

2014

MARSHALL COUNTY

MULTI-HAZARD MITIGATION PLAN

I. COMPREHENSIVE PLAN

A MULTI-JURISDICTIONAL PLAN



Prepared under the direction of the
Marshall County Hazard Mitigation Planning Committee



With the support of the Marshall County EMA by:



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January 30, 2015

2014 Marshall County Multi-Hazard Mitigation Plan

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January 30, 2015

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Executive Summary

I. Background

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U. S.C. 5165 as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, as amended, 42 U. S. C. 4001 *et seq.* reinforced the need and requirement for mitigation plans, linking flood mitigation assistance to State, Tribal and Local Mitigation Plans. FEMA has implemented the various hazard mitigation planning provisions through regulations in 44 CFR Part 201, which also permits human-caused and technological hazards (man-made) to be addressed in a local mitigation plan. These Federal regulations describe the requirement for a State Mitigation Plan as a condition of pre- and post-disaster assistance as well as the mitigation plan requirement for local and Tribal governments as a condition of receiving hazard mitigation assistance. 44 CFR 201.6(d)(3) requires that a local jurisdiction must review and revise its local plan to reflect any changes and resubmit it for approval within five years in order to remain eligible for mitigation grant funding. The initial 2004 plan was approved by FEMA, effective July 12, 2004, upon its adoption by the Marshall County Commission, and the 2009 plan update was approved by FEMA on August 19, 2009.

II. Organization of the Plan

The 2014 Marshall County Multi-Hazard Mitigation Plan is organized to parallel the 44 CFR Section 201.6 Federal requirements for a local mitigation plan, as interpreted by Local Mitigation Planning Handbook, FEMA, March 2013. The organization of this plan is consistent with the organization of the 2013 Alabama State Hazard Mitigation Plan, which also parallels the Federal requirements. The plan has three parts, as follows:

<i>Volume I</i>	<i>Comprehensive Plan</i> , which is divided into these seven chapters:
Chapter 1	Introduction
Chapter 2	Prerequisites
Chapter 3	Community Profiles
Chapter 4	The Planning Process
Chapter 5	Risk Assessment
Chapter 6	Mitigation Strategy
Chapter 7	Plan Maintenance Process

Volume II *Community Action Programs*, which is divided into a section devoted to each participating jurisdiction.

Appendices

- A Federal Requirements for Local Mitigation Plans
- B Community Mitigation Capabilities
- C 2009 Plan Implementation Status
- D Hazard Ratings and Descriptions
- E Hazard Profile Data
- F Identification and Analysis of Mitigation Measures
- G Committee Meeting Documentation
- H Community Involvement Documentation
- I Multi-Jurisdictional Participation Activities
- J Adopting Resolution

This plan update is also organized similarly to the 2004 Marshall County, Alabama, Natural Hazards Mitigation Plan and the 2009 Marshall County Multi-Hazard Mitigation Plan, which allows for easy cross reference. Each chapter of the 2014 plan update references the requirements of 44 CFR Section 201.6 that it addresses and includes a table that summarizes the updates to the 2009 plan.

III. Highlights of the Plan

Through a comprehensive planning process and risk assessment, this plan update continues a unified approach among all Marshall County communities for dealing with identified hazards and associated risk issues. It serves as a guide for local governments in their ongoing efforts to reduce community vulnerabilities. It also evaluates the 2009 plan: notes its successes and shortcomings, suggests adjustments, and introduces new measures to address the various hazards.

Each hazard, natural and human-caused, that is viewed as a possible risk to Marshall County is described in detail; the vulnerability of the County and each jurisdiction to the hazards are addressed; goals, objectives, and mitigation strategies and actions are stated; and mitigation plans that direct each jurisdiction in the implementation and monitoring of the measures are included in the update.

Chapter 1. Introduction

Chapter 1 of the plan update provides a general introduction to the plan update. It explains the purpose of the plan and which jurisdictions participated in the plan update. The chapter mentions the regulations that require the active participation by local jurisdictions in the mitigation planning process. Also included in this chapter is the explanation of various funding sources that can be applied for if a plan update is submitted to FEMA. Summaries of the planning processes from the 2004 and 2009 plan and this update's planning process are also described in this section.

Chapter 2. Prerequisites

Chapter 2 of the plan update addresses the regulations governing the development and updating of the mitigation plan. It addresses 44 CFR Secs. 201.6 and the prerequisites required through these regulations. It goes into greater detail about the various mitigation grants and other federal money available for the County's use for mitigation planning and projects.

Chapter 2 also addresses multi-jurisdictional participation and plan adoption. It describes the relationship and responsibilities of the various entities involved in the planning process. It explains the various means in which they could participate in the planning process. The multi-jurisdictional plan adoption procedure is explained in the last section of the chapter.

Chapter 3. Community Profiles

Chapter 3 profiles the participating jurisdictions. Each jurisdiction within Marshall County is described in detail. The overall geographic setting and history of Marshall County and the participating jurisdictions are addressed. Summaries about the jurisdictions' government, demographics, economy, utilities, media, transportation and climate are included.

Chapter 4. The Planning Process

Chapter 4 explains the planning process in detail. It explains how the public was involved in the planning process, what steps the Hazard Mitigation Planning Committee (HMPC) took in developing the plan update, what documents were consulted in the plan update, and how the plan was prepared, reviewed and updated.

In January 2014, a kick off meeting was held to reactivate the HMPC and prepare for the upcoming five year plan update. The Marshall County Hazard Mitigation Planning Committee (HMPC), comprised of representatives from all the jurisdictions and organizations concerned with hazard mitigation, guided the development of this plan.

During the plan drafting process, the Hazard Mitigation Planning Committee held five meetings between January 28 and July 23, 2014. Each Committee member was asked to participate in a series of exercises designed to solicit input into the planning process. A notice and survey were sent to various local and regional agencies with an interest in hazard mitigation, agencies that have the authority to regulate development, and representatives of businesses, academia and other private and non-profit interests notifying them of the draft plan and requesting their input and cooperation.

The participating jurisdictions provided copies of their plans, studies, reports, ordinances, regulations and technical information to the planning team in 2009, but no

significant changes had been made to these documents since then. The planning team had previously reviewed the documents and recorded the sections from each document that pertained to hazard mitigation. These documents were considered to see what mitigation measures were currently being pursued and what new measure could be included in future revisions.

The Hazard Mitigation Planning Committee solicited public input into the mitigation plan through a public survey, public meetings, the local news media, and a website at marshall.hazardmitigationplan.com. They were also invited to attend committee meetings and provide their comments and concerns. The plan on the website was continually updated and available for public review and comment throughout the planning process. The public was further encouraged to participate via Twitter and Facebook or to email their comments to marshall@hazardmitigationplan.com. The Marshall County EMA made a number of attempts to get participation by the media, public and area agencies through emails once the draft plan was complete. They also held a county wide community meeting in the Commission Chambers of the Marshall County Courthouse on August 13th, where the public was invited to fill out a public survey about the risks and threats of hazards.

A public hearing to receive comments was jointly held by all jurisdictions prior to each adopting this plan by resolution, as required by State law. The original resolutions and public hearing minutes are kept on file at the EMA offices.

The plan review and update process resulted in a comprehensive update of the entire 2009 plan elements, which was achieved through a process that involved the following tasks, among others:

- Update of the Community Profiles to reflect changed demographics, economic characteristics, and growth and development trends.
- A detailed assessment of local capabilities to carry out mitigation measures.
- An evaluation of the status and effectiveness of Community Mitigation Action Programs adopted in the 2009 plan, which was reflected in the 2014 Community Action Programs for each jurisdiction.
- A reassessment of risks to include detailed research and analysis of hazards affecting the communities, as well as adding man-made hazards to the Risk Assessment.
- A thorough update of critical facilities and assessment of vulnerabilities.
- A complete update of the HAZUS – MH reports for floods, earthquakes, and hurricanes.
- A reexamination of development trends and exposure to risks.
- A review and recommitment to the vision for disaster-resistant communities; modifications to the 2009 goals; and support of the 2013 State goals for hazard mitigation.

- Identification and analysis of a comprehensive range of mitigation alternatives.
- A reprioritization of mitigation actions and projects.
- Revised mitigation action programs for each jurisdiction to better reflect the results of the plan update.
- Review of the plan maintenance.

Chapter 5. Risk Assessment

Chapter 5 first describes the process used to identify and prioritize the hazard risks to each Marshall County jurisdiction. It describes the resources used to identify the hazards and provides detailed descriptions of each identified hazard. A hazard profile for each identified hazard includes a general description of the nature of the hazard in Marshall County, followed by an explanation of the location, extents, previous occurrences, and the probabilities of future occurrences. The hazard profiles rely heavily on maps, charts, tables, and figures to communicate the profile information. The Federal requirements for repetitive loss properties are included in this chapter.

Vulnerability assessments are reported for each identified hazard. The vulnerability assessments include a summary of the impacts of each hazard on each jurisdiction. Next, vulnerability assessments of structures are reported. Detailed inventories of buildings, infrastructure, and critical facilities are presented and often mapped. The HAZUS-MH data bases are supplemented by local information. The estimates of losses are calculated in HAZUS-MH for earthquakes, hurricanes, and floods, and methods are presented for loss estimate calculations of the other identified hazards. A fresh look at land and development trends since the 2009 plan reveals the concerns for reducing exposure for developing areas of Marshall County.

Chapter 5 concludes with an analysis of how the risks vary among the jurisdictions. This concluding section summarizes the findings of the hazard profiles and vulnerability assessments.

A complete reevaluation of the hazards was performed by the planning team in the plan update process. Hazard profiles and vulnerability assessments were based on current and more complete information since the 2004 plan. The latest release of HAZUS-MH was applied to the risk assessments, and the updated HAZUS-MH database provided much of the information required to evaluate the vulnerability of structures and perform loss estimates.

Chapter 6. Mitigation Strategy

Chapter 6 addresses the full range of mitigation strategies evaluated by the HMPC. It explains the common community vision for disaster resistance and the goals that the plan is trying to achieve, along with objectives that can be used to achieve those

goals. It identifies and analyzes mitigation actions and projects. A description of participation and compliance with the National Flood Insurance Program is provided. Mitigation actions implementation is discussed. This forms the basis for the Community Action Programs for each jurisdiction.

The goals in the 2009 plan have been reaffirmed, based on current conditions, the completion of mitigation measures over the five-year plan implementation cycle, the 2014 update to the risk assessment in Chapter 5, the update to the risk assessment in the 2013 Alabama Hazard Mitigation Plan, and the update of State goals and mitigation priorities reflected in the state plan.

The goals for this plan update are, as follows:

- **Prevention Goal.** Manage the development of land and buildings to minimize risks of loss due to natural and man-made hazards.
- **Property Protection Goal.** Protect structures and their occupants and contents from the damaging effects of natural and man-made hazards.
- **Public Education and Awareness Goal.** Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.
- **Natural Resources Protection Goal.** Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.
- **Structural Projects Goal.** Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where found to be feasible, cost effective, and environmentally suitable.

This strategic planning approach for identifying and analyzing mitigation actions and projects follows five categories of a comprehensive hazard mitigation program, which also form the basis for the goals of this plan. These program categories were developed by FEMA for managing a successful mitigation program and were used as guidelines for identifying and sorting the alternative mitigation measures. They are prevention, property protection, public education and awareness, natural resources protection, and structural projects. Emergency services was discarded as a mitigation goal, with related emergency services measures incorporated into one of the five other goals.

The Hazard Mitigation Planning Committee (HMPC) and local jurisdictions selected among the available mitigation measures within each of the above categories and prioritized the measures by applying the STAPLEE method. They also evaluated the consistency with the vision, goals, and objectives; weight of benefit to cost; FEMA and State funding priorities for Hazard Mitigation Assistance grants; and the planning, regulatory, fiscal, and staffing capacities of the jurisdictions for carrying out the measures. Mitigation measures that resulted in loss reduction to existing and new buildings and infrastructure were chosen for the final list of considered measures. Each jurisdiction assigned a priority to selected measures, established a general completion schedule, assigned administrative responsibility for carrying out the measures, estimated costs, where possible, and identified potential funding sources, including potential eligibility for FEMA Hazard Mitigation Assistance Programs.

A separate Community Action Program has been established for each community and published as a separate volume. The proposed measures are within the authority of the jurisdiction or are part of a joint effort among multiple jurisdictions covered by this plan. All actions included in these programs are achievable and within the capabilities of each jurisdictions.

Chapter 7. Plan Maintenance Process

Chapter 7 describes the maintenance process for the 2014 Marshall County Multi-Hazard Mitigation Plan. It explains the monitoring, evaluation and updating procedures and how to incorporate the plan into other planning mechanisms. It also describes the need for continuing public participation in the plan maintenance process.

The plan explains that ongoing monitoring of the plan should occur throughout the next five years until the next scheduled update. Ongoing status reports of each jurisdiction's progress will be reviewed by the EMA Director and representatives from the HMPC and should include the following information:

- Actions that have been undertaken to implement the scheduled mitigation measure, such as, obtaining funding, permits, approvals or other resources to begin implementation.
- Mitigation measures that have been completed, including public involvement activities.
- Revisions to the priority, timeline, responsibility, or funding source of a measure and cause for such revisions or additional information or analysis that has been developed that would modify the mitigation measure assignment as initially adopted in the plan.
- Measures that a jurisdiction no longer intends to implement and justification for cancellation.

The ongoing review process may require adjustments to the selection of mitigation measures, priorities, timelines, lead responsibilities, and funding sources.

Plan evaluation should occur within sixty days following a significant disaster or an emergency event having a substantial impact on a portion of or the entire Marshall County area or any of its jurisdictions. A risk assessment should be done and the findings should determine any new mitigation initiatives that should be incorporated into this plan to avoid similar losses from future hazard events.

The HMPC will oversee an annual evaluation of progress towards implementation of the Mitigation Strategy. In its annual review, the HMPC will discuss the following topics to determine the effectiveness of the implementation actions and the need for revisions to the Mitigation Strategy:

- Are there any new potential hazards that have developed and were not addressed in the plan?
- Have any disasters occurred and are not included in the plan?
- Are there additional mitigation ideas that need to be incorporated into the plan?
- What projects or other measures have been initiated, completed, deferred or deleted?
- Are there any changes in local capabilities to carry out mitigation measures?
- Have funding levels to support mitigation actions either increased or decreased?

Any updates, revisions, or amendments to the Marshall County Emergency Operations Plan, local comprehensive plans, capital improvement budgets or plans, zoning ordinances and maps, subdivision regulations, building and technical codes, and related development controls should be consistent with the goals, objectives, and mitigation measures adopted in this plan. As part of the subsequent five-year update process, all local planning mechanisms should again be reviewed for effectiveness, and recommendations for new integration opportunities should be carefully considered. Multi-hazard mitigation planning should be integrated into existing public information activities, as well as household emergency preparedness.

Ongoing public education programs should stress the importance of managing and mitigating hazard risks. Consequently, the Hazard Mitigation Planning Committee is dedicated to direct involvement of its citizens in providing feedback and comments on the plan throughout the five-year implementation cycle and interim reviews.

Public meetings will be held when significant modifications to the plan are required or when otherwise deemed necessary by the Hazard Mitigation Planning Committee. The public will be able to express their concerns, ideas, and opinions at the meetings. At a minimum, public hearings will be held during the annual and five-year

plan updates and to present the final plan and amendments to the plan to the public before adoption.

Appendices

The final sections of the plan are the Appendices. The supporting documents for this plan update that were able to be included in this plan update have been inserted into the following appendices:

- A *Federal Requirements for Local Mitigation Plans* contains the entire 44 CFR Sec. 201.6 requirements for local mitigation plans.
- B *Community Mitigation Capabilities* reports on the results of a comprehensive survey and assessment of each jurisdiction's capabilities to implement mitigation measures.
- C *2009 Plan Implementation Status* reports the evaluation results of implementation of mitigation measures recommended for implementation by each jurisdiction in the 2004 plan.
- D *Hazard Ratings and Descriptions* reports the results of the Committee exercise for identifying hazards for inclusion in the 2014 plan update and the ratings of the hazards for extents and probability of future occurrences. A complete description of each identified hazard is included here.
- E *Hazard Profile Data* contains detailed hazard records of the National Weather Service, the National Climatic Data Center, and local newspapers.
- F *Alternative Mitigation Measures* examines the range of mitigation measures considered for the 2014 Mitigation Strategy in Chapter 6 and the Community Action Programs in Volume II.
- G *Committee Meeting Documentation* documents the HMPC meetings during the drafting phase of the 2014 plan update.
- H *Community Involvement Documentation* reports on the full scope of community involvement opportunities during the drafting phase of the 2014 plan update.
- I *Multi-Jurisdictional Participation Activities* records the scope of participation of all jurisdictions in the drafting and adoption of the 2014 plan update.
- J *Adopting Resolution* presents a model resolution for plan adoption by local governing bodies.

Other documents and materials mentioned in the plan or used in its preparation but not included in the plan appendices are kept on file in the Marshall County EMA office. These other documents and materials include, but are not limited to, the following items:

- Local newspaper articles reporting hazard events since 1960;
- 2014 HAZUS-MH global reports for earthquakes, hurricanes, and floods;
- Damage reports of hazard events;
- Meeting records of the Hazard Mitigation Planning Committee prior to 2014, since first established in 2004; and
- Documentation in support of the 2004, 2009, and 2014 plans.

Chapter 1 – Introduction

- 1.1 Background
- 1.2 Authority
- 1.3 Funding
- 1.4 Eligibility for FEMA Hazard Mitigation Assistance Grants
- 1.5 Marshall County Natural Hazards Mitigation Plan (2004)
- 1.6 The 2009 Marshall County Multi-Hazard Mitigation Plan Update
- 1.7 The 2014 Marshall County Multi-Hazard Mitigation Plan Update

1.1 Background

The 2014 Marshall County Multi-Hazard Mitigation Plan is a multi-jurisdictional guide for all communities that have participated in the preparation of this plan through the Hazard Mitigation Planning Committee (HMPC). The jurisdictions that participated in the development of this plan include the cities of Albertville, Arab, Boaz, and Guntersville, the towns of Grant, Douglas and Union Grove, and the boards of education for Marshall County, Albertville, Arab, Boaz, and Guntersville. The plan fulfills the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000) as administered by the Alabama Emergency Management Agency (AEMA) and the Federal Emergency Management Agency (FEMA) Region IV.

