed.

# Scotland County Multi-Jurisdictional Hazard Mitigation Plan Update
## Kickoff Meeting—Sign-In Sheet

| | | | |
|---|---|---|---|
| **Project:** | Scotland County, Missouri Multi-jurisdictional Hazard Mitigation Plan Update | **Meeting Date/Time:** | Scotland County HMP Conference Call<br>October 8, 2020, 10:00 A.M. |
| **Facilitator:** | Derek Weber, Executive Director<br>Northeast Missouri Regional Planning Commission | **Call-In #:** | (844)844-0414<br>Access Code: 511868 |

| Name | Title | Department/Agency | Email | Phone # | Signature |
|---|---|---|---|---|---|
| Duane Ebeling | Presiding Commissioner | Scotland County | debeling43@gmail.com | | |
| David Wiggins | Western Dist. Commissioner | Scotland County | dwiggins@nemr.net | | |
| Danette Clatt | Eastern Dist. Commissioner | Scotland County | | | |
| Alan Creek | City Administrator | Memphis | allenc@cityofmemphismo.com | | |
| Angela Newman | City Clerk | Memphis | angelan@cityofmemphismo.com | | |
| Twila Stevenson | City Clerk | Arbela | Twila.m.stevenson@gmail.com | | |
| Carol McCabe | Trustee | Rutledge | | 660-341-1970 | |
| Dale Haldeman | Mayor | Rutledge | | 660-341-1970 | |
| Ryan Bergeson | Superintendent | Scotland County R-I | rbergeson@scotland.k12.mo.us | | |
| Derek Weber | Executive Director | NEMO RPC | derekweber@nemorpc.org | (660)465-7281 Ext. 1 | |

# Multi-Jurisdictional Hazard Mitigation Plan

## Data Collection Questionnaire

## For Local Governments

County: Scotland

Jurisdiction: _____

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: County Commission

Phone: 660-465-7027

Email: Scotland County @sos.mo.gov

Date: Mar. 5-2020

**Please return questionnaires by mail, email, or fax to:**

Name: _____

Address: _____

Email: _____

Fax: _____

# CAPABILITY ASSESSMENT
# &
# INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Planning Capabilities** | | |
| **Comprehensive Plan** | Date: NA | |
| Builder's Plan | Date: NA | |
| Capital Improvement Plan | Date: NA | |
| City Emergency Operations Plan | Date: NA | |
| County Emergency Operations Plan | Date: 7-2013 | |
| Local Recovery Plan | Date: NA | |
| County Recovery Plan | Date: NA | |
| City Mitigation Plan | Date: NA | |
| County Mitigation Plan | Date: NA | |
| Debris Management Plan | Date: NA | |
| **Economic Development Plan** | Date: NA | |
| Transportation Plan | Date: NA | |
| Land-use Plan | Date: NA | |
| Flood Mitigation Assistance (FMA) Plan | Date: NA | |
| **Watershed Plan** | Date: NA | |
| Firewise or other fire mitigation plan | Date: NA | |
| Critical Facilities Plan (Mitigation/Response/Recovery) | Date: NA | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Policies/Ordinance** | | |
| Zoning Ordinance | NA | |
| Building Code | Version: NA | |
| Floodplain Ordinance | Date: NA | |
| Subdivision Ordinance | NA | |
| Tree Trimming Ordinance | NA | |
| Nuisance Ordinance | NA | |
| Stormwater Ordinance | NA | |
| Drainage Ordinance | NA | |
| Site Plan Review Requirements | NA | |
| Historic Preservation Ordinance | NA | |
| Landscape Ordinance | NA | |
| **Program** | | |
| Zoning/Land Use Restrictions | NA | |
| Codes Building Site/Design | NA | |
| Hazard Awareness Program | NA | |
| National Flood Insurance Program (NFIP) ✓ | | |
| NFIP Community Rating System (CRS) program | NA | If so, what is your current level rating? |
| National Weather Service (NWS) Storm Ready Certification | NA | |
| Firewise Community Certification | NA | |
| Building Code Effectiveness Grading (BCEGs) | NA | |
| ISO Fire Rating | Rating: 6 | |
| Economic Development Program | NA | |
| Land Use Program | NA | |
| Public Education/Awareness | NA | |
| Property Acquisition | NA | |
| Planning/Zoning Boards | NA | |
| Stream Maintenance Program | NA | |
| Tree Trimming Program | NA | |
| **Engineering Studies for Streams (Local/County/Regional)** | NA | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Mutual Aid Agreements | NA | |
| | **Studies/Reports/Maps** | |
| **Hazard Analysis/Risk Assessment (City)** | NA | |
| **Hazard Analysis/Risk Assessment (County)** | NA | |
| Evacuation Route Map | NA | |
| **Critical Facilities Inventory** | NA | |
| **Vulnerable Population Inventory** | NA | |
| **Land Use Map** | NA | |
| **Staff/Department** | | **Full Time or Part Time?** |
| Building Code Official | NA | |
| Building Inspector | NA | |
| Mapping Specialist (GIS) | NA | |
| Engineer | NA | |
| Development Planner | NA | |
| Public Works Official | NA | |
| Emergency Management Coordinator | NA | F / T |
| NFIP Floodplain Administrator | NA | |
| Emergency Response Team | NA | |
| Hazardous Materials Expert | NA | |
| Local Emergency Planning Committee | Yes | Part time |
| County Emergency Management Commission | NA | |
| Sanitation Department | NA | |
| Transportation Department | NA | |
| Economic Development Department | NA | |
| Housing Department | NA | |
| Historic Preservation | NA | |
| **Non-Governmental Organizations (NGOs)** | **Is there a local chapter? Yes or No** | |
| American Red Cross | Yes | |
| Salvation Army | NA | |
| Veterans Groups | Yes | |
| Local Environmental Organization | NA | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Homeowner Associations | NA | |
| Neighborhood Associations | NA | |
| Chamber of Commerce | Yes | |
| Community Organizations (Lions, Kiwanis, etc. | Yes | Rotary, 4H, Scouts |

| Financial Resources | Is your jurisdiction able to? Yes or No |
|---|---|
| Apply for Community Development Block Grants | Yes |
| Fund projects thru Capital Improvements funding | Yes |
| Authority to levy taxes for specific purposes | Yes |
| Fees for water, sewer, gas, or electric services | NO |
| Impact fees for new development | NO |
| Incur debt through general obligation bonds | Yes |
| Incur debt through special tax bonds | NO |
| Incur debt through private activities | NO |
| Withhold spending in hazard prone areas | NO |

**For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.**

| Planning Capabilities | Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation |
|---|---|
| Comprehensive Plan | NA |
| Builder's Plan | |
| Capital Improvement Plan | |
| Local Recovery Plan | |
| County Recovery Plan | |
| Debris Management Plan | |
| Economic Development Plan | |
| Transportation Plan | |
| Land-use Plan | |
| Watershed Plan | |
| Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan | |

## Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

   3 Members

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education. None

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

   FEMA

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

5. How many outdoor warning sirens are in your community? 2

   How are they activated (indicate responsible department/personnel)?