1.2 Authority

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), 42 U. S.C. 5165 as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for States, Tribes, and local governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, as amended, 42 U. S. C. 4001 *et seq.* reinforced the need and requirement for mitigation plans, linking flood mitigation assistance to State, Tribal and local mitigation plans.

FEMA has implemented the various hazard mitigation planning provisions through regulations in 44 CFR Part 201, which also permit man-made hazards to be addressed in a local mitigation plan. These Federal regulations describe the requirement for a State mitigation plan as a condition of pre- and post-disaster assistance as well as the mitigation plan requirement for local and Tribal governments as a condition of receiving hazard mitigation assistance. 44 CFR 201.6(d)(3) requires that a local jurisdiction must review and revise its local plan to reflect any changes and resubmit it for approval within five years of FEMA approval in order to remain eligible for mitigation grant funding.

1.3 Funding

The Marshall County EMA applied to the Alabama EMA for planning grant funds in 2013 to complete the 2014 update of this plan. In late 2013, the Alabama EMA awarded a \$20,625.00 planning grant funded through the FEMA Hazard Mitigation Grant Program (HMGP) to the Marshall County Commission to fund 75% of the total cost of the five year plan update for all incorporated and unincorporated areas within Marshall County.

1.4 Eligibility for FEMA Hazard Mitigation Assistance Grants

Adoption of this plan is the initial step towards continuing eligibility for FEMA Hazard Mitigation Assistance (HMA) grant assistance to participating localities. These FEMA grants include the following programs:

1. The Hazard Mitigation Grant Program (HMGP). The HMGP is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, U.S. Code (U.S.C.) 5170c. It provides opportunities for communities to undertake mitigation measures to reduce the risk of loss of life and property from future disasters during the reconstruction process following a disaster. Funding becomes following a Presidential major disaster declaration in the areas of the State requested by the Governor. The amount of HMGP funding available is based upon the estimated total of Federal assistance for disaster recovery under the declaration: up to 15 percent of the first \$2 billion of the total estimated disaster assistance, up to 10 percent for amounts between \$2 billion and \$10 billion, and up to 7.5 percent for amounts between \$10 billion and \$35.333 billion. For States with enhanced hazard mitigation plans, up to 20 percent for estimated amounts of disaster assistance not to exceed \$35.333 billion can become available. Following the 2011 tornado outbreak, approximately \$70 million became available statewide.
2. The Pre-Disaster Mitigation Grant Program (PDM). The PDM program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds. For FY 2013, \$23.7 million in PDM funding was available nationwide.

3. The Flood Mitigation Assistance Program (FMA). The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist states and communities with the implementation of measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP). For FY 2013, \$120 million in FMA funding was available nationwide. Two types of FMA grants are available to communities:
 - *Planning Grants* to prepare Flood Mitigation Plans
 - *Project Grants* to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. Priority is given to properties that have incurred repetitive flood insurance losses.
4. The Public Assistance Grant Program (Categories C – G). The Public Assistance (PA) Grant Program provides assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations to quickly respond to and recover from major disasters or emergencies declared by the President. Through categories C – G of the PA Program, FEMA provides supplemental Federal disaster grant assistance for the repair, replacement, or restoration of publicly infrastructure and facilities and the facilities of certain Private Non-Profit (PNP) organizations that were damaged by the declared disaster. The PA Program can also be used to protect these damaged facilities from future events through hazard mitigation measures.
5. The Fire Management Assistance Grant Program. Fire Management Assistance Grant Program (FMAGP) provides grants to States, local and tribal governments. Funds can be used for the “mitigation, management, and control of fires on publicly or privately owned forests or grasslands,” where destruction poses such a threat that could result in a major disaster declaration. The State submits a request for assistance to FEMA at the time a “threat of major disaster” exists. The process is expedited with a FEMA decision made within hours. The FMAGP provides a 75 percent Federal cost share with the State for eligible firefighting costs, such as “expenses for field camps; equipment use, repair and replacement; tools, materials and supplies; and mobilization and demobilization activities.”

1.5 Marshall County Natural Hazards Mitigation Plan (2004)

The planning process began in January 2004 with the appointment of the Hazard Mitigation Planning Committee (HMPC) by the Local Emergency Planning Committee of the Marshall County Emergency Management Agency (EMA). The committee first convened in January 2004. In July 2004, the plan was approved and adopted by the county and all participating municipalities.

The scope of the 2004 Marshall County Natural Hazards Mitigation Plan is the unincorporated and incorporated areas within Marshall County. The plan addresses all natural hazards deemed to threaten property and persons within the county. Both short- and long-term hazard mitigation strategies are addressed, implementation tasks assigned, and funding alternatives identified.

1.6 The 2009 Marshall County Multi-Hazard Mitigation Plan Update

The Hazard Mitigation Planning Committee (HMPC) reconvened in January 2009 to update the 2004 plan as the 2009 Marshall County Multi-Hazard Mitigation Plan, which addresses man-made hazards in addition to natural hazards. The Marshall County Commission retained the firm of Lehe Planning, LLC, to prepare the plan under the direction of the HMPC and the Marshall County EMA Director, Anita McBurnett. The firm's manager, James E. Lehe, AICP, a professional urban planner, served as the Planning Coordinator for the update. The 2009 HMPC represented unincorporated Marshall County, the cities of Albertville, Arab, Boaz, and Guntersville, and the towns of Grant, Douglas, and Union Grove, as well as other stakeholders and interested agencies. The HMPC convened on a regular basis during the update process to oversee the drafting of the plan. Through a comprehensive planning process and risk assessment, the plan created a unified approach among all Marshall County communities for dealing with identified hazards and associated risk issues. It served as a guide for local governments in their ongoing efforts to reduce community vulnerabilities. FEMA approved the 2009 plan update on August 19, 2009.

1.7 The 2014 Marshall County Multi-Hazard Mitigation Plan Update

The Hazard Mitigation Planning Committee (HMPC) again reconvened five years later in January 2014 to update the 2009 plan as the 2014 Marshall County Multi-Hazard Mitigation Plan. The Marshall County Commission retained the same firm of Lehe Planning, LLC, to prepare the updated plan under the direction of the HMPC and the Marshall County EMA Director, Anita McBurnett. The firm's manager, James E. Lehe, AICP, a professional urban planner, served as the Planning Coordinator for the update. The 2014 HMPC represented unincorporated Marshall County, the cities of Albertville, Arab, Boaz, and Guntersville, and the towns of Grant, Douglas and Union Grove, all local school boards, as well as other stakeholders and interested agencies, including Snead State Community College, the Marshall County Department of Public Health, and

the Marshall Medical Centers EMS. The HMPC convened seven meetings to oversee the drafting of the plan update and hosted a community event to inform the public of the plan findings and recommendations and solicit public comments. The 2014 planning process continued the unified approach among all Marshall County communities and continues to guide Marshall County communities in their ongoing efforts to mitigate vulnerabilities.

Chapter 2 – Prerequisites

- 2.1 Federal Prerequisites
- 2.2 Plan Approval Required for Mitigation Grants Eligibility
- 2.3 Multi-Jurisdictional Participation
- 2.4 Multi-Jurisdictional Plan Adoption

2.1 Federal Prerequisites

This chapter of the Plan addresses the Prerequisites of 44 CFR Sections 201.6(a)(1) and (4) and (c)(5), as follows:

“Section 201.6(a) *Plan requirements*.

(1) A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. ... A local government must have a mitigation plan approved pursuant to this section in order to apply for and receive mitigation project grants under all other mitigation grant programs.

(4) Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan

Section 201.6(c) *Plan content*. The plan shall include the following:

(5) *Documentation* that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.”

2.2 Plan Approval Required for Mitigation Grants Eligibility

FEMA approval of this plan is the initial step towards continuing eligibility for FEMA grant assistance to participating localities and school districts, under the following hazard mitigation assistance programs: the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation Grant Program (PDM), the Flood Mitigation Assistance Program (FMA), Categories C – G of the Public Assistance (PA) Grant Program, and the Fire Management Assistance Grant Program (FMAGP). Once the plan is approved pending adoption, the governing bodies of the participating jurisdictions and school districts must formally adopt the plan and submit their adopting resolutions to FEMA through the Alabama EMA to receive official FEMA approval. This process must take place within twelve months of FEMA’s notification of conditional approval pending adoption. If the plan is not approved by FEMA and locally adopted by resolution of the

governing body, the jurisdiction or school board will not be eligible to apply for and receive project grants under any of the FEMA hazard mitigation assistance programs. Hazard mitigation assistance programs have additional requirements for grant eligibility depending on the program's funding source.

2.3 Multi-Jurisdictional Participation

The Marshall County EMA serves as the lead coordinating agency for mitigation planning. It has been working in conjunction with the Hazard Mitigation Planning Committee (HMPC) and has remained in contact and coordinated mitigation activities with all Marshall County jurisdictions throughout the five year period since the 2009 update was first approved. Marshall County, the cities of Albertville, Arab, Boaz, and Guntersville, and the towns of Grant, Douglas and Union Grove all have continued to participate in the 2014 plan update of the existing plan. In addition to the participating jurisdictions, other stakeholders affected by the plan, including Federal, State, and regional agencies, business interests, academia, non-profits, and the general public contributed to the drafting of this Plan. (See Chapter 4 – “The Planning Process” for a more detailed explanation of the organization of the HMPC and the participation of stakeholders in the planning process.)

School districts are defined as local governments, according to Federal regulations at 44 CFR Section 201.2, and are therefore required to have a FEMA-approved a local mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. A school district may also demonstrate their participation as a separate government entity in another local government's approved mitigation plan to be eligible for project grants under FEMA hazard mitigation assistance programs. The Marshall County, Albertville, Arab, Boaz, and Guntersville Boards of Education actively participated in and adopted the 2014 plan.

The planning process presented many opportunities for multi-jurisdictional participation. (See Appendix I “Multi-Jurisdictional Participation Activities,” which shows the type of participation by Marshall County jurisdictions.) These multi-jurisdictional participation opportunities included the following activities:

- Attendance and participation in seven HMPC committee meetings held between January and July of 2014 during the drafting phase of the 2014 plan update. (See Appendix G “Committee Meeting Documentation,” which includes agendas and sign-in sheets).
- Providing key staff support to complete HMPC exercises and questionnaires regarding local capabilities for conducting mitigation activities, the implementation status of the 2009 community mitigation action programs, identifying and rating hazards, profiling hazards and hazard events, evaluating alternative mitigation measures, and updating plan goals and objectives.
- Reviewing and providing comments on draft plan sections.

- Compiling plans, studies, reports, regulations, ordinances, and codes related to hazard mitigation and making these documents available to planners for review.
- Conferring with planners during the drafting phase of the plan update.
- Providing information to the HMPC and planners on critical facilities and infrastructure.
- Attendance and participation in the Multi-Hazard Mitigation Planning Community Meeting held in the Marshall County Courthouse at the culmination of the drafting phase of the plan update.
- Communicating with elected officials and other jurisdictional constituents on the scope and contents of the draft plan update.
- Conducting public hearings, which offered additional opportunities for public comments prior to formal adoption by the governing bodies.

Residents of each jurisdiction and other stakeholders were provided the following opportunities for participation in the planning process:

- Attending HMPC meetings as observers of these open public forums, which were publicly announced.
- Participating in the Community Meeting.
- Completing Public Questionnaires distributed at the Community Meeting.
- Accessing the plan update website at marshall.hazardmitigationplan.com to keep abreast of HMPC activities, review draft sections of the plan, and offer comments and suggestions through the email account, marshall@hazardmitigationplan.com
- Contacting HMPC members and Marshall County EMA staff.
- Contacting elected officials of each jurisdiction.
- Attending public hearings of the local governing bodies and offering comments.

2.4 Multi-Jurisdictional Plan Adoption

The governing bodies of each participating jurisdiction have adopted the 2014 Marshall County Multi-Hazard Mitigation Plan by resolution following public notice and hearing. Adoption followed notification from the Alabama EMA that the plan had received conditional approval from FEMA pending adoption. Adoption by all participating jurisdictions took place within one year of the notification of FEMA conditional approval, and afterwards, a certified copy of each adopting resolution was transmitted to FEMA through the Alabama EMA. Once the first resolution had been received by FEMA, the plan was formally approved on that date, which begins the next five year planning cycle. FEMA then issued a final approval notification. (The form of the adopting resolutions is in Appendix J “Adopting Resolution”). Copies of the resolution are on file at the EMA and with each jurisdiction.

The school boards representing the Marshall County, City of Albertville, City of Arab, City of Boaz, and City of Guntersville School Districts have participated in the planning process as local governments and adopted the final FEMA-approved plan.

Chapter 3 – Community Profiles

- 3.1 Federal Advisory Guidance for Community Profiles
- 3.2 Summary of Plan Updates
- 3.3 Geographic Setting and History
- 3.4 Government
- 3.5 Physical Features
- 3.6 Climate
- 3.7 Demographics
- 3.8 Economy
- 3.9 Utilities
- 3.10 Media
- 3.11 Transportation

3.1 Federal Advisory Guidance for Community Profiles

The advisory on page 27 of the FEMA Local Multi-Hazard Mitigation Planning Guidance, July 1, 2008, suggests that community profile information be included in a mitigation plan for context:

The planning team should consider including a current description of the jurisdiction in this section or in the introduction of the plan. The general description can include a socio-economic, historic, and geographic profile to provide a context for understanding the mitigation actions that will be implemented to reduce the jurisdiction's vulnerability.

Since 2008, FEMA published an update to the above-referenced 2008 advisory guidance, Local Mitigation Planning Handbook, March 2013. This latest guidance advises that community assets be identified in step 2 of Task 5 *Conduct a Risk Assessment*. This step requires identification of "People, Economy, Built Environment, and Natural Environment," all of which are profiled here and incorporated into the vulnerability components found in sections 5.5 through 5.10 of Chapter 5 Risk Assessment in this 2014 plan update.

3.2 Summary of Plan Updates

Table 3-1 summarizes changes made to the 2009 plan as a result of the 2014 plan update, as follows:

Table 3-1. Summary of Plan Updates

Section		Changes
3.3	Geographic Setting and History	Update descriptions, maps, and data
3.4	Government	Update descriptions and data
3.5	Physical Features	Update descriptions, maps, and data
3.6	Climate	Update descriptions and data
3.7	Demographics	Update descriptions, maps, and data
3.8	Economy	Update descriptions, map, and data
3.9	Utilities	Update descriptions and data
3.10	Media	Update descriptions and data
3.11	Transportation	Update descriptions, map, and data

3.3 Geographic Setting and History

Marshall County

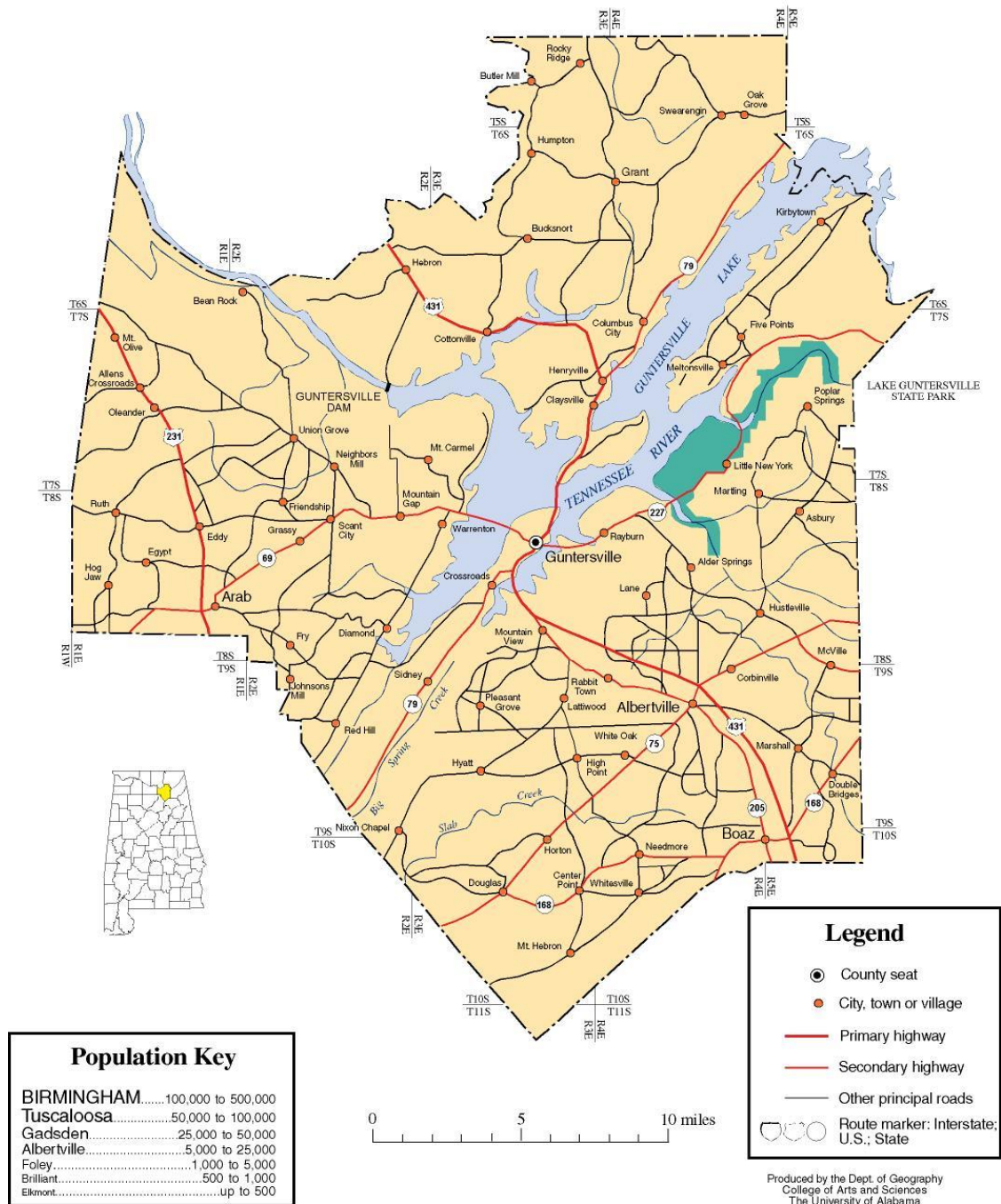
On January 9, 1836 Marshall County, Alabama was created by the state legislature. Marshall County was named for Chief Justice John Marshall. There have been four county seats - Claysville (1836), Marshall (1838), Warrenton (1841) and the current seat, Guntersville (1848).

Marshall County is comprised of the following seven incorporated communities:

- City of Albertville
- City of Arab
- City of Boaz
- Town of Douglas
- Town of Grant
- City of Guntersville
- Town of Union Grove

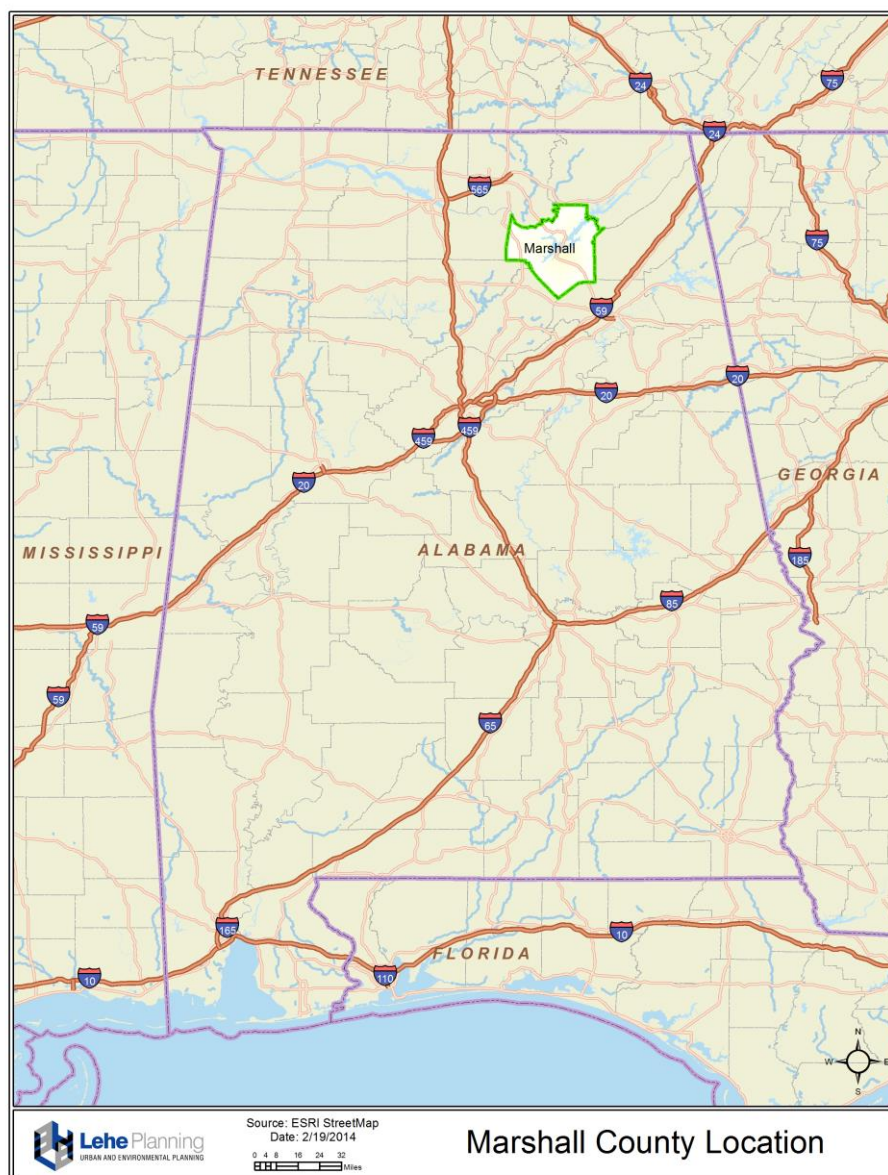
Map 3-1. Marshall County

MARSHALL COUNTY



Marshall County, population 93,019 (Census 2010), is located in rural northeast Alabama as shown in Map 3-2. Marshall County is not part of any surrounding metropolitan area. The County is bordered on the northeast by Jackson County, on the east by DeKalb County, on the southeast by Etowah County, on the southwest by Blount and Cullman Counties, on the west by Morgan County, and on the northwest by Madison County. Marshall County is located approximately 65 miles from Birmingham, Alabama; 180 miles from Montgomery, Alabama; 35 miles from Huntsville, Alabama; 330 miles from Mobile, Alabama; 98 miles from Chattanooga, Tennessee; 150 miles from Atlanta, Georgia; 400 miles from New Orleans, Louisiana; and 665 miles from Dallas, Texas.

Map 3-2. Location of Marshall County



City of Albertville

The City of Albertville, population 21,160 (2010 Census), is located in southeastern Marshall County, as shown on Map 3-3. The City is 26.6 square miles of which 26.5 square miles is land and 0.1 square miles is water. Albertville is at an elevation of 1,089 feet. The City of Albertville, named for one of its founders, Thomas Albert, had its real beginning around 1881 when L.S. Emmett moved there from Georgia and set up the City's first large store. Albertville was incorporated on February 18, 1881 with W.M. Coleman serving as its first mayor. One of the worst tornadoes to ever touch down in Alabama almost completely destroyed Albertville on April 24, 1908. The City recovered and today it is the largest city in Marshall County.

City of Arab

The City of Arab, population 8,050 (2010 Census), is located in western Marshall County and eastern Cullman County as shown in Map 3-3. The City is 12.98 square miles. It is comprised of 12.88 square miles of land and only 0.1 square miles of water. Arab has an elevation of 1,100 feet and is situated atop Brindley Mountain. The founder of Arab, Stephen Tuttle Thompson, was appointed postmaster. One of his first duties was to apply to Washington, D.C. for the incorporation of Thompson's Falls. Three names were chosen for consideration: Ink, Bird, and Arad. Arad was chosen, but was accidentally written Arab. The error was never corrected. Arab was incorporated in 1892.

City of Boaz

The City of Boaz, population 9,551 (2010 Census), is located in southeastern Marshall County as shown in Map 3-3. The City is 14.5 square miles of which 14.4 square miles is land and 0.1 square miles is water. Boaz is situated on top of the Sand Mountain plateau at an elevation of 1,089 feet. Boaz was incorporated in 1897.

Town of Douglas

The Town of Douglas, population 744 (2010 Census), is located in southern Marshall County as shown in Map 3-3. The Town has a total area of 3.4 square miles; 3.3 square miles of it is land and less than 0.1 square miles is water. Many of the residents of Douglas work in the surrounding communities and the Huntsville metro area.

Town of Grant

The Town of Grant, population 896 (2010 Census), is located in northeast Marshall County as shown in Map 3-3. The Town is 1.8 square miles and is comprised solely of land. Grant is situated on top of Gunter Mountain at an elevation of 1,310 feet

overlooking Guntersville Lake, the Tennessee River and historic Kennamer Cove. Grant takes its name from the U.S. Post Office that was established on May 18, 1887 to serve the citizens of Gunter Mountain. The post office was named for President Ulysses S. Grant. The Town of Grant was later incorporated in 1945.

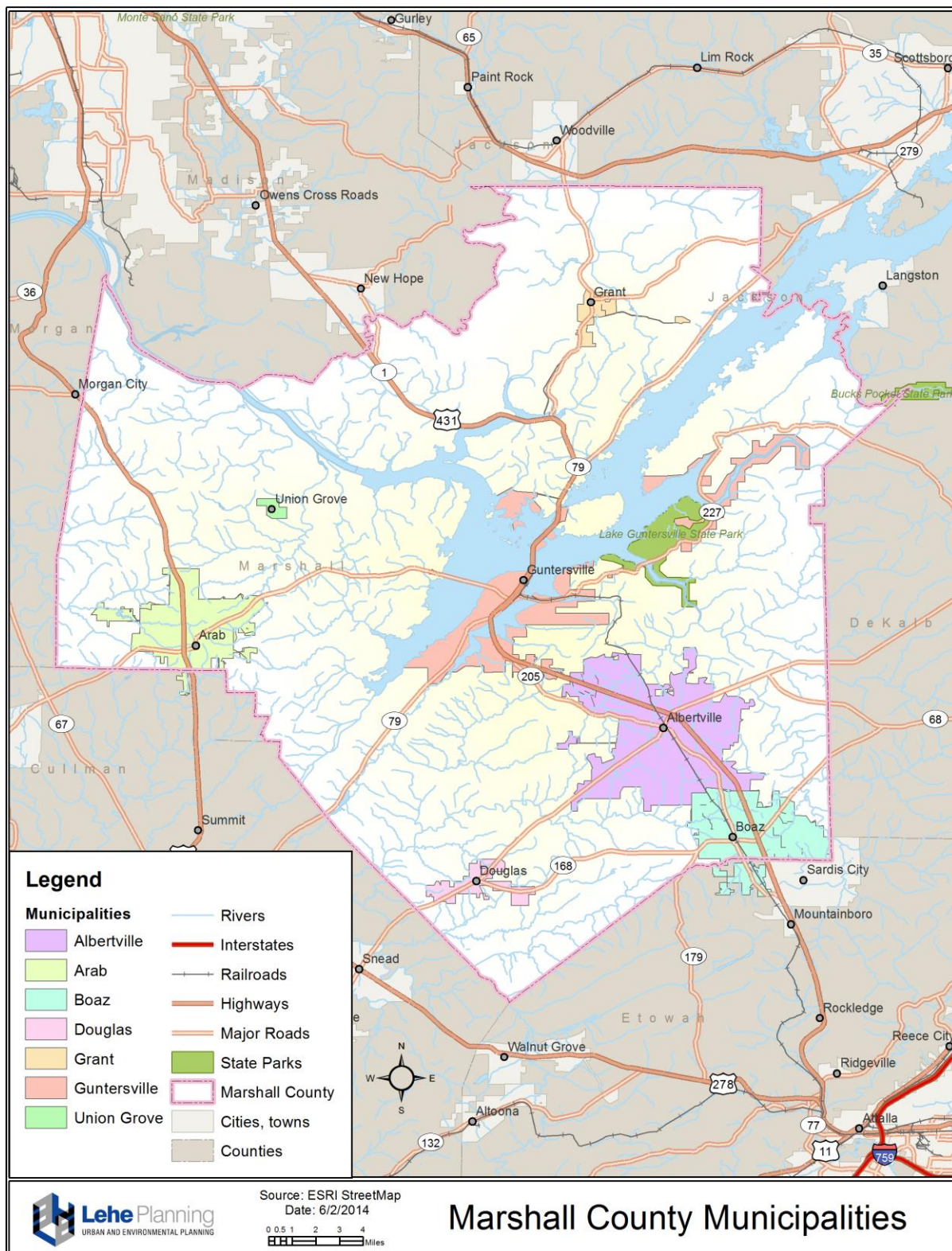
City of Guntersville

The City of Guntersville, population 8,197 (2010 Census), is located in central Marshall County as shown in Map 3-3. The City is 42.4 square miles of which 25.4 square miles is land and 17.0 square miles is water. The City is located at the southernmost point of the Tennessee River on Lake Guntersville, formed by the Guntersville Dam. Guntersville was founded by German immigrant John Gunter, the wealthy owner of a salt mine in the early 1800s. In order to obtain more land to mine, Gunter struck a deal with the Cherokee tribe that inhabited the area. As part of the deal, Gunter married the daughter of the tribe's chief and agreed to give salt to the tribe. A town sprung up next to the mine and was named after Gunter. The City was incorporated in 1847.

Town of Union Grove

The Town of Union Grove, population 77 (2010 Census), is located in western Marshall County as shown in Map 3-3. The Town is 0.6 square miles and is comprised solely of land. Union Grove sits at an elevation of 1,027 feet. The majority of Union Grove's residents are employed in the surrounding communities and the Huntsville area.

Map 3-3. Municipalities



3.4 Government

The Marshall County Commission, with the courthouse offices located in Guntersville, is composed of a five member Board: one Chairman and four Commissioners that are elected by the voters in each of the geographic districts. The Chairman is elected from the County at-large. The entire Commission serves a four-year term, which is staggered.

All municipalities are governed by a mayor-council form of government, as described below:

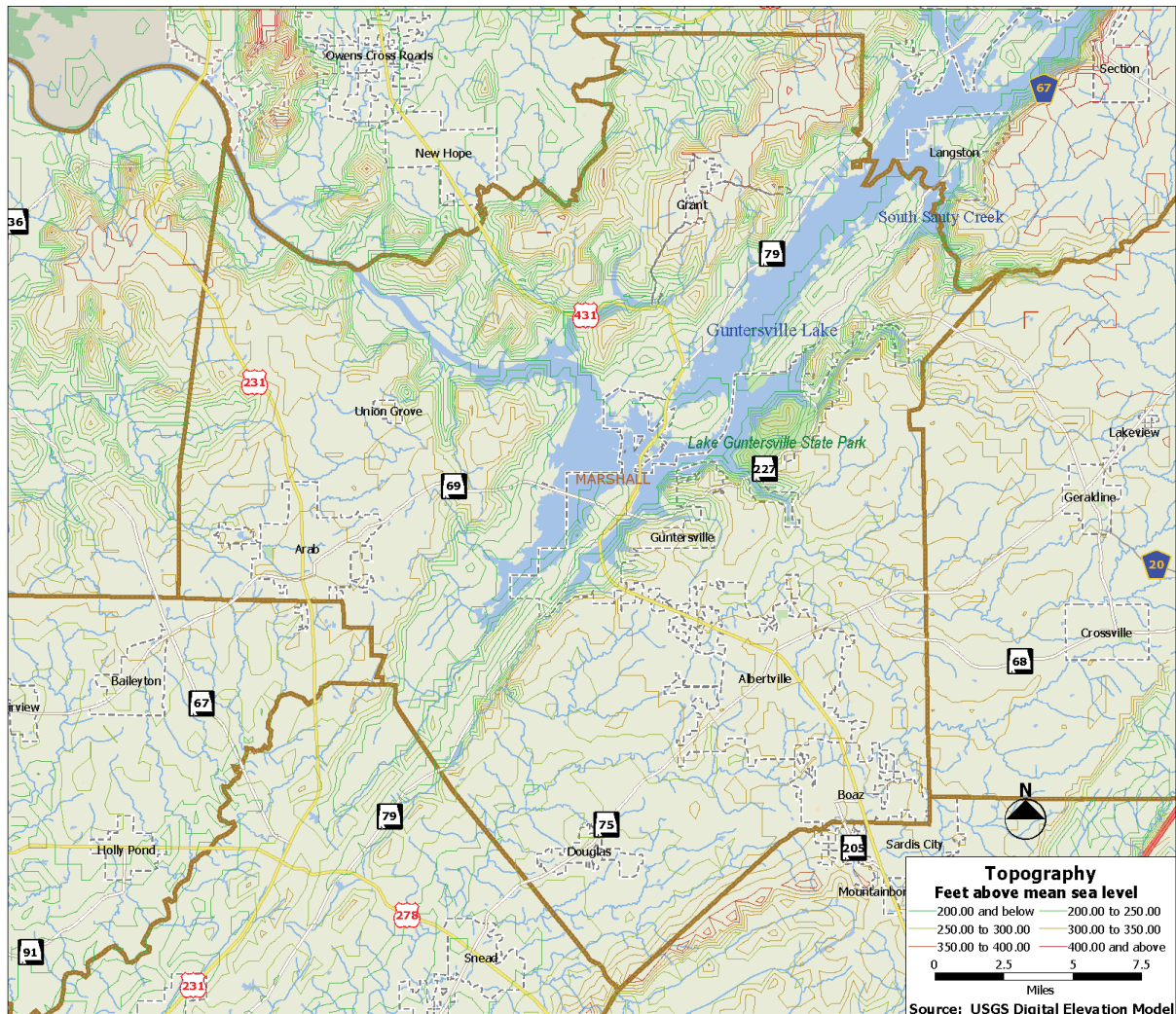
- The City of Albertville is governed by a mayor and a five-member city council elected at-large, every five years.
- The Arab City Council is comprised of a mayor and five council members who stand for election every four years. Members represent "places" or "seats" rather than running from a geographic district. Elections are city-wide.
- The City of Boaz is governed by a mayor and a five-member city council elected at-large.
- The Town of Douglas is governed by a mayor and five-member town council elected at-large.
- The Town of Grant is governed by a mayor and a five-member town council elected at-large; they serve four year terms.
- The City of Guntersville is governed by a mayor and seven council members elected by district.
- The Town of Union Grove is governed by a mayor and a five-member town council elected at-large.

3.5 Physical Features

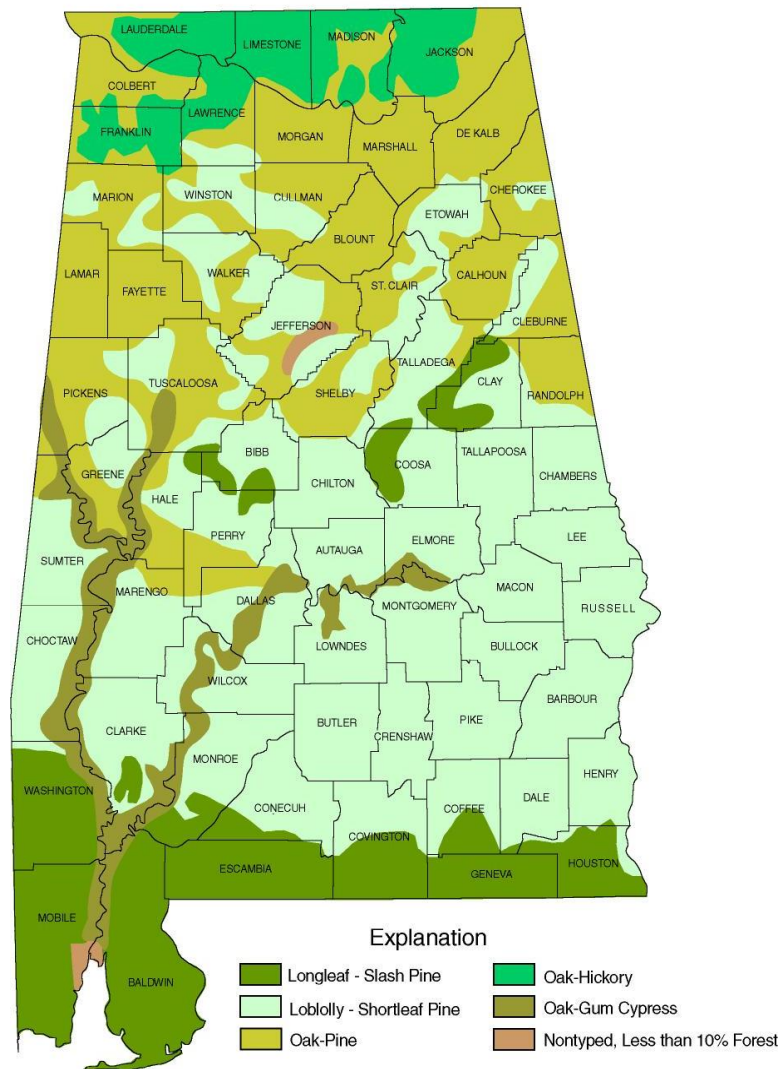
The County has an area of approximately 627 square miles with 56 square miles covered by Guntersville Reservoir. The County is divided into three physiographic divisions - sandstone plateaus, rough mountain slopes, and limestone valleys. From the southwest to the northeast across the center of the County is an anticlinal valley. It is approximately 3 miles wide. From the northeast through the valley to Guntersville is the Tennessee River. The river turns northwestward from Guntersville and flows through a valley cut by its flow. The anticlinal valley and the Tennessee River Valley cut the County into three segments. Deep, steep-walled geologic erosion channels dissected the undulating plateaus. Rough mountain slopes extend into the limestone valleys from the edges of the plateaus. North of the Tennessee River lies Gunters Mountain, to the east of the anticlinal valley is Sand Mountain, and to the west of the valley is Brindley Mountain. Gunters Mountain is the highest plateau. Most of the County drains into the Tennessee River. The County's most southern portion drains to the southwest to the branches of the Locust Fork or the Black Warrior River. Map 3-4 "Topography" shows

the major physiographic features of Marshall County. Approximately 150,446 acres of Marshall County's 362,918 acres are forestland (Alabama Forestry Commission, 2011). The dominant tree varieties in Marshall County forests are the oak and pine, which are commonly used in furniture, flooring, and roofing. Marshall County's location within Alabama's distribution of forest types is depicted in Map 3-5 "Alabama Forest Types."