   City of Memphis

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe. NO

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards? NO

   Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

No plan

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

Growth in North Fabius Hwy 136

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

Not Known

11. Please list major employers in your jurisdiction with an estimated number of employees.

Hospital Schools Nursing Home

County - Under-50

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

N A

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

N A

# VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

| Natural Hazards | |
|---|---|
| Flooding (Major & Flash) - **RF** | Drought - **D** |
| Levee Failure - **LF** | Extreme Temperature - **ET** |
| Dam Failure - **DF** | Severe Thunderstorm (incl. winds, hail, lightning) - **ST** |
| Earthquake - **EQ** | Severe Winter Weather (incl. snow, ice, severe cold) - **SWW** |
| Land Subsidence / Sinkholes - **LSS** | Tornadoes - **T** |
| | Wildfire - **WF** |

## Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

**Essential Facilities**
Hospitals and other medical facilities
Police stations
Fire station
Emergency Operations Centers

**High Potential Loss Facilities**
Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

**Transportation and Lifeline**
Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and pipelines
Oil facilities and pipelines
Communications facilities

## Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

## Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

## Critical Facilities

| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| Essential Facilities such as hospitals and other medical facilities, police and fire stations, Emergency Operations Centers | | | | | | |
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| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| High Potential Loss Facilities such as power plants, dams/levees, military installations, hazardous materials sites, shelters, day care centers, nursing homes, main government buildings (Do not include schools—they will be reported by the school districts) | | | | | | |
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| Transportation and Lifelines such as highways, bridges, and tunnels; railroads and facilities, bus facilities, airports, water treatment facilities, natural gas facilities and pipelines, oil facilities, oil facilities and pipelines, communications facilities | | | | | | |
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***If replacement cost data is not available, use the best available data (assessed valuation or other method for estimating cost) and explain any data deficiencies.**

## Economic Assets (Major Employers, etc)

| Asset | Address | Product/ Service | Value (if known) | Number of Employees | Hazards |
|---|---|---|---|---|---|
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# HISTORIC HAZARD EVENTS

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| **Jurisdiction** | |
| **Type of event** | |
| **Nature and magnitude of event** | |
| **Location** | |
| **Date of event** | |
| **Injuries** | |
| **Deaths** | |
| **Property damage** | |
| **Infrastructure damage** | |
| **Crop damage** | |
| **Business/economic impacts** | |
| **Road/school/other closures** | |
| **Other damage** | |
| **Insured losses** | |
| **Federal/state disaster relief funding** | |
| **Source of information** | |
| **Comments** | |

# HISTORIC HAZARD EVENTS (continued)

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| **Jurisdiction** | |
| **Type of event** | |
| **Nature and magnitude of event** | |
| **Location** | |
| **Date of event** | |
| **Injuries** | |
| **Deaths** | |
| **Property damage** | |
| **Infrastructure damage** | |
| **Crop damage** | |
| **Business/economic impacts** | |
| **Road/school/other closures** | |
| **Other damage** | |
| **Insured losses** | |
| **Federal/state disaster relief funding** | |
| **Source of information** | |
| **Comments** | |

# ASSESSMENT OF PREVIOUSLY PROPOSED ACTIONS

**Jurisdiction:** _____

The contractor/plan development facilitator has provided a list of actions proposed in the previously approved plan for each jurisdiction. Use the worksheet below to evaluate whether each action is still current, feasible, desirable, and/or creates benefit that outweighs the cost.

The worksheet should include information on the status of the action and progress made in implementation, if any. This includes:

- For **completed actions** provide a description of the implementation process. This may be a success story you would like to publicize in your community.
- Some of the actions might have been **ongoing** in nature, such public information and education programs. When this is the case, indicate what activity has occurred during the previous five years, and indicate if this program is still viable enough that it should be carried on into the future.
- If **no progress** has been made in the implementation of a given action, discuss why. Note that implementation is not a requirement. However, if no progress has been made, perhaps this is an action that would be appropriate to delete in the updated plan.

During review of the previously approved actions, consider whether any new actions should be proposed. Perhaps damages from a recent hazard event have indicated the need for new approaches to protect property and life. Review the problem statements from the updated plan for ideas. Also review the FEMA publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*.

| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – ✓<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
| | | | | | | |
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| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – ✓<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
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# Multi-Jurisdictional Hazard Mitigation Plan