Map 3-4. Topography



Map 3-5. Alabama Forest Types



Produced by the Dept. of Geography
The University of Alabama

3.6 Climate

Marshall County's climate is humid with cold winters and hot summers. The total annual rainfall is 52.5 inches. The mean winter temperature is 43.5 degrees Fahrenheit and the mean summer temperature is 78.2 degrees Fahrenheit. Marshall County sees an average season snowfall of 2.6 inches. Table 3-2 shows the weather observations for Marshall County.

Table 3-2. Weather Observations

Category	Observation
Average Winter Temperature	43.5° F
Average Winter Minimum Temperature	32.7° F
Lowest Temperature (January 21, 1985)	-11° F
Average Summer Temperature	78.2° F
Average Summer Maximum Temperature	89.5° F
Highest Temperature (July 17, 1980)	106° F
Total Annual Precipitation	52.5 inches
Heaviest One-Day Rainfall (September 6, 2007)	8.9 inches
Average Season Snowfall	2.6 inches

Source: SE Regional Climate Center, 2012

3.7 Demographics

Population Growth and Density

Marshall County has experienced an increase in population over recent decades. In 2010, the population of the County was 93,019, a 13.1% increase over the 2000 population of 82,231. Table 3-3 shows the population of the County and municipalities/towns, as well as their percent increase from 1990 to 2010 according to the U. S. Census Bureau.

Table 3-3. Population Change from 1990 to 2010

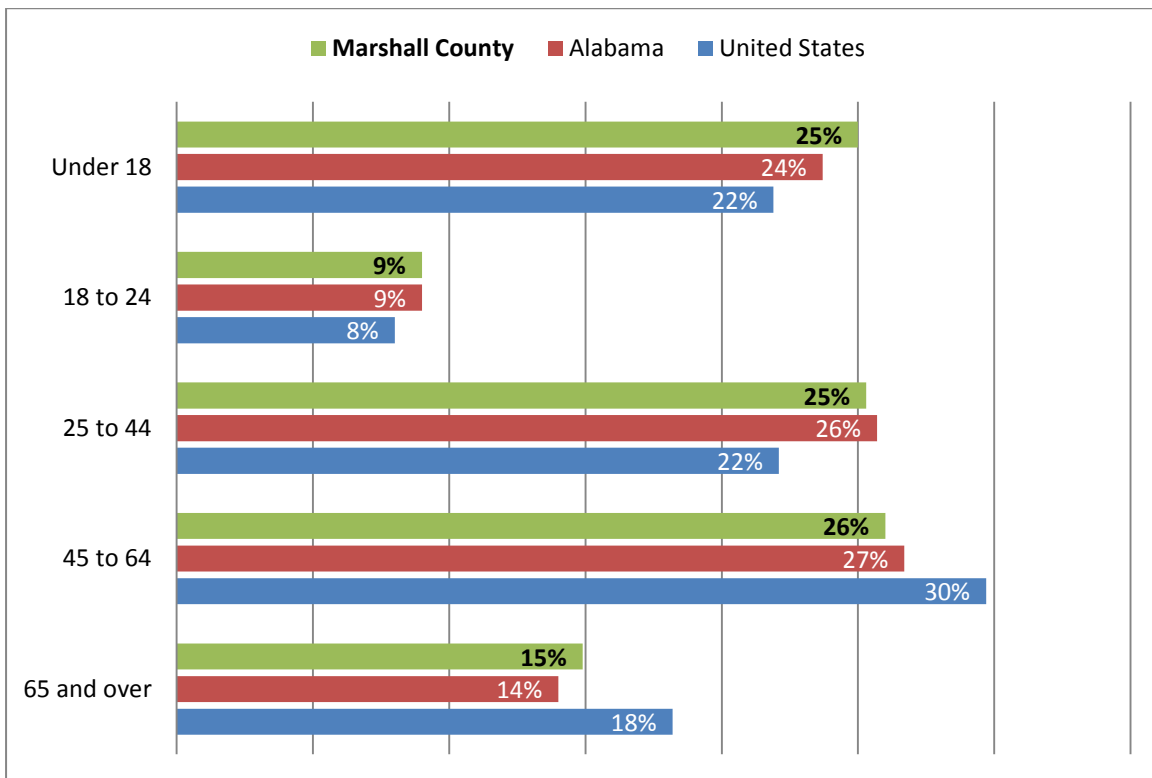
Jurisdiction	1990	2000	Number Change	Percent Change	2010	Number Change	Percent Change
Marshall County	70,832	82,231	11,399	16%	93,019	10,788	13.1%
Albertville	14,507	17,247	2,740	19%	21,160	3,913	22.7%
Arab	6,321	7,174	826	13%	8,050	876	12.2%
Boaz	6,928	7,411	483	7%	9,551	2,140	28.9%
Douglas	474	530	56	12%	744	214	40.3%
Grant	638	665	27	4%	896	231	34.7%
Guntersville	7,038	7,395	357	5%	8,197	802	10.8%
Union Grove	119	94	-25	-21%	77	17	-18%

Source: U.S. Census Bureau, 2010

Age Distribution

The 2010 Census indicates that Marshall County's population has an almost equal distribution of residents under the age of 18 (25%), ages 25 to 44 (25%), and ages 45 to 64 (26%). The 18 to 24 age group comprises only 9% which might indicate that once residents graduate high school, they are leaving the county to attend college and then perhaps moving back to the county after college. The 25 to 64 age group comprises 51% of the total population. This age group is an important asset in realizing the County's full social and economic potential since people between the ages of 25 and 64 are usually the most productive in the County. Approximately 15% of the county's population is 65 and over, which is important due to the impact on the community facilities required to serve this age group such as health care facilities, as well as elderly and public assistance programs. Comparisons to the State of Alabama and the U.S. show relatively no difference. Chart 3-1 depicts the breakdown of the County, State, and U.S. by the age of residents.

Chart 3-1. Marshall County Population by Age



Sources: US Census Bureau, 2010

Race and Gender

According to the 2010 Census, throughout Marshall County, whites comprise 87.6% of the population which represents a slight decline from 2000. The African-American population comprises 1.6% of the total Marshall County population. The most diverse locality within the county is Albertville with 1.9% African American, 0.8% American Indian, 0.5% Asian and 18.7% Other Race. The Hispanic population comprises 12.1% in the county as a whole. Of this, 27.9% reside in Albertville, 14.2% reside in Boaz, and 6.5% reside in Union Grove. The County is 50.7% female and 49.3% male. The female population outnumbers the male population in all jurisdictions, except for Union Grove, where males outnumber females by 19.4%.

Table 3-4. Population by Race and Hispanic Origin

Community	White	Black/African American	American Indian	Asian	Other Race	Two or More Races	Hispanic (of any race)
Marshall County	87.6%	1.6%	0.8%	0.5%	7.8%	1.7%	12.1%
Albertville	75.9%	1.9%	0.8%	0.5%	18.7%	2.1%	27.9%
Arab	96.6%	0.1%	0.5%	0.7%	0.7%	1.1%	1.7%
Boaz	87.3%	1.8%	0.4%	0.7%	7.9%	1.6%	14.2%
Douglas	93.3%	0.8%	0.4%	0%	2.8%	2.6%	3.9%
Grant	98.1%	0%	0%	0.4%	0%	1.5%	1.3%
Guntersville	85.8%	7.8%	0.5%	1.5%	2.5%	1.9%	3.8%
Union Grove	93.5%	0%	0%	0%	6.5%	0%	6.5%

Sources: U.S. Census Bureau, 2010

Table 3-5. Population by Gender

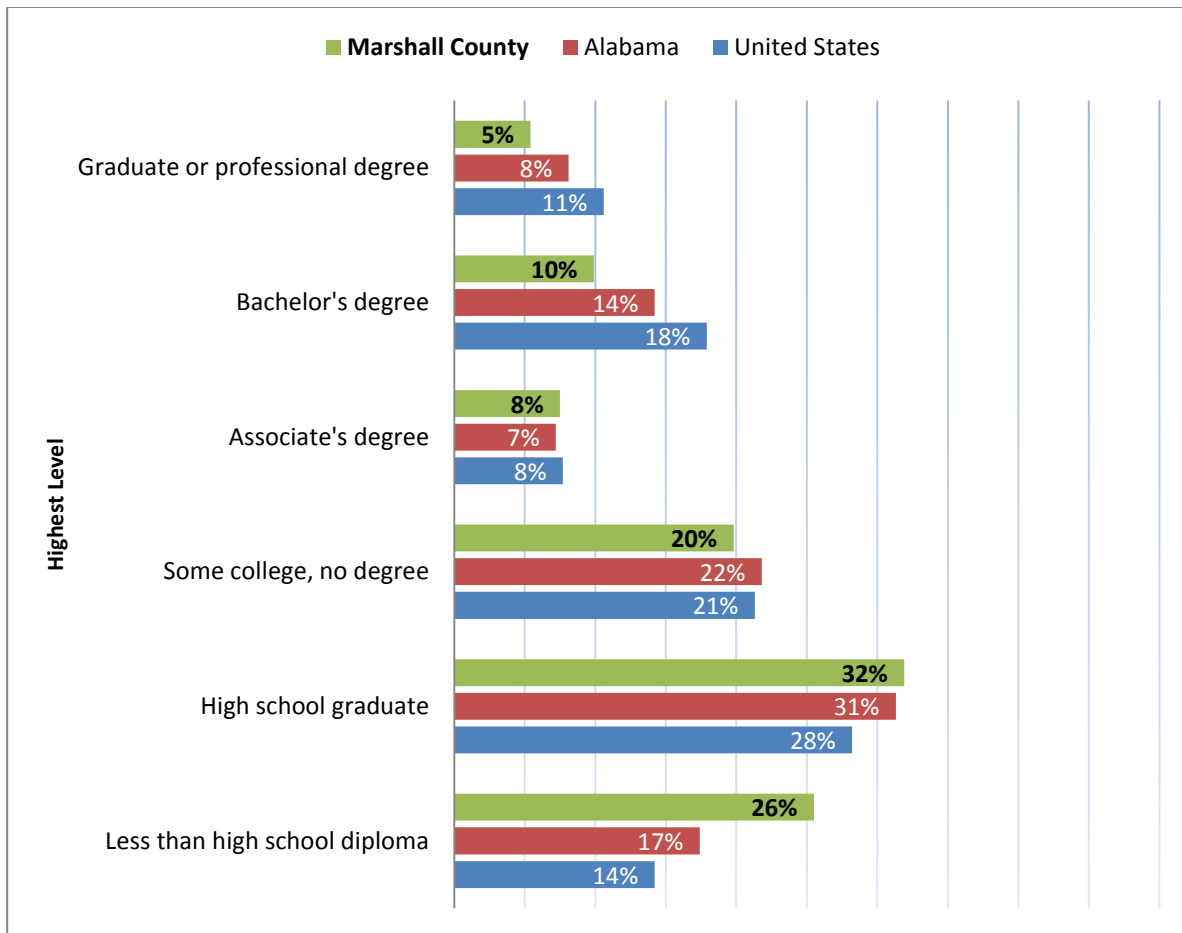
Community	Male	Female
Marshall County	49.3%	50.7%
Albertville	49.3%	50.7%
Arab	47.0%	53.0%
Boaz	47.4%	52.6%
Douglas	47.8%	52.2%
Grant	48.4%	51.6%
Guntersville	48.0%	52.0%
Union Grove	59.7%	40.3%

Source: U.S. Census Bureau, 2010

Educational Attainment

Of Marshall County's population of 25 years or older, 75 percent are high school graduates or higher, and 15% percent of those have a bachelor's degree or higher. Relative to the State of Alabama and the U.S., Marshall County has a greater population receiving less than a high school diploma, but is comparable in terms of those who have attended some college and/or received an associate's degree. Chart 3-2 depicts the educational attainment of Marshall County residents, according to the U.S. Census Bureau's American Community Survey, 2008-2012 estimates.

Chart 3-2. Educational Attainment for 25 Years Old and Older



Source: U.S. Census Bureau, 2008-2012 American Community Survey 5-year Estimates

Income

It is important to identify the income variations and populations below poverty level. Table 3-6 and Chart 3-3 depicts the median household income and poverty level data for the jurisdictions in Marshall County, the State of Alabama and the United States.

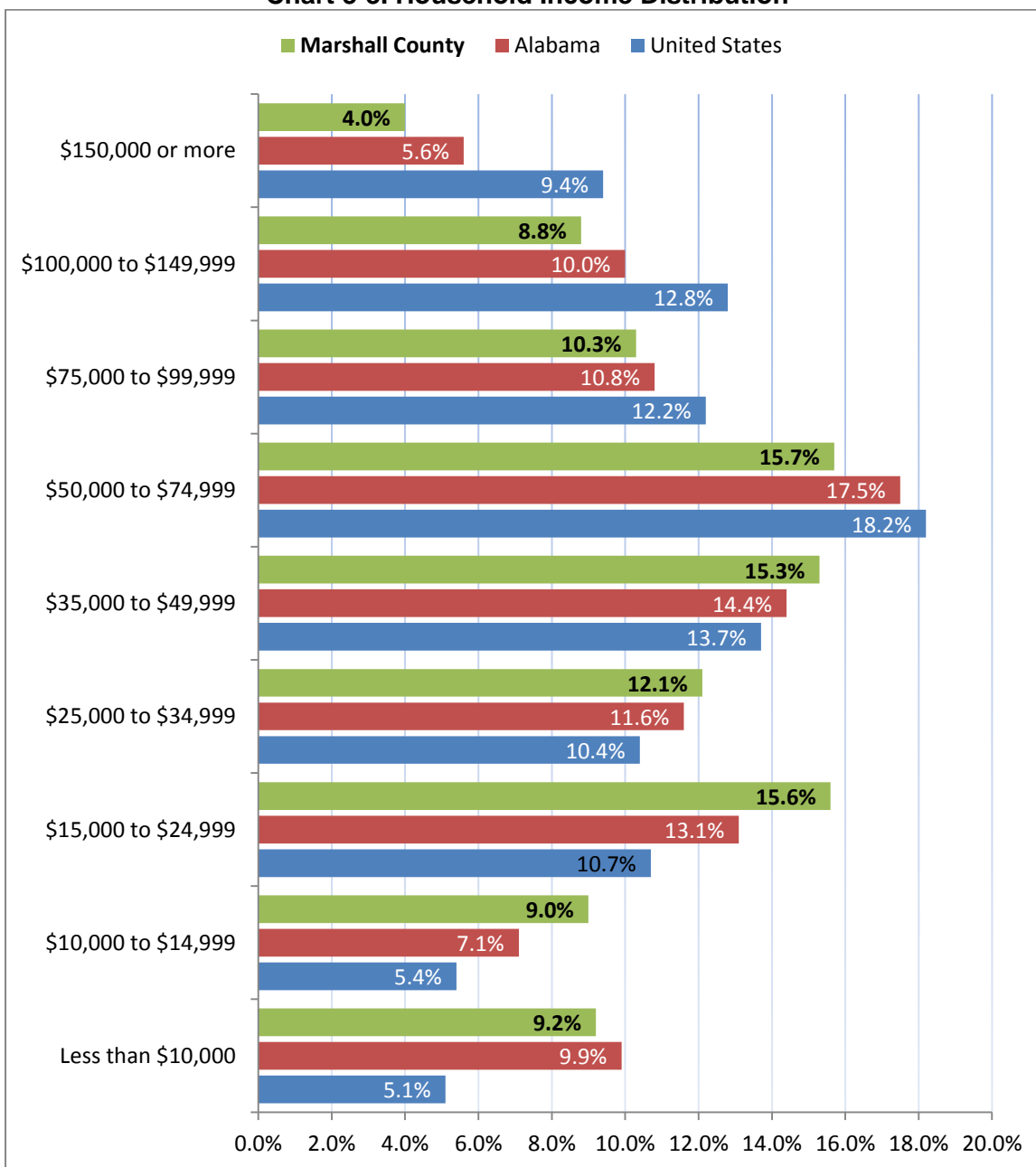
The median household income for Marshall County is \$38,649 compared to a state average of \$43,160, and U.S. average of \$53,046, according to the 2010 Census. Only one city in Marshall County has a median household income exceeding that of the state – Arab, with \$44,224. Despite the Town of Grant having a median household income of \$39,318, which is higher than Marshall County, the town maintains the highest rate of people below poverty level (29.7%). In addition, the Town of Union Grove and the Town of Douglas have significant levels of people below poverty level, with 29.5% and 27.5%, respectively. Only the City of Arab's percentage of people below poverty level falls below the state and the nation.

Table 3-6. Comparison of Income and Poverty Levels

Geographic Area	Median Household Income	Persons Below Poverty Level	Percent Below Poverty Level
Marshall County	\$38,649	18,353	20.0%
Albertville	\$37,385	4,929	23.7%
Arab	\$44,224	911	11.4%
Boaz	\$32,473	1,835	19.7%
Douglas	\$31,250	236	27.5%
Grant	\$39,318	325	29.7%
Guntersville	\$34,869	1,751	22.3%
Union Grove	\$35,000	28	29.5%
Alabama	\$43,160	4,662,094	18.1%
U.S.	\$53,046	301,333,410	14.9%

Source: US Census Bureau, 2008 – 2012 American Community Survey

Chart 3-3. Household Income Distribution



Source: U.S. Census Bureau, 2008-2012 American Community Survey

3.8 Economy

Business and Industry

Poultry slaughtering and processing comprises the largest industry in Boaz and Guntersville. Pilgrim's Pride leads this industry, employing approximately 1,600 people, followed by AlaTrade Foods, LLC. (1,275), Tyson Foods, Inc. (1,042), Wayne Farms (989), and Albertville Quality Foods (900). The first two are located in Guntersville,

while the rest are located in Albertville. The largest employer in Boaz is TS Tech Alabama, an automobile parts manufacturing plant, with 700 employees. Orchid Orthopedic Solutions and Atrion Medical Products are the two largest employers in Arab, employing 130 and 128 people, respectively. Map 3-6 shows the locations of major employers in Marshall County. Table 3-7 “Major Employers” lists the largest employers in Marshall County (with 50 or more employees).

Table 3-7. Major Employers

Company	# of Employees	Product	Location
Pilgrim's Pride	1600	Poultry Processing	Guntersville
AlaTrade Foods, LLC	1275	Poultry Further Processing	Guntersville
Tyson Foods, Inc.	1042	Poultry Processing	Albertville
Wayne Farms	989	Poultry Processing	Albertville
Albertville Quality Foods	900	Poultry Processing	Albertville
TS Tech Alabama	700	Mfg. Automobile Parts	Boaz
Mueller Co.	600	Fire Hydrants	Albertville
Mitchell Grocery Corporation	450	Distributes Groceries	Albertville
Diamond Foods	302	Livestock Services	Albertville
Colormasters, LLC	278	Polyethylene Plastic Bags	Albertville
Progress Rail Service	200	Recondition RR/Locomotive Parts	Albertville
Kabco Builders	190	Home Builders	Boaz
Huhtamaki Retail Bus. Unit/Chinet Co.	160	Molded Fiber Products	Albertville
Parker-Hannifin Corp.	152	Hardware Retail/Home Centers	Boaz
Federal-Mogul	150	Auto Wheel & Master Cylinders	Boaz
Kappler, Inc.	150	Chemical Protective Clothing	Guntersville
Kennametal	148	Machinery	Grant
Orchid Orthopedic Solutions	130	Orthopedic Mfg.	Arab
Atrion Medical Products, Inc.	128	Medical Device Mfg.	Arab
Factory Connection, Inc.	125	Wall Décor	Guntersville
Hyco Alabama, LLC	123	Hydraulic Cylinders	Arab
Pinnacle Mfg., LLC	100	Tank Building	Boaz
Vendor Remanufacturing of Alabama, Inc.	100	Vending Machine Repair	Guntersville
Arab Cartage & Express Co, Inc.	85	Trucking Services	Arab
Associate Jobbers Warehouse	80	Automotive Parts Distributor	Boaz
B&G Supply Company, Inc.	80	Transportation Trucking Co.	Albertville
Paragon Decors, Inc.	80	Wall Décor	Albertville

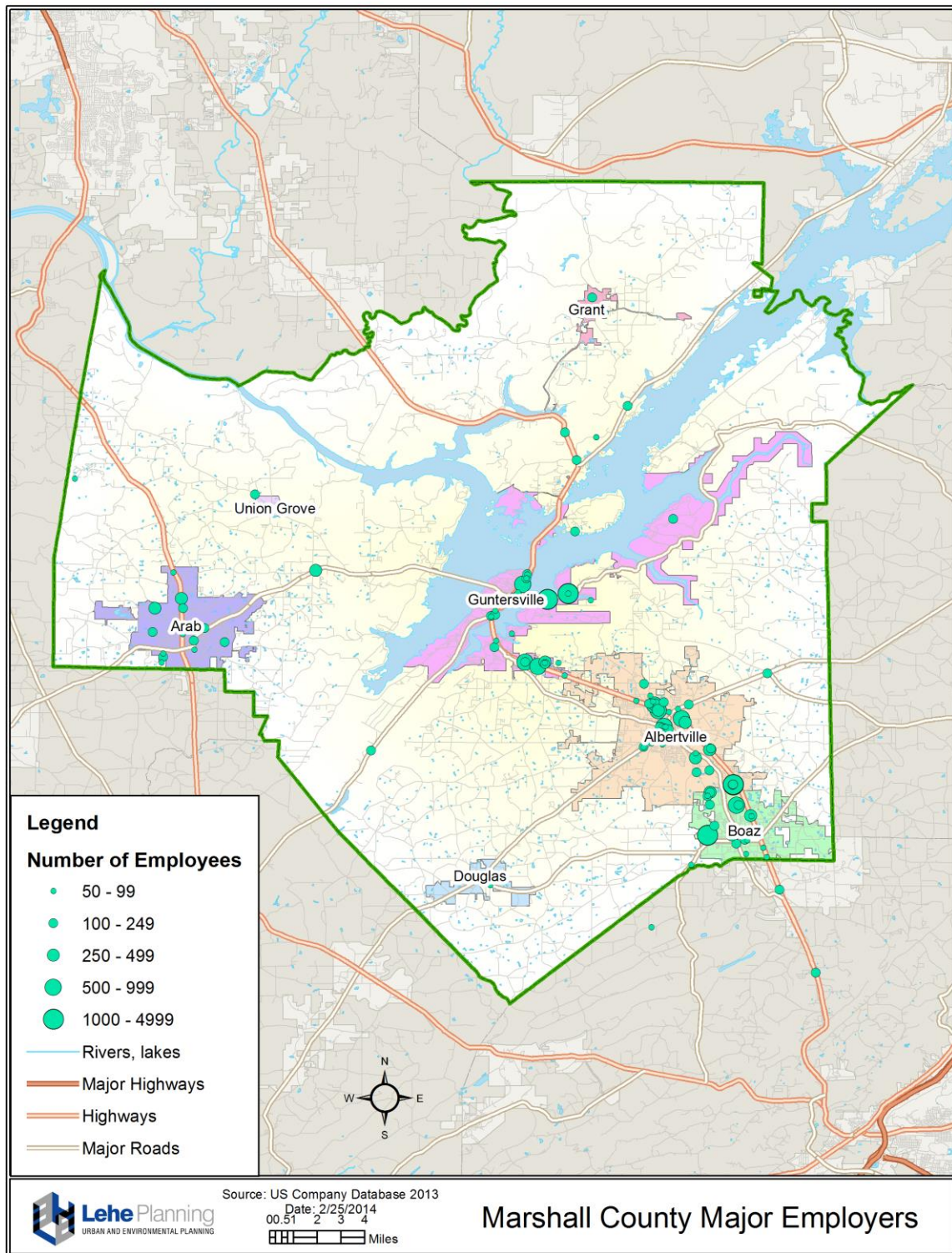
CHAPTER 3

2014 Marshall County Multi-Hazard Mitigation Plan

Company	# of Employees	Product	Location
Warren Distribution	74	Mix & Distribute Motor Oil	Guntersville
Syncro Corp.	71	Industrial Controls	Arab
Faithway Feed Company, Inc.	65	Animal Feeds/Elevator	Guntersville
Tyson Foods Hatchery	61	Hatchery	Albertville
FABCO Equipment Co.	55	Meat/Poultry Processing Equip.	Albertville
Propac Images	55	Promotional Framed Art Work	Albertville
BPI Media Group	54	Commercial Printing	Boaz
Umicore Specialty Chemicals	53	Chemicals	Arab
BAE Systems	50	Aerospace Systems	Albertville
Bakery Feeds	50	Recycling of Bakery Products	Albertville
Lowery Mfg., Inc.	50	Farm Machinery	Boaz

Source: Marshall County Economic Development Council, 2014

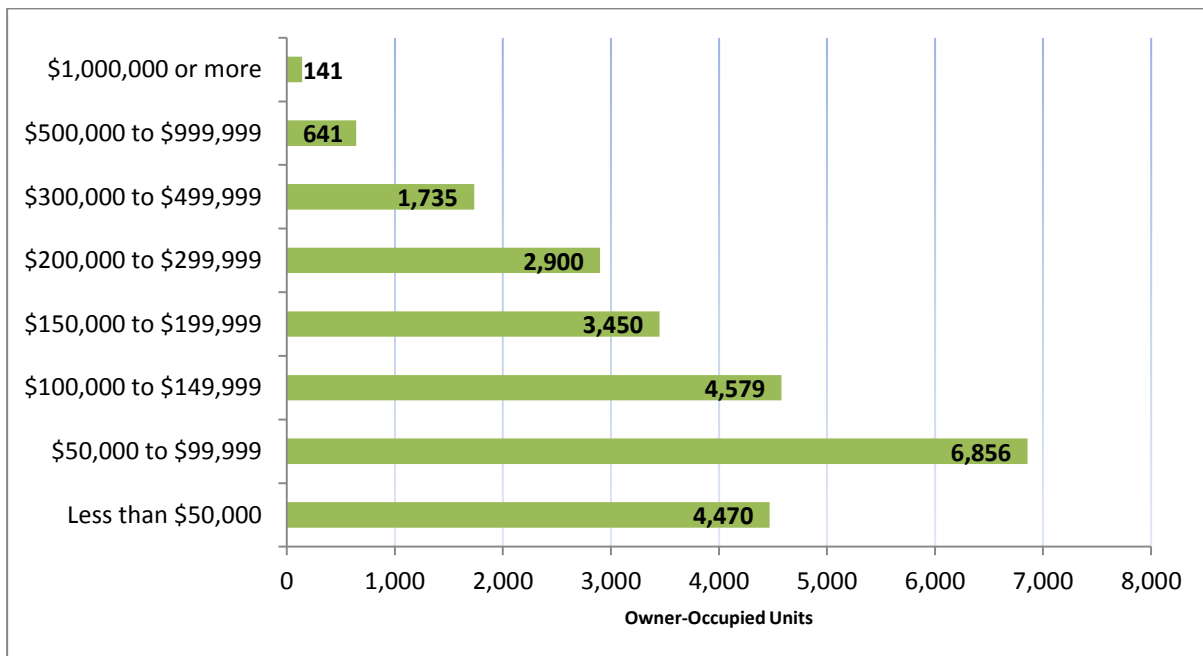
Map 3-6. Major Employers



Income and Housing

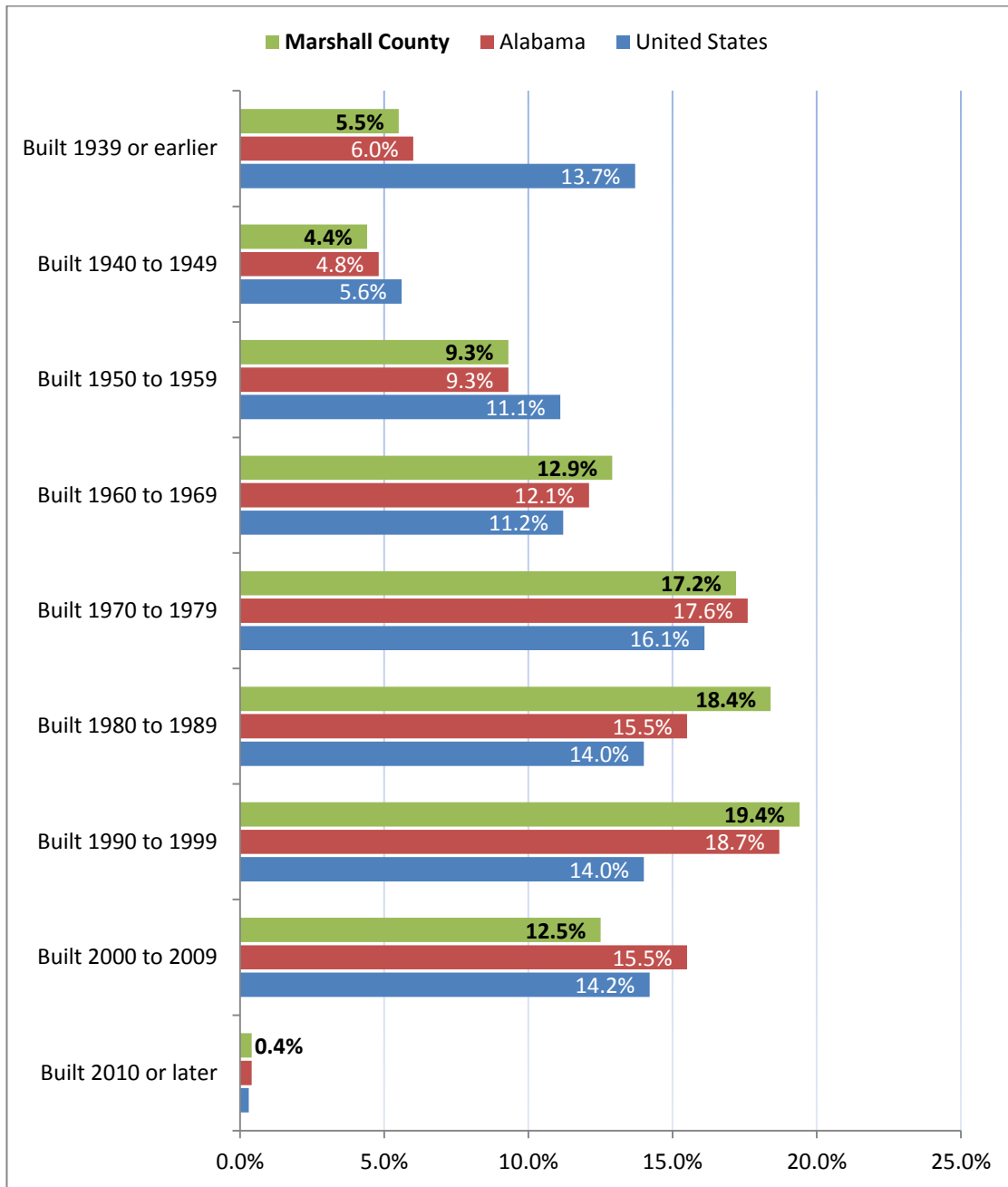
Approximately 20% percent of families in Marshall County live below the poverty line. The majority of owner-occupied housing values fall within the \$50,000 to \$99,999 range, totaling 6,856 (27.7%). Housing values ranged from 4,470 units at less than \$50,000 to 141 units valued at \$1,000,000 or more (see Chart 3-4). The median value for a home in Marshall County in 2007 was \$109,800. Chart 3-5 “Housing Stock by Age” shows that the majority of housing in Marshall County was constructed between 1970 and 1999, comprising 55% of total housing stock. This trend is similar to Alabama and the U.S.

Chart 3-4. Housing Units by Value



Source: U.S. Census Bureau, 2008-2012 American Community Survey 5-year Estimates

Chart 3-5. Housing Stock by Age



Source: U.S. Census Bureau, 2008-2012 American Community Survey 5-year Estimates

3.9 Utilities

Electric Power

Electric power is provided by Alabama Power, the Albertville Municipal Utilities Board (Albertville), Arab Electric Cooperative (Arab), Huntsville Utilities, North Alabama Electric Cooperative (Stevenson), Guntersville Electric Board (Guntersville), Cherokee Electric Cooperative (Marshall County), Marshall-DeKalb Electric Cooperative (Boaz), Sand Mountain Electric Cooperative (Marshall County), and the Tennessee Valley Authority.

Natural Gas

Natural gas is provided by the Marshall County Gas District for all areas other than Boaz. The Boaz Gas Board provides gas for the Boaz area. Marshall County Gas District provides natural gas, which may be distributed by other companies serving Marshall County.

Water and Sewer

Water and sewer service is provided by Albertville Municipal Utilities Board, Arab Water & Sewer, Asbury Water Services, Boaz Water & Sewer, Douglas Water Board, Guntersville Water Works and Sewer Board, North Marshall Utilities (Grant), Northeastern Alabama Water, Swearingin Water System, and Union Grove Utility Board.

3.10 Media

Cable and Satellite TV

AT&T, Charter Communications, Horizon Communications, New Hope Telephone Cooperative, North Alabama Electric Cooperative, and Otelco provide cable service for areas within Marshall County. Satellite television is also available throughout the County.

Newspapers

The Advertiser Glean and Lakeside Post out of Guntersville, the Sand Mountain Reporter out of Albertville, and the Arab Tribune of Arab are the three local newspapers for Marshall County. Residents also receive the Huntsville Times, the Gadsden Times, and the Birmingham News.

Telephone Services

AAA Communications, AT&T, Bellsouth, Cherokee Telephone Company, Cingular Wireless, Cool-Com, Corr Wireless, East Alabama Electronic, Inc., Farmers Wireless, New Hope Telephone Cooperative, Otelco, Verizon Wireless, and Wireless Advantage provide telephone and cellular services. American Telegraph Service and Western Union provide telegraph services.

Radio

Local radio stations include: WAFN-FM 92.7 – Arab, WQSB-FM 105.1 – Albertville, WAVU-AM 630 – Albertville, W298BG-FM 107.5 – Albertville, WTWX-FM 95.9 – Guntersville, WGSV-AM 1270 – Guntersville, WBSA-AM 1300 – Boaz, WRAB-AM 1380 – Arab, WJIA-FM 88.5 – Guntersville, WWGC-AM 1090 – Albertville, and WZZN-FM 97.7 – Union Grove.

3.11 Transportation

Major Roadways

Marshall County is served by a four-lane highway system with access to Interstates 59 and 65. Major highways in the county include U.S. Highways 431 and 231, and six State Highways: 69, 75, 79, 168, 205, and 227. See Map 3-7.

Railway

The Alabama-Tennessee Railway serves Marshall County through OmniTrax. OmniTrax has a lease agreement with CSX, which connects to the CSX mainlines, as well as Norfolk Southern lines. This rail line extends 120 miles from Birmingham to the rail barge terminal at the Port of Guntersville located along the Tennessee River. See Map 3-7.