## Data Collection Questionnaire

## For Local Governments

County: Scotland County_____

Jurisdiction: City of Memphis_____

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: _____

Phone: 660-465-7285 _____

Email: _____

Date: _____

**Please return questionnaires by mail, email, or fax to:**

Name: _____

Address: _____

Email: _____

Fax: _____

# CAPABILITY ASSESSMENT
# &
# INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

| Element | Yes, No, N/A, # | Comments and/or Weblink |
|---|---|---|
| **Planning Capabilities** | | |
| **Comprehensive Plan** | Date: | |
| Builder's Plan | Date: | |
| Capital Improvement Plan | Date: | |
| City Emergency Operations Plan | Date: | |
| County Emergency Operations Plan | Date: April 2005 | |
| Local Recovery Plan | Date: | |
| County Recovery Plan | Date: | |
| City Mitigation Plan | Date: | |
| County Mitigation Plan | Date: | |
| Debris Management Plan | Date: | |
| **Economic Development Plan** | Date: | |
| Transportation Plan | Date: | |
| Land-use Plan | Date: | |
| Flood Mitigation Assistance (FMA) Plan | Date: | |
| **Watershed Plan** | Date: | |
| Firewise or other fire mitigation plan | Date: | |
| Critical Facilities Plan (Mitigation/Response/Recovery) | Date: | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Policies/Ordinance** | | |
| Zoning Ordinance | Yes | https://www.ecode360.com/ME3363 |
| Building Code | Version: IBC 2012 | |
| Floodplain Ordinance | Date: 9/5/2019 | https://www.ecode360.com/ME3363 |
| Subdivision Ordinance | Yes | |
| Tree Trimming Ordinance | Yes | |
| Nuisance Ordinance | Yes | |
| Stormwater Ordinance | Yes | |
| Drainage Ordinance | Yes | |
| Site Plan Review Requirements | | |
| Historic Preservation Ordinance | | |
| Landscape Ordinance | | |
| **Program** | | |
| Zoning/Land Use Restrictions | Yes | |
| Codes Building Site/Design | | |
| Hazard Awareness Program | | |
| National Flood Insurance Program (NFIP) | | |
| NFIP Community Rating System (CRS) program | | If so, what is your current level rating? |
| National Weather Service (NWS) Storm Ready Certification | | |
| Firewise Community Certification | | |
| Building Code Effectiveness Grading (BCEGs) | | |
| ISO Fire Rating | Rating:06/6X | A new ISO inspection was conducted in February 2020 – results not yet received. |
| Economic Development Program | | The City has an economic development committee. |
| Land Use Program | | |
| Public Education/Awareness | | |
| Property Acquisition | | |
| Planning/Zoning Boards | Yes | |
| Stream Maintenance Program | | |
| Tree Trimming Program | Yes | |
| **Engineering Studies for Streams (Local/County/Regional)** | | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Mutual Aid Agreements | | |
| **Studies/Reports/Maps** | | |
| **Hazard Analysis/Risk Assessment (City)** | | |
| **Hazard Analysis/Risk Assessment (County)** | | |
| Evacuation Route Map | | |
| **Critical Facilities Inventory** | | |
| **Vulnerable Population Inventory** | | |
| **Land Use Map** | Yes | Zoning Map |
| **Staff/Department** | | **Full Time or Part Time?** |
| Building Code Official | Yes | FT |
| Building Inspector | Yes | FT |
| Mapping Specialist (GIS) | | Contracted – Midland GIS (as needed) |
| Engineer | Yes | As needed |
| Development Planner | | |
| Public Works Official | Yes | FT |
| Emergency Management Coordinator | | |
| NFIP Floodplain Administrator | | |
| Emergency Response Team | | |
| Hazardous Materials Expert | | |
| Local Emergency Planning Committee | | |
| County Emergency Management Commission | | |
| Sanitation Department | Yes | FT |
| Transportation Department | Yes | FT |
| Economic Development Department | | committee |
| Housing Department | | |
| Historic Preservation | | |
| **Non-Governmental Organizations (NGOs)** | **Is there a local chapter? Yes or No** | |
| American Red Cross | | |
| Salvation Army | | |
| Veterans Groups | | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Local Environmental Organization | | |
| Homeowner Associations | | |
| Neighborhood Associations | | |
| Chamber of Commerce | Yes | |
| Community Organizations (Lions, Kiwanis, etc. | Rotary | |

| Financial Resources | Is your jurisdiction able to? Yes or No |
|---|---|
| Apply for Community Development Block Grants | Yes |
| Fund projects thru Capital Improvements funding | |
| Authority to levy taxes for specific purposes | Yes |
| Fees for water, sewer, gas, or electric services | Yes |
| Impact fees for new development | |
| Incur debt through general obligation bonds | |
| Incur debt through special tax bonds | |
| Incur debt through private activities | |
| Withhold spending in hazard prone areas | |

**For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.**

| Planning Capabilities | Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation |
|---|---|
| Comprehensive Plan | |
| Builder's Plan | |
| Capital Improvement Plan | |
| Local Recovery Plan | |
| County Recovery Plan | |
| Debris Management Plan | |
| Economic Development Plan | |
| Transportation Plan | |
| Land-use Plan | |
| Watershed Plan | |
| Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan | |

## Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

   Mayor/City Administrator/City Council (4 members)

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

5. How many outdoor warning sirens are in your community? 2

   How are they activated (indicate responsible department/personnel)?

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

   Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

    Rehabilitation of the City water plant is currently in progress.

11. Please list major employers in your jurisdiction with an estimated number of employees.

    Scotland County R-1 Schools
    Scotland County Hospital
    Scotland County Care Center
    Memphis/Pepsi Bottling Co.
    City of Memphis – 25
    J's Foods

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

# VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

| Natural Hazards | |
|---|---|
| Flooding (Major & Flash) - **RF** | Drought - **D** |
| Levee Failure - **LF** | Extreme Temperature - **ET** |
| Dam Failure - **DF** | Severe Thunderstorm (incl. winds, hail, lightning) - **ST** |
| Earthquake - **EQ** | Severe Winter Weather (incl. snow, ice, severe cold) - **SWW** |
| Land Subsidence / Sinkholes - **LSS** | Tornadoes - **T** |
| | Wildfire - **WF** |

## Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

**Essential Facilities**
Hospitals and other medical facilities
Police stations
Fire station
Emergency Operations Centers

**High Potential Loss Facilities**
Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

**Transportation and Lifeline**
Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and pipelines
Oil facilities and pipelines
Communications facilities

## Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

## Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

## Critical Facilities

| Name of Asset | Address | Area (sq ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| Essential Facilities such as hospitals and other medical facilities, police and fire stations, Emergency Operations Centers | | | | | | |
| Fire Station | 110 N. Washington | | $161,000 | | | |
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| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| High Potential Loss Facilities such as power plants, dams/levees, military installations, hazardous materials sites, shelters, day care centers, nursing homes, main government buildings (Do not include schools – they will be reported by the school districts) | | | | | | |
| Electric Plant | 737 W. Strong Blvd. | | $2.8M | | | |
| City Hall | 125 W. Jefferson | | $585,000 | | | |
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| Transportation and Lifelines such as highways, bridges, and tunnels, railroads and facilities, bus facilities, airports, water treatment facilities, natural gas facilities and pipelines, oil facilities, oil facilities and pipelines, communications facilities | | | | | | |
| Airport | Hwy 136 West | | | | | |
| Water Treatment Plant | 787 W. Strong Blvd. | | $3.5M | | | |
| Lake ShowMe | Hwy 136 West | | | | | |
| Water Tower | 831 N. Main | | $1.5M | | | |
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***If replacement cost data is not available, use the best available data (assessed valuation or other method for estimating cost) and explain any data deficiencies.**

## Economic Assets (Major Employers, etc)

| Asset | Address | Product/ Service | Value (if known) | Number of Employees | Hazards |
|---|---|---|---|---|---|
| | | | | | |
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# HISTORIC HAZARD EVENTS