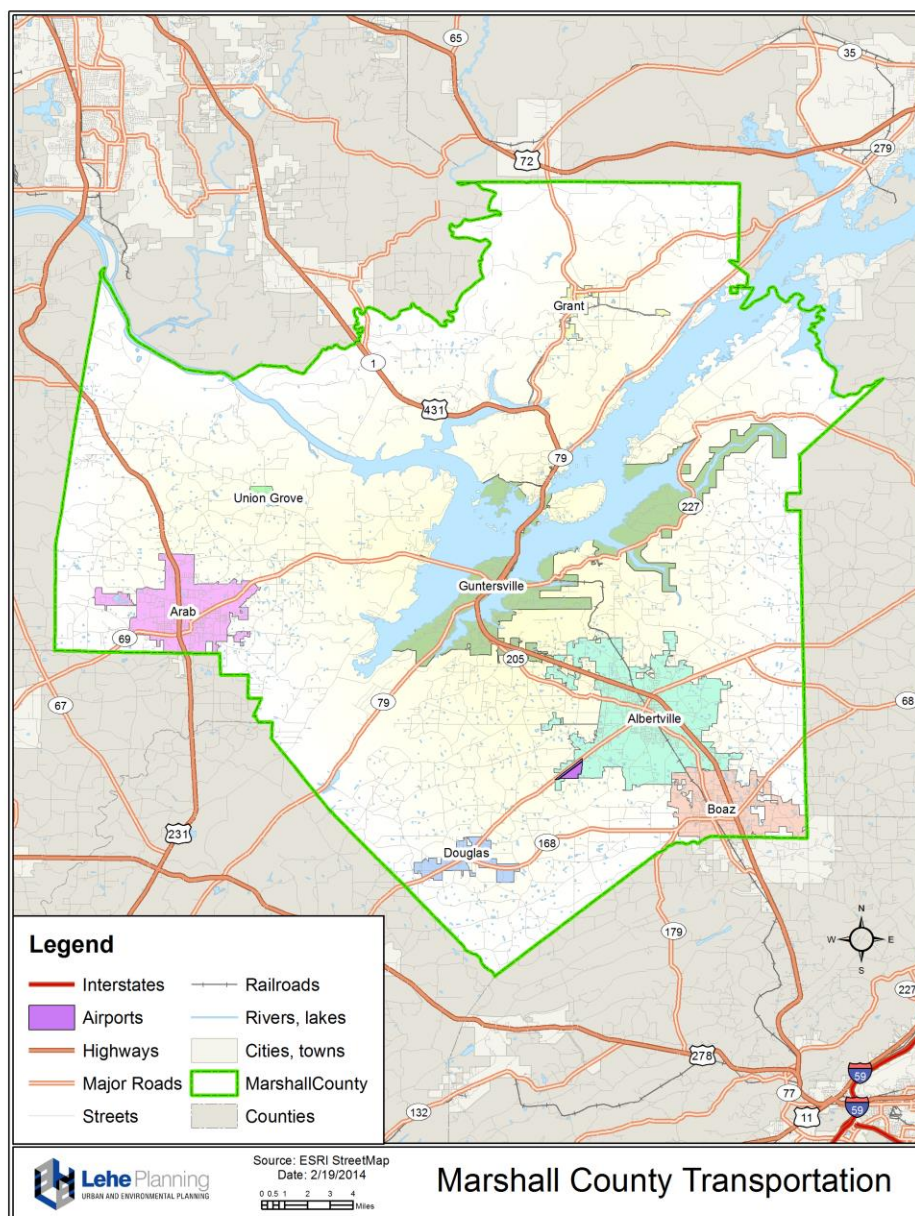
Airports and Heliports

There are two municipal airports, one in Guntersville and the other in Albertville, providing service to small private and commercial aircraft. There is a heliport located near Lake Guntersville State Park. The Huntsville and Birmingham International Airports are 45 and 60 miles from Guntersville, respectively. Chattanooga Metropolitan Airport is 90 miles and Atlanta-Hartsfield International Airport is 150 miles from Guntersville. See Map 3-7.

Waterways

Flowing through Marshall County is the Tennessee River. This river has a navigable depth of 9 feet, which connects to the Tennessee Tombigbee Waterway and the Mississippi River. It is from the Tennessee River that Lake Guntersville is formed. The Guntersville Dam is a hydroelectric dam that is approximately 94 feet in height and has a generating capacity of 97,200 kW. The port facilities of the Port of Guntersville are located along the Tennessee River in Guntersville. The Paint Rock River forms a portion of the County's northern boundary, and several tributaries of the Black Warrior River run through the southwest part of the County. See Map 3-7.

Map 3-7. Marshall County Transportation



Chapter 4 - The Planning Process

- 4.1 Federal Requirements for the Planning Process
- 4.2 Summary of Plan Updates
- 4.3 Opportunities for Public Comment on the Plan
- 4.4 Opportunities for Involvement in the Planning Process
- 4.5 Review and Incorporation of Applicable Plans and Documents
- 4.6 How the Plan was Prepared
- 4.7 Who was Involved in the Planning Process
- 4.8 How the Public was Involved in the Planning Process
- 4.9 The Plan Review and Update Process

4.1 Federal Requirements for the Planning Process

This chapter of the Plan addresses the Planning Process requirements of 44 CFR Section 201.6 (b) and (c)(1) and the process for the plan review and update requirements of Section 201.6 (d)(3), as follows:

“201.6 (b) *Planning process*. An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

- (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
- (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
- (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information. ”

“201.6 (c) *Plan content*. The plan shall include the following:

- (1) Documentation of 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.”

“201.6 (d) *Plan review.*

- (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.”

4.2 Summary of Plan Updates

Table 4-1 summarizes changes made to the 2009 plan as a result of the 2014 plan update:

Table 4-1. Summary of Plan Updates

Section		Change
4.3	Opportunities for Public Comment on the Plan	Added new opportunities through addition of Twitter and Facebook
4.4	Opportunities for Involvement in the Planning Process	No changes
4.5	Review and Incorporation of Plans and Documents	Integrated the Risk Assessment portion into the Marshall County THIRA
4.6	How the Plan was Prepared	No changes
4.7	Who was Involved in the Planning Process	Reorganized HMPC with some new members
4.8	How the Public was Involved in the Planning Process	Different public meeting structure
4.9	The Plan Review and Update Process	This is the second 5 year review and update of the plan

4.3 Opportunities for Public Comment on the Plan

The Hazard Mitigation Planning Committee (HMPC) solicited public input into the mitigation plan through public meetings, the local news media, and an internet website marshall.hazardmitigationplan.com. Residents were encouraged to provide input through their representative on the Committee from each jurisdiction. They were also invited to attend committee meetings and provide their comments and concerns. The plan on the website was continually updated and available for public review and comment throughout the planning process. The public could send comments to the committee through Twitter, Facebook and the email address marshall@hazardmitigationplan.com. The meeting materials such as the PowerPoint presentations and handouts were uploaded to the website and available for public viewing. (Refer to Appendix H “Community Involvement Documentation” for further explanation and documentation.)



Some jurisdictions conducted public hearings in their communities prior to the plan's submission to the AEMA. There was also a county wide community meeting held on August 13, 2014 at the Commission Chambers of the Marshall County Courthouse. Prior to adopting this Plan by resolution, there was an additional hearing as required by State law for each jurisdiction. The original resolutions and public hearing minutes are kept on file at the Marshall County EMA offices.

4.4 Opportunities for Involvement in the Planning Process

Emails were sent to various local and regional agencies with an interest in hazard mitigation, agencies that have the authority to regulate development, and representatives of businesses, academia and other private and non-profit interests

notifying them of the draft plan and requesting their input and cooperation. (A copy of the emails are included in Appendix H). Those agencies which received the notice are listed below.

Federal Agencies

- National Weather Service - Huntsville Office
- U.S.D.A. Natural Resources Conservation Service – Alabama District
- U.S. Army Corps of Engineers – Mobile District
- U.S. Army Corps of Engineers – Nashville District
- Tennessee Valley Authority
- FEMA
- FEMA Region IV

State Agencies

- Alabama Emergency Management Agency (AEMA)
- Alabama Department of Economic and Community Affairs (ADECA)
- Alabama Department of Environmental Management (ADEM)
- Alabama Department of Transportation (ADOT), First Division
- Alabama Department of Transportation (ADOT), First Division, District 4, Marshall County
- Alabama Forestry Commission
- Geological Survey of Alabama
- Lake Guntersville State Park
- Alabama Historical Commission

Local and Regional Agencies

- Top of Alabama Regional Council of Governments
- Marshall County Economic Development Council
- North Alabama Industrial Development Association

Neighboring Counties (represented by county EMA directors)

- Madison County
- Morgan County
- Cullman County
- Blount County
- Etowah County
- DeKalb County
- Jackson County

Chambers of Commerce

- Albertville Chamber of Commerce
- Arab Chamber of Commerce
- Boaz Chamber of Commerce
- Grant Chamber of Commerce
- Lake Guntersville Chamber of Commerce
-

Academia

- Marshall County School Board
- City of Albertville School Board
- City of Arab School Board
- City of Boaz School Board
- City of Guntersville School Board
- Snead State Community College
- Marshall Christian School, Albertville

Non-Profits and Other Agencies

- American Red Cross, Madison-Marshall County Chapter
- DHR
- Marshall Medical Center North
- Marshall Medical Center South
- Salvation Army
- TS Tech Alabama, LLC.
- United Way

The Geological Survey of Alabama provided additional information on geohazards that affect Marshall County for the update. The Alabama Department of Human Resources representative also reviewed the plan but had no recommendations or changes at the time they reviewed the plan. The Senior Mitigation Planner with FEMA's Region IV reviewed the plan and provided some ideas on how to improve the inclusion of information into the plan.

4.5 Review and Incorporation of Applicable Plans and Documents

The plans and documents reviewed in 2009 were not revisited in this update because there were no significant changes to these documents since 2009, as reported by the committee members. It was discovered in the previous hazard mitigation plans that some of these ordinances that were reviewed addressed specific natural hazards concerns – flood plain management, storm water detention, erosion and sedimentation control, commercial logging, and open burning.

The plans and documents reviewed in 2009 were:

- Comprehensive plans of the cities of Albertville, Arab, Boaz, Grant and Guntersville
- Zoning ordinances of the cities of Albertville, Arab, Boaz, Guntersville and the town of Grant
- Building codes of the cities of Albertville, Arab, Boaz, and Guntersville
- Subdivision regulations of the cities of Albertville, Arab, Boaz, Guntersville, the towns of Grant and Douglas and Marshall County
- Flood plain management ordinances for the cities of Albertville, Arab, Boaz, Guntersville and Marshall County
- Storm Water Management Plans of the cities of Arab, Boaz, and Guntersville.
- Downtown revitalization plans of the cities of Boaz and Guntersville
- Open burn ordinance of the town of Grant
- Critical Incident Management Plans of the cities of Albertville, Arab, and Boaz
- Erosion and sedimentation control regulations of the city of Arab
- Mountainside and steep slope development regulations of the city of Guntersville
- Regulations for commercial logging for the city of Guntersville
- Water conservation ordinance of Guntersville
- Solid Waste Management Plan of Marshall County
- Hazardous Materials Commodity Flow Study of Marshall County
- Tennessee Valley Authority, Guntersville Dam and Nickajack Dam Emergency Action Plan
- Tennessee Valley Authority Guntersville Watershed Plan
- U.S. Census Bureau and Alabama Data Center demographic and economic reports
- NOAA and NWS storm events records
- FEMA and local disasters reports
- Flood Insurance Studies and Flood Insurance Rate Maps

The 2014 mitigation strategy was incorporated into the Marshall County Emergency Operations Plan (MCEOP) administered through the Emergency Management Agency office. From 2009 through 2014, the Marshall County EMA conducted a yearly review of the MCEOP in conjunction with the mitigation actions that were in progress or planned for implementation. The Risk Assessment portion of the plan update was also integrated into the THIRA (Threat and Hazard Identification and Risk Assessment) for Marshall County.

The pertinent mitigation strategies developed from this mitigation plan update should be integrated into any revisions of existing comprehensive plans and future planning documents at the appropriate time. Specific measures for plan integration are included in the Community Mitigation Action Programs for each jurisdiction.

4.6 How the Plan was Prepared

From January through July 2014, the Marshall County HMPC held five meetings facilitated by the planning consulting team of Lehe Planning, LLC. The EMA Director, Anita McBurnett, scheduled two additional meetings to go over the material covered in the meeting previously and to work on any exercises or matters brought up during those previous meetings. Documentation of the meetings facilitated by Lehe Planning in the form of agendas and sign-in sheets are on file in the EMA office and copies are included in Appendix G “Committee Meeting Documentation.” Agendas and sign-in sheets from the two additional HMPC meetings conducted by the Marshall County EMA during that time period are also included in Appendix G. The Committee’s tasks were facilitated by a website specifically designed to assist in the planning process, marshall.hazardmitigationplan.com. The website listed the dates and times of all Committee meetings and public meetings and displayed sections of the draft plan as they were completed. Also uploaded to the site were the PowerPoint presentations and handouts for each meeting. Committee members who were unable to attend a meeting received agendas and Committee assignments via fax, email, mail, telephone, or personal meetings.

The kick-off meeting, which was originally scheduled for January 28, was held on January 29, 2014. Due to an extreme snow event the meeting was postponed for a day although the town of Grant’s representative Bethany King, met with the planning team on the 28th as originally planned. The meeting was a refresher for those HMPC members who had participated in previous years and an introduction to those who were new to the process. The presentation included the definition of Hazard Mitigation and examples of the cost of previous hazard events throughout the United States. A discussion of the federal requirements in regard to the plan and the planning process occurred along with an outline of the new plan. The drafts of Chapters 1, 2 and 7 and Appendices A and J were reviewed. The Marshall County EMA conducted an interim meeting on February 27th with the HMPC to review the draft updates.

The second HMPC meeting facilitated by the planning team was held on March 18, 2014. During the meeting Chapter 3, the first portion of Chapter 5, and Appendices D and E were reviewed. The committee members were asked about corrections to the information provided about their communities in Chapter 3. The Chapter 5 review involved a discussion of the different hazards that affect the jurisdictions and actual events that had occurred since the 2009 plan update. The committee exercise “Hazard Identification and Ratings” was handed out during the meeting for the committee

members to fill out and return for inclusion in this update. An interim meeting was held by the Marshall County EMA on April 17th.

The Committee reconvened on May 27, 2014 for their third meeting regularly scheduled meeting. This meeting focused on the second part of Chapter 5 and Chapter 6 along with Appendices B and C. The committee looked at the possible economic impact various hazards may have on the different jurisdictions through evaluating populations, the vulnerabilities of the structures in the area, and an inventory of critical facilities and infrastructure. They also began considering mitigation strategies and looked into the type of capabilities each jurisdiction possesses and learned how to evaluate the different measures they are considering.

The final committee meeting facilitated by the planning team was held on July 23, 2014. At the meeting the Committee reviewed the drafts of this chapter, "The Planning Process", and its related appendices. The committee also went over Volume II "Community Action Programs" to ensure the measures selected were in agreement with their jurisdictions' goals and capabilities. The integration of portions of this plan into the Threat and Hazard Identification and Risk Assessment for Marshall County, AL was also discussed.

The planning team assembled the final draft plan for submission to the Alabama Emergency Management Agency for FEMA review and approval, prior to local adoption. This final approved plan was adopted by resolutions of all participating jurisdictions at public hearings of their governing bodies.

4.7 Who was Involved in the Planning Process

4.7.1 The Hazard Mitigation Planning Committee

The Marshall County Hazard Mitigation Planning Committee (HMPC), comprised of representatives from all the jurisdictions and organizations concerned with hazard mitigation, guided the development of this plan. The following is a list of the membership of the HMPC and the jurisdictions and organizations they represented.

Leslie McClendon, City of Albertville
Tim Tidmore, Albertville City Schools, Director of Federal Programs
Gary Nunnally, City of Albertville, Personnel and Purchasing
Jeremy Griggs, City of Arab, Building Inspector
Brad Kitchens, Arab City Schools, Coordinator of Support Services
Jessica Patterson, City of Boaz, Administrative Assistant
Jimmy Hanson, City of Boaz, Building Inspector
Randall Haney, Boaz City Schools, Assistant Superintendent
Carolyn Garrett, Town of Douglas, Court Clerk

Bethany King, Town of Grant, Court Clerk
Carl Fulmer, City of Guntersville, Revenue and Code Enforcement Officer
Patty Meigs, City of Guntersville
Jeff Gibbs, Guntersville City Schools, Board of Education Safety
Sarah Bunch, Town of Union Grove, Town Clerk
Anita McBurnett, Marshall County EMA, Director
George Harwell, Marshall County EMA, Operations Specialist
Bob Pirando, Marshall County, County Engineer
Charlie Jimmerson, Marshall County, IT/Technology
Candace Adkins, Alabama Department of Public Health, Surveillance Nurse
Darren Welborn, Marshall Medical Centers EMS, Deputy Chief
Paul Gore, Snead State Community College, Director of Security
Mark Richard, Snead State Community College, Chief Financial Officer
Steve Williams, Snead State Community College, Physical Plan Director
Cindy McGregor, Advertiser-Gleam

The Town of Union Grove was represented by the Marshall County EMA through the use of authorized representation appointed by resolution adopted by the Town Council.

4.7.2 The Mission of the Hazard Mitigation Planning Committee

The Committee adopted the following mission statement in 2004 and retained it for the 2009 and this update:

The mission of the Marshall County Hazard Mitigation Planning Committee is to oversee and establish a comprehensive hazard mitigation planning process that engages public participation and support; facilitates Federal, state, regional and local agencies' coordination; constantly monitors and evaluates the potential risks of hazards to life and property; actively mobilizes all available community resources and measures to mitigate the threats of hazards; and, results in programmed actions with specific results.

4.7.3 Preparation of the Plan Update

This 2014 plan update was prepared under the direction of the Hazard Mitigation Planning Committee with the support of the Marshall County EMA. The Marshall County Commission retained the consulting firm of Lehe Planning, LLC, the same firm that assisted with the 2004 and 2009 plans, to prepare the 2014 update. A professional urban planner James E. Lehe, AICP, served as Plan Coordinator. A professional planner will continue to provide guidance and support to the Committee with any revisions, amendments, or updates to this Plan.

4.8 How the Public was Involved in the Planning Process

The public was given many opportunities to participate in the plan update. The opportunities ranged from being an active participant during committee meetings to offering comments through the internet and social media.

All Hazard Mitigation Planning Committee meetings were announced and open to the public. Anyone interested in the planning process was welcomed to attend and the meeting dates were posted on the Marshall County Hazard Mitigation Plan Update website at marshall.hazardmitigationplan.com and announced by some of the local media. During some of the meetings, representatives of the local media were present and reported to the public on the progress of the plan update

The public was encouraged to participate via Twitter and Facebook or to email their comments to marshall@hazardmitigationplan.com. The Marshall County EMA made a number of attempts to get participation by the media, public and area agencies through emails once the draft plan was complete. They also held a county wide community meeting in the Commission Chambers of the Marshall County Courthouse on August 13th.