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| Jurisdiction | |
| Type of event | |
| Nature and magnitude of event | |
| Location | |
| Date of event | |
| Injuries | |
| Deaths | |
| Property damage | |
| Infrastructure damage | |
| Crop damage | |
| Business/economic impacts | |
| Road/school/other closures | |
| Other damage | |
| Insured losses | |
| Federal/state disaster relief funding | |
| Source of information | |
| Comments | |

# HISTORIC HAZARD EVENTS (continued)

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| Jurisdiction | |
| Type of event | |
| Nature and magnitude of event | |
| Location | |
| Date of event | |
| Injuries | |
| Deaths | |
| Property damage | |
| Infrastructure damage | |
| Crop damage | |
| Business/economic impacts | |
| Road/school/other closures | |
| Other damage | |
| Insured losses | |
| Federal/state disaster relief funding | |
| Source of information | |
| Comments | |

# ASSESSMENT OF PREVIOUSLY PROPOSED ACTIONS

**Jurisdiction:** _____

The contractor/plan development facilitator has provided a list of actions proposed in the previously approved plan for each jurisdiction. Use the worksheet below to evaluate whether each action is still current, feasible, desirable, and/or creates benefit that outweighs the cost.

The worksheet should include information on the status of the action and progress made in implementation, if any. This includes:

- For **completed actions** provide a description of the implementation process. This may be a success story you would like to publicize in your community.
- Some of the actions might have been **ongoing** in nature, such public information and education programs. When this is the case, indicate what activity has occurred during the previous five years, and indicate if this program is still viable enough that it should be carried on into the future.
- If **no progress** has been made in the implementation of a given action, discuss why. Note that implementation is not a requirement. However, if no progress has been made, perhaps this is an action that would be appropriate to delete in the updated plan.

During review of the previously approved actions, consider whether any new actions should be proposed. Perhaps damages from a recent hazard event have indicated the need for new approaches to protect property and life. Review the problem statements from the updated plan for ideas. Also review the FEMA publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*.

| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – ✓<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
| | | | | | | |
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| | | | | | | |

| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – ✓<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
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# Multi-Jurisdictional Hazard Mitigation Plan

## Data Collection Questionnaire

## For Local Governments

County: Scotland

Jurisdiction: Arbela

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Twila Stevenson

Phone: 660-945-3903

Email: twila.m.stevenson@gmail.com

Date: 2-24-2020

**Please return questionnaires by mail, email, or fax to:**

Name: _____

Address: _____

Email: _____

Fax: _____

# CAPABILITY ASSESSMENT
# &
# INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

| Element | Yes, No, N/A | Comments and/or Weblink, if |
|---|---|---|
| | Planning Capabilities | |
| **Comprehensive Plan** | Date: | |
| Builder's Plan | Date: | |
| Capital Improvement Plan | Date: | |
| City Emergency Operations Plan | Date: | |
| County Emergency Operations Plan | Date: | |
| Local Recovery Plan | Date: | |
| County Recovery Plan | Date: | |
| City Mitigation Plan | Date: | |
| County Mitigation Plan | Date: | |
| Debris Management Plan | Date: | |
| **Economic Development Plan** | Date: | |
| Transportation Plan | Date: | |
| Land-use Plan | Date: | |
| Flood Mitigation Assistance (FMA) Plan | Date: | |
| **Watershed Plan** | Date: | |
| Firewise or other fire mitigation plan | Date: | |
| Critical Facilities Plan (Mitigation/Response/Recovery) | Date: | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Policies/Ordinance** | | |
| Zoning Ordinance | | |
| Building Code | Version: | |
| Floodplain Ordinance | Date: | |
| Subdivision Ordinance | | |
| Tree Trimming Ordinance | | |
| Nuisance Ordinance | | |
| Stormwater Ordinance | | |
| Drainage Ordinance | | |
| Site Plan Review Requirements | | |
| Historic Preservation Ordinance | | |
| Landscape Ordinance | | |
| **Program** | | |
| Zoning/Land Use Restrictions | | |
| Codes Building Site/Design | | |
| Hazard Awareness Program | | |
| National Flood Insurance Program (NFIP) | | |
| NFIP Community Rating System (CRS) program | | If so, what is your current level rating? |
| National Weather Service (NWS) Storm Ready Certification | | |
| Firewise Community Certification | | |
| Building Code Effectiveness Grading (BCEGs) | | |
| ISO Fire Rating | Rating: | |
| Economic Development Program | | |
| Land Use Program | | |
| Public Education/Awareness | | |
| Property Acquisition | | |
| Planning/Zoning Boards | | |
| Stream Maintenance Program | | |
| Tree Trimming Program | | |
| **Engineering Studies for Streams (Local/County/Regional)** | | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Mutual Aid Agreements | | |
| **Studies/Reports/Maps** | | |
| **Hazard Analysis/Risk Assessment (City)** | | |
| **Hazard Analysis/Risk Assessment (County)** | | |
| Evacuation Route Map | | |
| **Critical Facilities Inventory** | | |
| **Vulnerable Population Inventory** | | |
| **Land Use Map** | | |
| **Staff/Department** | | **Full Time or Part Time?** |
| Building Code Official | | |
| Building Inspector | | |
| Mapping Specialist (GIS) | | |
| Engineer | | |
| Development Planner | | |
| Public Works Official | | |
| Emergency Management Coordinator | | |
| NFIP Floodplain Administrator | | |
| Emergency Response Team | | |
| Hazardous Materials Expert | | |
| Local Emergency Planning Committee | | |
| County Emergency Management Commission | | |
| Sanitation Department | | |
| Transportation Department | | |
| Economic Development Department | | |
| Housing Department | | |
| Historic Preservation | | |
| **Non-Governmental Organizations (NGOs)** | **Is there a local chapter? Yes or No** | |
| American Red Cross | No | |
| Salvation Army | No | |
| Veterans Groups | No | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Local Environmental Organization | No | |
| Homeowner Associations | No | |
| Neighborhood Associations | No | |
| Chamber of Commerce | No | |
| Community Organizations (Lions, Kiwanis, etc. | No | |

| Financial Resources | Is your jurisdiction able to? Yes or No |
|---|---|
| Apply for Community Development Block Grants | No |
| Fund projects thru Capital Improvements funding | No |
| Authority to levy taxes for specific purposes | yes |
| Fees for water, sewer, gas, or electric services | No |
| Impact fees for new development | No |
| Incur debt through general obligation bonds | No |
| Incur debt through special tax bonds | No |
| Incur debt through private activities | No |
| Withhold spending in hazard prone areas | No |

**For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.**

| Planning Capabilities | Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation |
|---|---|
| Comprehensive Plan | |
| Builder's Plan | |
| Capital Improvement Plan | |
| Local Recovery Plan | |
| County Recovery Plan | |
| Debris Management Plan | |
| Economic Development Plan | |
| Transportation Plan | |
| Land-use Plan | |
| Watershed Plan | |
| Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan | |

## Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

   5

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

   None

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

   None

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

   None

5. How many outdoor warning sirens are in your community?

   None

   How are they activated (indicate responsible department/personnel)?

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

   No

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

   No

   Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

N/A

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

N/A

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

No

11. Please list major employers in your jurisdiction with an estimated number of employees.

None

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

N/A

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

N/A

# VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

| Natural Hazards | |
|---|---|
| Flooding (Major & Flash) - **RF** | Drought - **D** |
| Levee Failure - **LF** | Extreme Temperature - **ET** |
| Dam Failure - **DF** | Severe Thunderstorm (incl. winds, hail, lightning) - **ST** |
| Earthquake - **EQ** | Severe Winter Weather (incl. snow, ice, severe cold) - **SWW** |
| Land Subsidence / Sinkholes - **LSS** | Tornadoes - **T** |
| | Wildfire - **WF** |

## Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

**Essential Facilities**
Hospitals and other medical facilities
Police stations
Fire station
Emergency Operations Centers

**High Potential Loss Facilities**
Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

**Transportation and Lifeline**
Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and pipelines
Oil facilities and pipelines
Communications facilities

## Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

## Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

## Critical Facilities

| Name of Asset | Address | Area (sq.ft.) | Replacement Value (insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| Essential Facilities such as hospitals and other medical facilities, police and fire stations, Emergency Operations Centers | | | | | | |
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| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| High Potential Loss Facilities such as power plants, dams/levees, military installations, hazardous materials sites, shelters, day care centers, nursing homes, main government buildings (Do not include schools—they will be reported by the school districts) | | | | | | |
| | N/A | | N/A | | | |
| Transportation and Lifelines such as highways, bridges, and tunnels, railroads and facilities, bus facilities, airports, water treatment facilities, natural gas facilities and pipelines, oil facilities, oil facilities and pipelines, communications facilities | | | | | | |
| | N/A | | N/A | | | |

***If replacement cost data is not available, use the best available data (assessed valuation or other method for estimating cost) and explain any data deficiencies.**

## Economic Assets (Major Employers, etc)

| Asset | Address | Product/ Service | Value (if known) | Number of Employees | Hazards |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | N/A | | | |
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# HISTORIC HAZARD EVENTS

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| Jurisdiction | |
| Type of event | |
| Nature and magnitude of event | |
| Location | |
| Date of event | |
| Injuries | |
| Deaths | |
| Property damage | |
| Infrastructure damage | |
| Crop damage | |
| Business/economic impacts | |
| Road/school/other closures | |
| Other damage | |
| Insured losses | |
| Federal/state disaster relief funding | |
| Source of information | |
| Comments | |

# HISTORIC HAZARD EVENTS (continued)

Please fill out the sheet on the next page for each significant hazard event that affected **Your Jurisdiction. Make as many copies as necessary to record all events** and complete with as much detail as possible. This includes all events associated with the hazards listed below that have caused previous damage in your jurisdiction. It is especially important to capture events that either were not included in the previous Hazard Mitigation Plan or occurred since the plan was completed. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| Jurisdiction | |
| Type of event | |
| Nature and magnitude of event | |
| Location | |
| Date of event | |
| Injuries | |
| Deaths | |
| Property damage | |
| Infrastructure damage | |
| Crop damage | |
| Business/economic impacts | |
| Road/school/other closures | |
| Other damage | |
| Insured losses | |
| Federal/state disaster relief funding | |
| Source of information | |
| Comments | |

# ASSESSMENT OF PREVIOUSLY PROPOSED ACTIONS

**Jurisdiction:** _____

The contractor/plan development facilitator has provided a list of actions proposed in the previously approved plan for each jurisdiction. Use the worksheet below to evaluate whether each action is still current, feasible, desirable, and/or creates benefit that outweighs the cost.

The worksheet should include information on the status of the action and progress made in implementation, if any. This includes:

- For **completed actions** provide a description of the implementation process. This may be a success story you would like to publicize in your community.
- Some of the actions might have been **ongoing** in nature, such public information and education programs. When this is the case, indicate what activity has occurred during the previous five years, and indicate if this program is still viable enough that it should be carried on into the future.
- If **no progress** has been made in the implementation of a given action, discuss why. Note that implementation is not a requirement. However, if no progress has been made, perhaps this is an action that would be appropriate to delete in the updated plan.

During review of the previously approved actions, consider whether any new actions should be proposed. Perhaps damages from a recent hazard event have indicated the need for new approaches to protect property and life. Review the problem statements from the updated plan for ideas. Also review the FEMA publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013).*

| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – ✓<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
| | | | | | | |
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| # | Action | Status | | | Description of Implementation Activities or Reasons for Lack of Progress | Keep – K<br>Delete – X<br>Modify – M |
|---|---|---|---|---|---|---|
| | | Complete | Ongoing | No Progress | | |
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# Multi-Jurisdictional Hazard Mitigation Plan

## Data Collection Questionnaire

## For Local Governments

County: Scotland County

Jurisdiction: City of Rutledge

Return by: _____

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs. Please note: School Districts and other Educational Institutions should complete the Data Collection Questionnaire indicated "For School Districts and Educational Institutions".

Prepared by: Dale Hardeman Chairman

Phone: 660-341-2467

Email: dhdale376@gmail.com

Date: 10-19-20

**Please return questionnaires by mail, email, or fax to:**

Name: Derek Weber

Address: 121 S. Cecil St. Memphis, MO 63555

Email: derekweber@nemorpc.org

Fax: 660-465-7163

# CAPABILITY ASSESSMENT
# &
# INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan. Although some of this information may have been captured in your previous mitigation plan, it is important to ensure this information is current in the plan update

Please indicate which of the following your jurisdiction has in place. For elements that do not pertain to your type of public entity, please indicate with "N/A". If applicable, please provide a completion date for the element. If your jurisdiction does not have a particular element, and a higher level of government has the authority pertaining to your jurisdiction, please indicate this in the comments column. If your jurisdiction has any of the **underlined and bolded** elements, please provide a copy of the document to the contact listed on the front and indicate method in the comments column (i.e. available on the web, will email or mail).