At the end of the planning process, the public was invited to attend public hearings held by all jurisdictions for plan adoption by each of the governing bodies, allowing individuals a final opportunity for public comment.

For more detailed documentation and additional discussion of public involvement, see Appendix H “Community Involvement Documentation”.

4.9 The Plan Review and Update Process

The plan review and update process resulted in a comprehensive update of the 2009 plan elements, which was achieved through a process that involved the following tasks, among others:

- Update of the Community Profiles to reflect changed demographics, economic characteristics, and growth and development trends.
- An assessment of local capabilities to carry out mitigation measures.
- An evaluation of the status and effectiveness of Community Mitigation Action Programs adopted in the 2009 plan, which was reflected in the 2014 Action Programs for each jurisdiction.
- A reassessment of risks to include detailed research and analysis of hazards affecting the communities.
- An update of critical facilities and assessment of vulnerabilities.
- An update of the HAZUS – MH reports for floods, earthquakes, and hurricanes.

- A reexamination of development trends and exposure to risks.
- A review and recommitment to the vision for disaster-resistant communities and support of the 2013 State goals for hazard mitigation.
- Identification and analysis of a comprehensive range of mitigation alternatives.
- A reprioritization of mitigation actions and projects.
- Revised community action programs for each jurisdiction to better reflect the results of the plan update.

Chapter 5 – Risk Assessment

- 5.1 Federal Requirements for Risk Assessments
- 5.2 Summary of Plan Updates
- 5.3 Identification of Hazards
- 5.4 Hazard Profiles
- 5.5 Vulnerability of Structures within Each Jurisdiction
- 5.6 Estimate of Dollar Losses to Vulnerable Structures
- 5.7 General Description of Land Uses and Development Trends
- 5.8 Repetitively-Damaged NFIP-Insured Structures
- 5.9 Summary of Hazards and Community Impacts
- 5.10 Risks that Vary Among the Jurisdictions

5.1 Federal Requirements for Risk Assessments

This chapter and the associated appendices of the Plan addresses the Risk Assessment requirements of 44 CFR Section 201.6 (c) (2), as follows:

“201.6 (c) (2) 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 risk assessment shall include:

- (i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
- (ii) 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. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:
 - (A). The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
 - (B). An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate;
 - (C). Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

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

5.2 Summary of Plan Updates

The 2014 update reflects changes to the following sections:

Table 5-1. Summary of Plan Updates

Section		Change
5.4	Hazard Profiles	Improved descriptions of locations and extents; updated past occurrences; improved mapping
5.5	Summary of Hazards and Community Impacts	Previously mentioned in hazard profiles; more community specific impact descriptions
5.6	Vulnerability of Structures within Each Jurisdiction	A more comprehensive inventory of buildings, critical facilities, and infrastructure from HAZUS-MH; updated GIS data and mapping; improved methodologies; included future conditions
5.7	Estimate of Dollar Losses to Vulnerable Structures	Improved methodology and documentation; updated GIS mapping
5.8	General Description of Land Uses and Development Trends	More extensive analysis; updated population and growth data; expanded mapping
5.9	Repetitively-Damaged NFIP-Insured Structures	Addressed new requirement
5.10	Risks that Vary Among the Jurisdictions	Improved explanation of how risks vary

5.3 Identification of Hazards

5.3.1 Identification of Hazards Affecting Each Jurisdiction

Types of Hazards

The types of hazards affecting each Marshall County jurisdiction are listed in Table 5-2 "Identified Marshall County Hazards." This table of identified hazards also notes multiple natural hazards that may be associated with and caused by certain hazard events. The 2009 Marshall County Multi-Hazard Mitigation Plan lists the same natural hazards and human-caused and technological hazards.

Table 5-2. Identified Marshall County Hazards

Hazards	Associated Hazards	Jurisdictions Affected
Tornadoes	High Winds	Marshall County
	Severe Storms	Albertville
	Lightning	Arab
	Hail	Boaz

Hazards	Associated Hazards	Jurisdictions Affected
		Douglas
		Grant
		Guntersville
		Union Grove
Severe Storms	Thunderstorms Hail Lightning High Winds Tornadoes Floods Landslides Wildfires	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Floods	Landslides	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Hurricanes	Tropical Storms Tropical Depressions Severe Storms High Winds Floods Tornadoes	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Winter Storms/Freezes	Snow Storms Ice Storms Extreme Cold	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove

Hazards	Associated Hazards	Jurisdictions Affected
Droughts/Heat Waves	Extreme Heat Wildfires Sinkholes	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Wildfires		Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Dam/Levee Failures	Floods	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Landslides	Mudslides	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Earthquakes	Landslides	Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove

Hazards	Associated Hazards	Jurisdictions Affected
Sinkholes (Land Subsidence)		Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove
Human-Caused and Technological Hazards		Marshall County
		Albertville
		Arab
		Boaz
		Douglas
		Grant
		Guntersville
		Union Grove

Sources for Identifying Marshall County Hazards

The planning team used the following sources for identifying hazards in Marshall County:

1. HMPC Hazard Identification and Ratings Exercise. The Hazard Mitigation Planning Committee completed a re-evaluation of the hazards in 2014, which are reported in Appendix D “Hazard Ratings and Descriptions.” This exercise was first administered for the 2004 plan and updated in 2009.
2. 2013 Alabama State Plan. The 2013 update of the State Plan served as an additional resource for identifying local hazards. All of the hazards identified by the State were compared against the local list and differences were noted. Table 5-3 compares the hazards identified in this 2014 plan update to those identified in the 2013 Alabama State Plan and explains the differences. The State plan does not include human-caused and technological hazards.

Table 5-3. Comparison of Identified Marshall County Hazards to State Plan

Hazards Identified in 2013 Alabama State Plan	Equivalent 2014 Marshall County Identified Hazards	Differences
Floods (storm surge, riverine, flash floods, etc.)	Floods	No storm surge or coastal floods in Marshall County - inland location.
High Winds (hurricanes, tornadoes and windstorms)	Tornadoes – High Winds Severe Storms – High Winds Hurricanes – High Winds	High winds included as components of tornadoes, severe

Hazards Identified in 2013 Alabama State Plan	Equivalent 2014 Marshall County Identified Hazards	Differences
		storms, and hurricanes in Marshall County plan.
Winter/Ice Storms	Winter Storms/Freezes	Marshall County plan identifies extreme cold as an associated hazard.
Landslides	Landslides	Marshall County plan identifies mudslides as an associated natural hazard.
Sinkholes and Land Subsidence	Sinkholes (Land Subsidence)	No difference.
Earthquakes	Earthquakes	Marshall County plan identifies landslides as an associated natural hazard.
Droughts	Droughts/Heat Waves	Included as a component of droughts/heat waves in Marshall County plan. Marshall County plan identifies sinkholes as a consequence of droughts/heat waves.
Hail	Severe Storms – Hail	Included as a component of severe storms in Marshall County plan.
Wildfires	Wildfires	Marshall County plan associates wildfires with droughts/heat waves.
Extreme Temperatures	Droughts/Heat Waves – Extreme Heat Winter Storms/Freezes – Extreme Cold	Included as components of droughts/heat waves and winter storms/freezes in Marshall County plan.
Lightning	Severe Storms – Lightning	Included as a component of severe storms in Marshall County plan.
Dam Failures	Dam/Levee Failures	Marshall County plan associates floods with dam/levee failures.

Hazards Identified in 2013 Alabama State Plan	Equivalent 2014 Marshall County Identified Hazards	Differences
Tsunamis	None	Marshall County is an inland location not subject to tsunamis.
Sea Level Rise	None	Marshall county is an inland location not subject to sea level rise.

3. List of Federally-Declared Disasters. Federal disaster declarations affecting Marshall County were an additional source for hazard identification. All declarations that have been issued since 1973 are included in the following table.

Table 5-4. 1973-2013 Federal Disaster Declarations Affecting Marshall County

Disaster No.	Description	Date	Declaration Type*
369	Tornadoes, flooding	4/5/1973	IA,PA-ABCDEFG,DH,DUA,IFG
388	Severe storms, flooding	7/3/1973	IA,PA-ABCDEFG,DH,DUA,IFG
422	Tornadoes	4/4/1974	HM
458	Severe storms, flooding	5/29/1973	HM
464	Severe storms, flooding	4/23/1975	HM
488	Severe storms, tornadoes, flooding	10/2/1975	HM
532	Severe storms, flooding	4/21/1977	IA,PA-ABCDEFG,DH,DUA,IFG
3045	Drought	8/16/1977	PA-AB
563	Severe storms, flooding	8/9/1978	HM
578	Severe storms, winds, flooding	4/18/1979	IA,PA-ABCDEFG, IFG, HM
598	Hurricane Frederic	9/13/1979	HM
619	Severe storms, tornadoes, flooding	4/20/1980	HM
638	Severe storms, tornadoes, flooding	4/10/1981	HM
639	Severe storms, flooding	5/14/1981	HM
695	Severe storms, flooding, tornadoes	12/13/1983	HM
742	Hurricane Elena	9/7/1985	HM
848	Severe storms, tornadoes	11/17/1989	HM
856	Flooding, severe storms, tornado	2/17/1990	IA,PA-ABCDEFG,DH,DUA,IFG,HM
861	Flooding, severe storm, tornado	3/21/1990	HM
890	Flooding, severe storms	1/4/1991	IA,PA-ABCDEFG,DH,DUA,IFG, HM
3096	Severe snowfall, winter storm	3/15/1993	PA-AB
1013	Winter storm, severe storms, freezing, flooding	3/3/1994	PA-ABCDEFG, HM

Disaster No.	Description	Date	Declaration Type*
1019	Severe storms, flooding, tornado	3/30/1994	IA,PA-ABCDEFGF, DH, DUA, IFG, HM
1034	Severe storms, flooding, Tropical Storm Alberto	7/8/1994	HM
1047	Severe storms, flooding, tornadoes	4/21/1995	IA,PA-ABCDEFGF, DH, DUA, IFG, HM
1070	Hurricane Opal	10/4/1995	HM
1104	Severe storms, flooding	4/22/1997	IA,PA-ABCDEFGF, DH, DUA, IFG, HM
1108	Storms, tornadoes, floods	3/20/1996	HM
1185	Severe storms, high winds, flooding	7/25/1997	HM
1208	Severe storms, flooding	3/9/1998	HM
1214	Severe storms, tornadoes	4/9/1998	HM
1250	Hurricane Georges	9/30/1998	HM
1261	Freezing Rain & Ice Storm	1/15/1999	HM
1317	Winter storm	2/18/2000	HM
1322	Severe storms, flooding	3/17/2000	HM
1352	Tornadoes	12/18/2000	HM
1362	Severe storms, flooding	3/5/2001	HM
1399	Severe storms, tornadoes	12/7/2001	IA,DH,IFG, SBA
1438	Tropical Storm Isidore	10/9/2002	HM
1442	Severe storms, tornadoes	11/14/2002	IA, DH, IFG, SBA
1466	Severe storms, tornadoes, flooding	5/12/2003	IA, PA-ABCDEFGF, DH
1549	Hurricane Ivan	9/15/2004	IA, PA-ABCDEFGF, HM
1593	Hurricane Dennis	7/10/2005	HM
1605	Hurricane Katrina	8/29/2005	HM
3237	Hurricane Katrina evacuation	9/10/2005	PA-AB, DFA
1687	Severe storms, tornadoes	3/3/2007	HM
3292	Hurricane Gustav	8/30/2008	PA-B
1789	Hurricane Gustav	9/10/2008	HM
1797	Hurricane Ike	9/26/2008	HM
1835	Severe storms, winds, flooding, tornadoes	4/28/2009	HM
1836	Severe storms, flooding, tornadoes, straight-line winds	5/8/2009	IA, PA-ABCDEFGF, HM
1842	Severe storms, tornadoes, flooding, straight-line winds	6/3/2009	HM
1866	Tropical Storm Ida	12/22/2009	HM
1870	Severe storms, flooding	12/31/2009	HM
1908	Severe storms, tornadoes, straight-line winds, flooding	5/3/2010	IA, PA-ABCDEFGF, HM
3319	Severe storms, tornadoes, straight-line winds	4/27/2011	PA-B, DFA

Disaster No.	Description	Date	Declaration Type*
1971	Severe storms, tornadoes, straight-line winds, flooding	4/28/2011	IA, PA-ABCDEFGF, DFA, HM
4052	Severe storms, tornadoes, straight-line winds, flooding	2/1/2012	HM
4082	Hurricane Isaac	9/21/2012	HM
* Declaration Type Key			
IA – Individual assistance		A – Debris removal	
PA – Public assistance		B – Protective measures	
DH – Disaster housing		C – Roads and bridges	
CC – Crisis counseling		D – Water control facilities	
DFA – Direct federal assistance		E – Public buildings	
DUA – Disaster unemployment assistance		F – Public utilities	
HM – Hazard mitigation		G – Recreational	
IFG – Individual and family grant		SA – Stafford Act	
SBA – Small Business Administration		403C – Department of Defense	

Source: FEMA, Region IV

4. Other Hazard Identification Sources. Other sources for identifying hazards included the following resources:

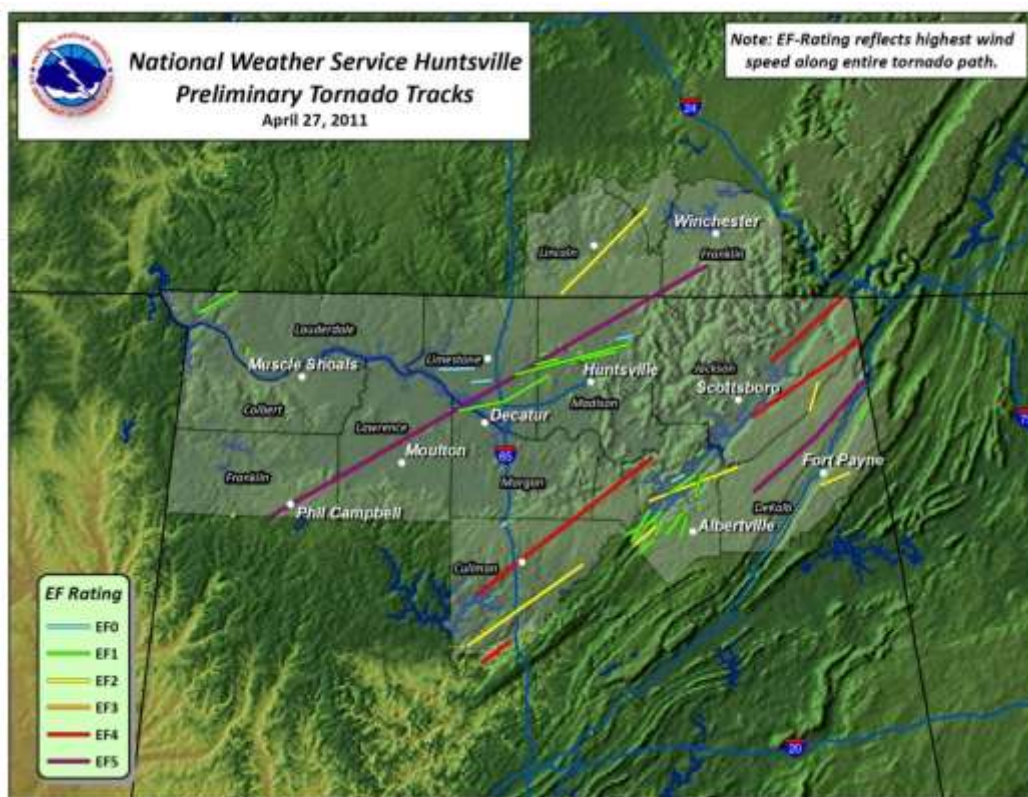
- Local knowledge and expertise of the Marshall County EMA Director and Operations Specialist;
- Discussions with longstanding residents who served on the HMPC and participated in community events and surveys;
- Local newspaper accounts which were thoroughly researched and assembled by the EMA staff;
- Records of the National Weather Service and NOAA Storm Events Database compiled for this plan; and
- Extensive internet research.

5.4 Hazard Profiles

5.4.1 Tornadoes Profile

On April 27, 2011, approximately 28 tornadoes (some at F-4 status) swept through the state of Alabama, killing 248 people and injuring thousands. April 27 had the most tornado-related fatalities in the nation since the 1925 “Tri-State” tornadoes, killing at least 747 people. Fifteen tornadoes hit Marshall County during the three waves of tornadoes occurring that day. Six people died in Marshall County (5 of which occurred in Ruth) and 48 were injured. In addition, major problems with food, gas, and homes occurred. Debris removal lasted approximately 6 months and cost \$2 million. Map 5-1 shows the tracks of the tornado paths on April 27.

Map 5-1. Tracks of the Tornadoes' Paths in Alabama on April 27, 2011



On February 16, 1995, a devastating F-3 tornado swept 14 miles through the Arab vicinity of Brindlee Mountain, killing six people and injuring more than 130 others. According to the Hazard Mitigation Planning Committee (HMPC), Marshall County communities face greatest threats from tornadoes. Hazard exposure, the severity of the risk, and the probability of future occurrences are highest for tornadoes, among all

identified hazards in Marshall County. Event records agree with the HMPC's assessment. Table 5-5 shows the strength of the tornado on the Fujita Scale and shows comparison to the Enhanced Fujita Scale, adopted in 2007. As shown on Table 5-6, Marshall County has experienced 67 tornadoes between 1957 and 2013, with the most devastating year (in terms of total damages) occurring in 2010.



Table 5-5. Comparison of F-Scale to EF-Scale

EF-Scale	Old F-Scale	Typical Damage
EF-0 (65-85 mph)	F0 (65-73 mph)	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF-1 (86-110 mph)	F1 (73-112 mph)	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF-2 (111-135 mph)	F2 (113-157 mph)	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF-3 (136-165 mph)	F3 (158-206 mph)	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF-4 (166-200 mph)	F4 (207-260 mph)	Devastating damage. Whole frame houses Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF-5 (>200 mph)	F5 (261-318 mph)	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd.); high-rise buildings have significant structural deformation; incredible phenomena will occur.
EF No rating	F6-F12 (319 mph to speed of sound)	Inconceivable damage. Should a tornado with the maximum wind speed in excess of EF-5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures.