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Planning Capabilities** | | |
| **Comprehensive Plan** | Date: | |
| Builder's Plan | Date: N/A | — |
| Capital Improvement Plan | Date: N/A | — |
| City Emergency Operations Plan | Date: N/A | — |
| County Emergency Operations Plan | Date: Yes | Scotland County |
| Local Recovery Plan | Date: N/A | — |
| County Recovery Plan | Date: N/A | |
| City Mitigation Plan | Date: N/A | |
| County Mitigation Plan | Date: N/A | — |
| Debris Management Plan | Date: N/A | — |
| **Economic Development Plan** | Date: N/A | |
| Transportation Plan | Date: N/A | — |
| Land-use Plan | Date: N/A | — |
| Flood Mitigation Assistance (FMA) Plan | Date: N/A | |
| **Watershed Plan** | Date: N/A | |
| Firewise or other fire mitigation plan | Date: N/A | — |
| Critical Facilities Plan (Mitigation/Response/Recovery) | Date: N/A | — |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| **Policies/Ordinance** | | |
| Zoning Ordinance | NA | |
| Building Code | Version: NA | |
| Floodplain Ordinance | Date: NA | |
| Subdivision Ordinance | NA | |
| Tree Trimming Ordinance | NA | |
| Nuisance Ordinance | Yes | ordinance # 109 |
| Stormwater Ordinance | NA | |
| Drainage Ordinance | Yes | Ordinance # 24 |
| Site Plan Review Requirements | NA | |
| Historic Preservation Ordinance | NA | |
| Landscape Ordinance | NA | |
| **Program** | | |
| Zoning/Land Use Restrictions | NA | |
| Codes Building Site/Design | NA | |
| Hazard Awareness Program | NA | |
| National Flood Insurance Program (NFIP) | NA | |
| NFIP Community Rating System (CRS) program | NA | If so, what is your current level rating? |
| National Weather Service (NWS) Storm Ready Certification | NA | |
| Firewise Community Certification | NA | |
| Building Code Effectiveness Grading (BCEGs) | NA | |
| ISO Fire Rating | Rating: 9 | |
| Economic Development Program | NA | |
| Land Use Program | NA | |
| Public Education/Awareness | NA | |
| Property Acquisition | NA | |
| Planning/Zoning Boards | NA | |
| Stream Maintenance Program | NA | |
| Tree Trimming Program | NA | |
| **Engineering Studies for Streams (Local/County/Regional)** | NA | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Mutual Aid Agreements | NA | |
| **Studies/Reports/Maps** | | |
| **Hazard Analysis/Risk Assessment (City)** | NA | |
| **Hazard Analysis/Risk Assessment (County)** | unknown | |
| Evacuation Route Map | NA | |
| **Critical Facilities Inventory** | NA | |
| **Vulnerable Population Inventory** | NA | |
| **Land Use Map** | NA | |
| **Staff/Department** | | **Full Time or Part Time?** |
| Building Code Official | NA | |
| Building Inspector | NA | |
| Mapping Specialist (GIS) | NA | |
| Engineer | NA | |
| Development Planner | NA | |
| Public Works Official | NA | |
| Emergency Management Coordinator | NA | |
| NFIP Floodplain Administrator | NA | |
| Emergency Response Team | NA | |
| Hazardous Materials Expert | NA | |
| Local Emergency Planning Committee | NA | |
| County Emergency Management Commission | NA | |
| Sanitation Department | NA | |
| Transportation Department | NA | |
| Economic Development Department | NA | |
| Housing Department | NA | |
| Historic Preservation | NA | |
| **Non-Governmental Organizations (NGOs)** | **Is there a local chapter? Yes or No** | |
| American Red Cross | NA | |
| Salvation Army | NA | |
| Veterans Groups | NA | |

| Element | Yes, No, N/A | Comments and/or Weblink |
|---|---|---|
| Local Environmental Organization | N/A | |
| Homeowner Associations | N/A | |
| Neighborhood Associations | N/A | |
| Chamber of Commerce | N/A | |
| Community Organizations (Lions, Kiwanis, etc. | N/A | |

| Financial Resources | Is your jurisdiction able to? Yes or No |
|---|---|
| Apply for Community Development Block Grants | Yes |
| Fund projects thru Capital Improvements funding | N/A |
| Authority to levy taxes for specific purposes | N/A |
| Fees for water, sewer, gas, or electric services | Yes |
| Impact fees for new development | N/A |
| Incur debt through general obligation bonds | N/A |
| Incur debt through special tax bonds | N/A |
| Incur debt through private activities | N/A |
| Withhold spending in hazard prone areas | N/A |

**For plan updates, the plan maintenance process outlined in your previous plan requires all participating jurisdictions to incorporate the requirements of the mitigation plan into other planning mechanisms, when appropriate. A key element of effective implementation of mitigation is for the mitigation plan to be incorporated in existing authorities, policies, programs, and resources. Next to each applicable planning mechanism, indicate how your jurisdiction incorporated the previous mitigation plan. If no incorporation has occurred, please explain, including background information detailing any challenges preventing incorporation.**

| Planning Capabilities | Method of Incorporation Since Previous Plan or Challenges Preventing Incorporation |
|---|---|
| Comprehensive Plan | |
| Builder's Plan | |
| Capital Improvement Plan | |
| Local Recovery Plan | |
| County Recovery Plan | |
| Debris Management Plan | |
| Economic Development Plan | |
| Transportation Plan | |
| Land-use Plan | |
| Watershed Plan | |
| Firewise or other Fire Mitigation Plan such as Community Wildfire Protection Plan | |

## Additional Questions

1. How is your government structure organized? (Commission, Mayor/City Council, how many members)

   Board of trustees 5 members

2. List any past or ongoing public education or information programs, such as for responsible water use, fire safety, household preparedness, or environmental education.

   NA

3. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities. Be sure to include pending or approved projects submitted for FEMA mitigation grants.

   NA

4. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

   NA

5. How many outdoor warning sirens are in your community?

   1

   How are they activated (indicate responsible department/personnel)?

   Rutledge Fire Dept.

6. Does your community utilize any other warning systems such as Cable Override, Reverse 911, etc? If so, please describe.

   NA

7. Does your community have designated public tornado shelters/saferooms? If so, are they constructed in accordance with FEMA standards?

   NA

   Please provide address locations:

8. List residential, commercial and industrial development in your jurisdiction since last plan update.

3 new Residential Buildings

9. Describe development trends and expected growth areas. Is any new development expected to occur in the 100-year floodplain? Is any new development expected to occur in any other known hazard areas? If possible, please provide a map indicating potential/planned growth areas.

unknown

10. Are any new facilities or infrastructure planned for construction during the next five years? If so, please provide facility name and purpose along with proposed locations, if known.

NO

11. Please list major employers in your jurisdiction with an estimated number of employees.

| | |
|---|---|
| Zimmerman Store | 10 |
| Mels Garage | 3 |
| Rutledge Garage | 3 |

12. Please list Mitigation Planning Committee members who served during the development of the previously approved plan. Was the process set forth for monitoring the implementation of the previously approved mitigation plan adhered to? Did the Committee meet as was specified in the previously approved plan? Why or why not?

NA

13. Describe your jurisdiction's participation in the NFIP. Include information about how compliance with the NFIP is enforced locally.

NA

# VULNERABILITY ASSESSMENT

The purpose of this worksheet is to assess the vulnerable buildings, populations, critical facilities, infrastructure, and other important assets in your community by using the best available data to complete the table. Use the table on the next page to compile a detailed inventory of specific assets at risk including critical facilities and infrastructure; natural, cultural, and historical assets; and economic assets. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

| Natural Hazards | |
|---|---|
| Flooding (Major & Flash) - **RF** | Drought - **D** |
| Levee Failure - **LF** | Extreme Temperature - **ET** |
| Dam Failure - **DF** | Severe Thunderstorm (incl. winds, hail, lightning) - **ST** |
| Earthquake - **EQ** | Severe Winter Weather (incl. snow, ice, severe cold) - **SWW** |
| Land Subsidence / Sinkholes - **LSS** | Tornadoes - **T** |
| | Wildfire - **WF** |

## Critical Facilities and Infrastructure

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets. 'Essential facilities' are those that if damaged would have devastating impacts on disaster response and/or recovery. 'High potential loss facilities' are those that would have a high loss or impact on the community. Transportation and lifeline facilities are third category of critical assets; examples are provided below.

**Essential Facilities**
Hospitals and other medical facilities
Police stations
Fire station
Emergency Operations Centers

**High Potential Loss Facilities**
Power plants
Dams/levees
Military installations
Hazardous material sites
Schools
Shelters
Day care centers
Nursing homes
Main government buildings

**Transportation and Lifeline**
Highways, bridges, and tunnels
Railroads and facilities
Bus facilities
Airports
Water treatment facilities
Natural gas facilities and pipelines
Oil facilities and pipelines
Communications facilities

## Economic Assets

Economic assets at risk may include major employers or primary economic sectors, such as agriculture, whose losses or inoperability would have severe impacts on the community and its ability to recover from disaster.

## Asset Inventory

Please list critical facilities and other community assets, the square feet, values, and occupancy/capacity. If not applicable, enter "N/A"). In the last column, use the codes from the previous page to indicate hazards to which the asset is vulnerable. Add as many rows as needed. If this information is available in GIS format, please provide.

## Critical Facilities

| Name of Asset | Address | Area (sq ft) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| Essential Facilities such as hospitals and other medical facilities, police and fire stations, Emergency Operations Centers | | | | | | |
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# Multi-Jurisdictional Hazard Mitigation Plan

## Data Collection Questionnaire

## For School Districts and Educational Institutions

County: Scotland County

School District /
Educational Institution Name: Scotland County R-1 School District

Return by: February 26, 2020

Please complete this data collection questionnaire as accurately and completely as possible as this information will appear in the mitigation plan. A data collection questionnaire must be completed for each "jurisdiction" that wishes to be included in the plan. According to FEMA's definition a jurisdiction is any local government, including counties, municipalities, cities, towns, school districts, special districts, councils of government, and tribal organizations. Any of these entities as well as publicly funded colleges and universities that do not participate in the planning process **will not** be eligible applicants for FEMA mitigation funding programs.

Prepared by: Ryan Bergeson, Superintendent

Phone: 660-465-8531

Email: rbergeson@scotland.k12.mo.us

Date: 2/25/2020

**Please return questionnaires by mail, email, or fax to:**

Name: _____

Address: _____

Email: _____

Fax: _____

# CAPABILITY ASSESSMENT
# &
# INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS AND TECHNICAL INFORMATION

The purpose of this section is to collect information to document existing capabilities as well as determine existing plans, studies, reports, and technical information that may need to be incorporated in the mitigation plan.

Please indicate which of the following your school district / institution has in place. For elements that do not pertain to you, please indicate with "N/A". If applicable, please provide a completion date for the element. If your school district / institution has any of the **underlined and bolded** elements, please provide a copy of the document to the contact indicated on the front of this questionnaire and indicate method in the comments column (i.e. available on the web, will email or mail).

| Planning Elements | Yes/No | Date of Latest Version | Comments |
|---|---|---|---|
| Master Plan | No | | |
| Capital Improvement Plan | No | | |
| **School Emergency Plan**<br>Shelter in place protocols<br>Evacuation protocols | Yes | Summer 2019 | |
| Weapons Policy | Yes | | MSBA Board Policy |

## Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your school district / institution.

| Personnel Resources | Yes/No | Department/Position | Comments |
|---|---|---|---|
| Full-time building official (i.e. Principal) | No | | |
| Emergency Manager | No | | |
| Grant Writer | No | | |
| Public Information Officer | No | | |

## Financial Resources

Identify whether your school district /institution has access to or is eligible to use the following financial resources for hazard mitigation.

| Financial Resources | Accessible/Eligible to Use (Y/N) | Comments |
|---|---|---|
| Capital improvements project funding | Yes | |
| Local funds | Yes | |
| General obligation bonds | No | |
| Special tax bonds | No | |
| Private activities/donations | Yes | |
| State and federal funds | Yes | |

## Additional Capabilities Questions

1. Are your buildings equipped with a public address (PA) system or other emergency alert system? Please describe.
   Yes

2. Does your school buildings' have NOAA Weather Radios?
   Central office

3. List any past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect facilities or provide education regarding hazards that could occur.
   Disaster Drills with staff and students.

4. List any other past or ongoing projects or programs designed to reduce disaster losses, these may include projects to protect critical facilities.
   Projects include building projects that put students under one roof.

5. Do any of your buildings have designated tornado shelters or "saferooms"? If so, are they constructed in accordance with FEMA standards?
   No buildings specifically designed as tornado shelters.

6. Did your school district / institution make any additions to buildings or construction new buildings since the last plan update (2010)? Please list the buildings and the improvement.
   Yes. Early Childhood and Elementary Library Building. Connecter between high school and Ag Building.

7. Does your school district / institution plan to remodel or construct any buildings in the next 5 years? If so, please list the building or proposed building and planned improvements. Are any planned construction activities in known hazard areas?
   Not at this time. No official plans are in the works

8. What percentage is your projected enrollment expected to increase or decrease in the next five years?
   Enrollment is projected to remain the same of decrease based on historical trends.

9. Do you have your own campus police? Please explain your police department or who you rely on for security needs.

No. We work closely with local law enforcement.

# VULNERABILITY ASSESSMENT

## Asset Inventory

The purpose of this worksheet is to assist in the assessment of the vulnerable populations and facilities owned by your school district / institution. Use the table below to compile a detailed inventory of specific assets at risk. In the natural hazard column of the asset inventory table, indicate (by assigned abbreviation) which of the following hazards the asset is vulnerable to:

| Natural Hazards | |
|---|---|
| Flooding (Major & Flash) - **RF** | Drought - **D** |
| Levee Failure - **LF** | Extreme Temperature - **ET** |
| Dam Failure - **DF** | Severe Thunderstorm (incl. winds, hail, lightning) - **ST** |
| Earthquake - **EQ** | Severe Winter Weather (incl. snow, ice, severe cold) - **SWW** |
| Land Subsidence / Sinkholes - **LSS** | Tornadoes - **T** |
| Drought - **D** | Wildfire - **WF** |

Please list buildings owned by your school district / institution including the square feet, values, and occupancy/capacity. If not applicable or not available, enter "N/A". Add as many rows as needed. **If you have this data in GIS formats, or other formats, please provide in lieu of this.**

| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
| | | | | | | |
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| Name of Asset | Address | Area (sq.ft.) | Replacement Value (Insured) ($) | Contents Value ($) | Occupancy/ Capacity (#) | Natural Hazards |
|---|---|---|---|---|---|---|
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# HISTORIC HAZARD EVENTS

Please fill out one sheet for each significant hazard event that affected **your school district / institution** with as much detail as possible. This includes all hazard events listed on the Vulnerability Assessment page that have caused previous damage. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| **Type of event** | |
| **Nature and magnitude of event** | |
| **Location** | |
| **Date of event** | |
| **Injuries** | |
| **Deaths** | |
| **Property damage** | |
| **Infrastructure damage** | |
| **Crop damage** | |
| **Business/economic impacts** | |
| **Road/school/other closures** | |
| **Other damage** | |
| **Insured losses** | |
| **Federal/state disaster relief funding** | |
| **Source of information** | |
| **Comments** | |

# HISTORIC HAZARD EVENTS (continued)

Please fill out one sheet for each significant hazard event that affected **your school district /institution** with as much detail as possible. This includes all hazard events listed on the Vulnerability Assessment page that have caused previous damage. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

| | |
|---|---|
| **Type of event** | |
| **Nature and magnitude of event** | |
| **Location** | |
| **Date of event** | |
| **Injuries** | |
| **Deaths** | |
| **Property damage** | |
| **Infrastructure damage** | |
| **Crop damage** | |
| **Business/economic impacts** | |
| **Road/school/other closures** | |
| **Other damage** | |
| **Insured losses** | |
| **Federal/state disaster relief funding** | |
| **Source of information** | |
| **Comments** | |

| | Name | Address 1 | Square Footage | Property Value | Content Value | Year Built |
|---|---|---|---|---|---|---|
| 1 | High School | 606 W Lovers Lane | 44921.00 | 7741219.58 | 1385134.00 | 1976 |
| 2 | Vo Ag & Industrial Arts Building | 606 W Lovers Lane (Rear) | 10224.00 | 1007859.68 | 449307.86 | 1976 |
| 3 | Storage Bldg. #2 | 438 W Lover's Lane | 400.00 | 23741.12 | 69124.36 | 1972 |
| 4 | North Elementary School | 438 W Lovers Lane | 35668.00 | 6026676.63 | 1060391.45 | 1960 |
| 5 | Multi-Purpose Building | 606 W Lovers Lane (Rear) | 3760.00 | 436797.45 | 22221.47 | 1985 |
| 6 | Bus Garage | 1055 N. Clay | 2500.00 | 73940.20 | 43342.78 | 1964 |
| 7 | Storage Bldg. #1 | 1055 N. Clay | 1600.00 | 12104.83 | 16575.92 | 1964 |
| 8 | Concession Stand (and Addition) | 606 W Lover's Lane | 976.00 | 30362.24 | 11653.90 | 2009 |
| 9 | H.S. Band Storage | 606 W Lover's Lane | 1700.00 | 108536.64 | 20000.00 | 1995 |
| 10 | High School Weight Room | 606 W Lover's Lane | 450.00 | 44417.05 | 31811.23 | 1995 |
| 11 | H.S. Classroom Addition/Storage | 606 W Lover's Lane | 1728.00 | 65413.25 | 22221.47 | 2000 |
| 12 | Modular Elementary | 438 W Lover's Lane | 0.00 | 87259.20 | 129897.46 | 2003 |
| 13 | Softball Concession Stand w/ Storage Building | 438 W Lover's Lane | 960.00 | 94867.75 | 6910.63 | 2011 |
| 14 | Elem. Freezer | 438 W Lover's Lane | 0.00 | 21356.41 | 14523.49 | 2009 |
| 15 | Central Office | 438 W. Lovers Lane | 1200.00 | 65325.60 | 63839.52 | 2017 |
| 16 | Early Childhood | 438 W Lovers Lane | 5000.00 | 1000000.00 | 12000.00 | 2018 |

| | Construction Type | Comments |
|---|---|---|
| 1 | Steel Frame (Masonry Non-Combustible) | |
| 2 | Pre-Engineered Metal (Non-Combustible) | |
| 3 | Protected Steel Frame (Modified Fire Resistive) | Not Appraised |
| 4 | Steel Frame (Masonry Non-Combustible) | |
| 5 | Pre-Engineered Metal (Non-Combustible) | |
| 6 | Protected Steel Frame (Modified Fire Resistive) | Not Appraised |
| 7 | Pre-Engineered Metal (Non-Combustible) | Not Appraised |
| 8 | Pre-Engineered Metal (Non-Combustible) | Not Appraised |
| 9 | Protected Steel Frame (Modified Fire Resistive) | Not Appraisedmoved contents to High School |
| 10 | Pre-Engineered Metal (Non-Combustible) | Not Appraised |
| 11 | Not Applicable | Not Appraised |
| 12 | Frame | Not Appraised |
| 13 | Frame | Not Appraised |
| 14 | Frame | Not Appraised |
| 15 | Pre-Engineered Metal (Non-Combustible) | |
| 16 | Frame | |