Source: NOAA, Storm Prediction Center, 2014

During the infamous Palm Sunday Tornado Outbreak of March 27, 2004, an F-2 tornado travelled southwest to northeast across an area just south of the city of Guntersville. According to reports by the National Weather Service (NWS) in Birmingham, the tornado apparently began along Highway 79 South, and then crossed Big Spring Creek damaging a number of residential structures along Spring Creek Drive. The tornado appeared to weaken, but was still strong enough to rip off the top part of the roof to the Marshall Nursing Home and damaged several houses near the entrance to Happy Home. It crossed U. S. Highway 431, near the high school, taking out some trees on the side of the mountain and damaging a couple homes. A total of 103 houses were

damaged, 45 of them along Spring Creek Drive and 8 along Highway 79 South. In addition, hail of 0.75 inches (size of a penny) was reported near Arab and 1.75 inches (size of a golf ball) in diameter was reported in Guntersville. (Source: NWS, Birmingham).

The most devastating tornadoes on record are the Dixie Tornado Outbreak of April 24, 1908. At least 34 tornadoes touched down generally east of the Mississippi River from April 23 through April 26, 1908. These tornadoes generally occurred from Texas to Georgia, then northward from Oklahoma to Tennessee. The violent storms killed at least 320 people and injured over a thousand citizens. At least four tornadoes touched down in Alabama during this outbreak of severe weather. These tornadoes were responsible for approximately 48 fatalities and at least 260 injuries. This devastating F4 tornado touched down near Dora in Walker County around 2:40 PM and continued northeastward until it dissipated near Sylvania in DeKalb County around 4:10 PM. This tornado may have been associated with a family of tornadoes or could have been one single path. The estimated single tornado damage path would be at least 100 miles long. The width of the damage path varied from around 200 yards to a half-mile. Twelve people were killed between Dora and Bergens, which was completely obliterated. Two people were killed in Warrior in Jefferson County, one near Royal in Blount County, and two in Wynnville in Blount County).

Fifteen people were killed and at least 150 were injured in Albertville in Marshall County, as half the town was destroyed from the 1908 storm outbreak. A nine-ton oil tank was reportedly carried around one half of a mile near Albertville. A funnel-shaped cloud swept along the entire path of the storm. The cloud was reported to have had a bounding and whirling motion, and to have swept everything from its path where it touched the ground. A loud, rumbling noise was heard from the cloud, which emitted brilliant lightning. Heavy and damaging hail also fell at points to the north of the storm's path. A train that contained 9 freight cars was overturned and destroyed. There was probably much more damage than documented. Additional loss of life and personal injuries also may have occurred in which no report was received.



Figure 5-1. Photo of 1908 Tornado

Source: NWS, Birmingham

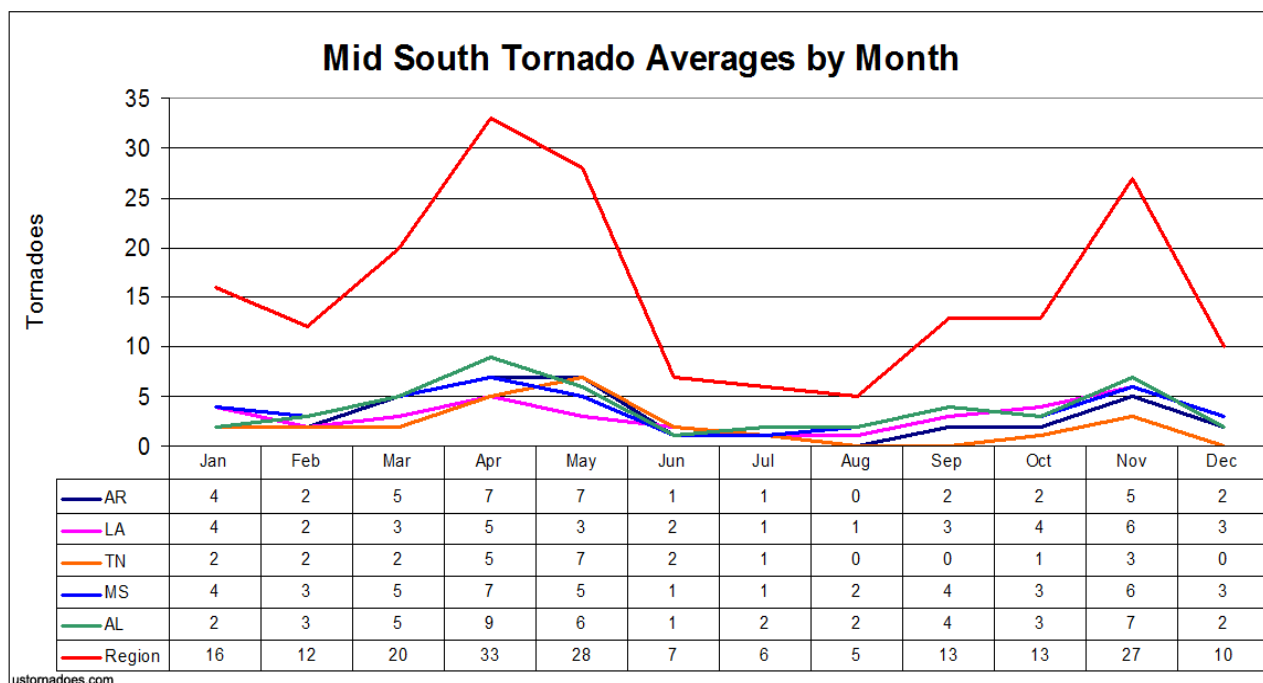
Most recently, on March 18, 2013, an EF-2 tornado contributed to at least seven injuries in Marshall County, destroyed at least two mobile homes, snapped and uprooted several trees and power lines, and caused significant damage to numerous other structures. The tornado that passed through Marshall County was the strongest tornado of the day (of the 10 reported tornadoes throughout the surrounding areas), with maximum winds of 125 mph. In addition, an EF-1 tornado touched down in Marshall County, causing damage in the Boaz/Sardis City area. Three people were injured during this tornado. These are just a few of the frequent occurrences of tornadoes common to Marshall County communities.



Source: Paul Jenkins

As shown on the following chart, tornadoes in Alabama typically occur between March and May of each year with a second peak in the late fall (November). Most tornadoes occur between 2 PM and midnight.

Chart 5-1. Monthly Tornado Frequency, Mid-South Region

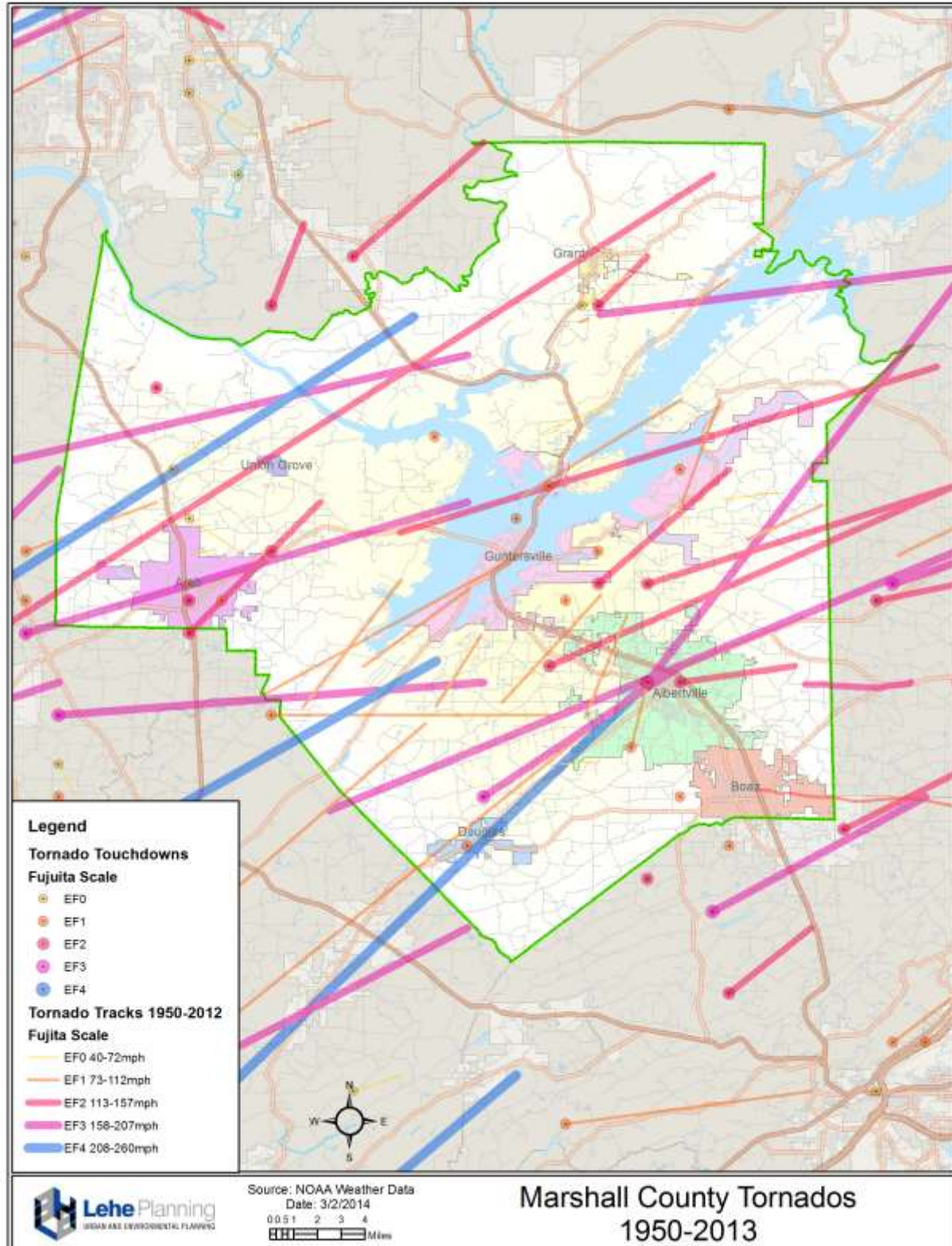


Source: ustornadoes.com, 2013

Location of Potential Tornadoes

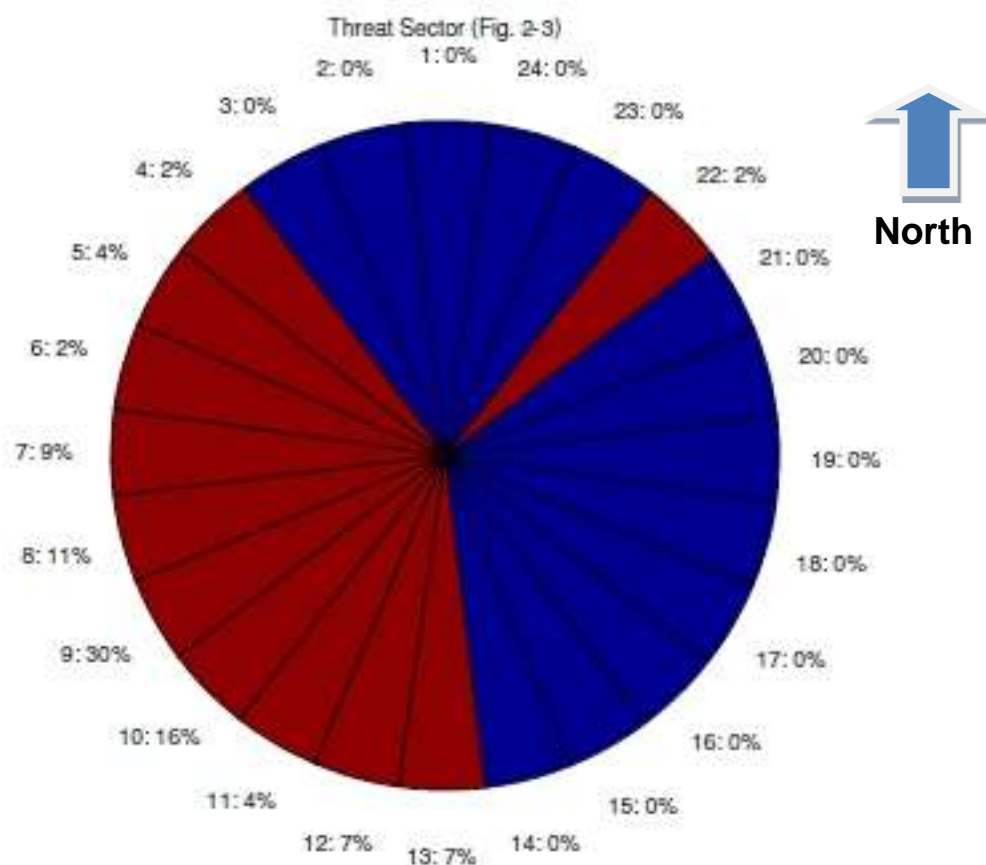
All Marshall County locations and jurisdictions are equally at risk for tornadoes. Paths of tornadoes and tornado touchdown locations within a 20-mile radius of the center of Marshall County from 1950-2013 are shown on Map 5-2. Although the map shows many of the tornadoes occurring within the Arab and Albertville areas during this period, the entire County is equally susceptible to damage from tornadoes.

Map 5-2. Marshall County Tornadoes, 1950-2013



The direction of tornadoes is shown in the following Chart 5-2 “Tornado Threat Sectors.” The threat sectors are color coded. Red sectors have had tornadic activity over the 1950-2006 periods, and blue sectors have had no activity. The chart indicates most tornadoes travel from a southwesterly direction.

Chart 5-2. Marshall County Tornado Threat Sectors

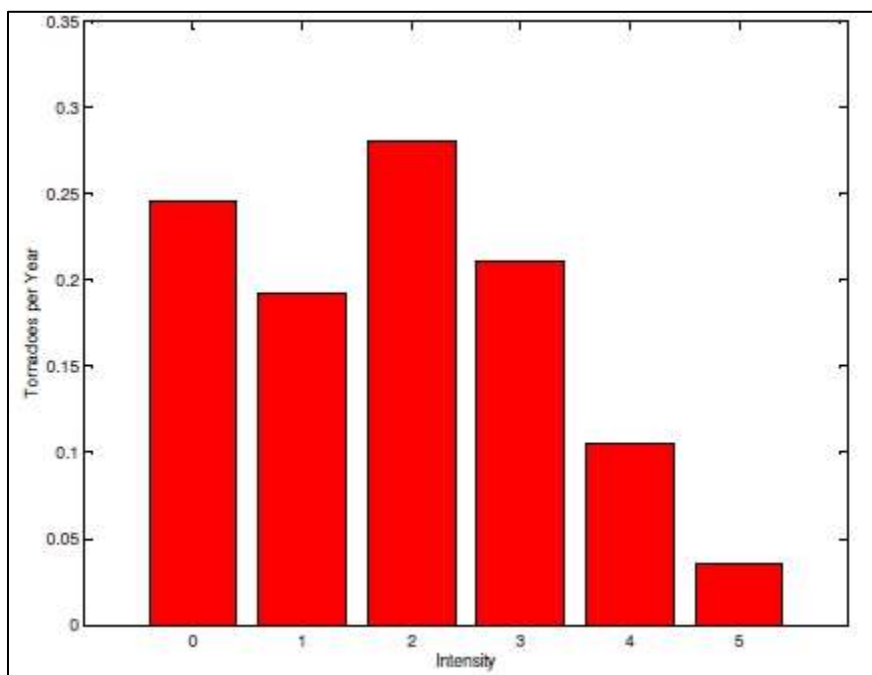


Source: VorTek, LLC. SATT 3.0 (Site Assessment of Tornado Threat) software

Extent and Intensity of Potential Tornadoes

Marshall County tornadoes, on average, tend to be severe and frequent, as shown on Chart 5-3 showing the frequency of tornadoes by intensity over the 1950-2006 periods. Also, refer to Map 5-2, which shows the intensity of mapped tornado paths and locations. The average intensity of tornadoes since 1950 is F-2. The locations of tornadoes by intensity are random, as shown on this map.

Chart 5-3. Annual Frequency of Tornado Intensity, Marshall County



Source: VorTek, LLC. SATT 3.0 (Site Assessment of Tornado Threat) software

Previous Occurrences of Tornadoes

According to the NOAA National Climatic Data Center records of tornadoes in Marshall County beginning in 1957 (see Table E-2 in Appendix E “Hazard Profile Data” for the complete NCDC Storm Events Database for tornadoes), the area had a total of 62 events, averaging 2.1 per year, with 163 injuries, 6 deaths, and close to \$39 million in damages. During the first wave of tornadoes on April 27, 2011, Marshall County was struck especially hard. Fifteen tornadoes swept through Marshall County and extensive damage was caused. Some of the damage includes chicken houses; piers, sheds, power poles, and uprooting of trees at Lake Guntersville; a steeple at Pleasant Hill Church; the roof of Lake Guntersville State Park lodge; Ferguson Fire & Fabrication Plant; and roofs on houses.

Table 5-6 depicts the annual summary of tornado events from 1957 to 2013, including number of deaths and injuries and total damages.

Table 5-6. Annual Summary of Tornado Events, 1957-2013

Year	Tornadoes	Deaths	Injuries	Total Damages
1957	2	0	6	\$250,000
1958	1	0	1	\$250,000
1961	1	0	8	\$250,000
1962	1	0	0	\$25,000

Year	Tornadoes	Deaths	Injuries	Total Damages
1964	1	0	0	\$25,000
1968	1	0	0	\$250,000
1972	1	0	2	\$25,000
1973	3	0	3	\$2,775,000
1974	2	0	1	\$28,000
1975	1	0	0	\$25,000
1976	2	0	0	\$275,000
1978	1	0	0	-
1981	1	0	0	\$25,000
1982	1	0	1	\$25,000
1983	2	0	2	\$2,525,000
1984	1	0	0	\$25,000
1985	1	0	5	\$2,500,000
1986	1	0	5	\$2,500,000
1994	2	0	30	\$5,500,000
1995	1	0	3	\$5,010,000
1996	1	0	0	\$350,000
2001	1	0	7	\$400,000
2002	1	0	0	\$1,400,000
2004	1	0	0	-
2006	3	0	0	\$110,000
2008	3	0	0	\$12,000
2009	5	1	6	\$54,000
2010	3	0	35	\$14,000,000
2011	15	5	48	\$50,000
2013	2	0	0	0
TOTAL	62	6	163	\$38,664,000
AVERAGE	2.1	.2	5.4	\$1,288,800

Source: National Climatic Data Center, 2013

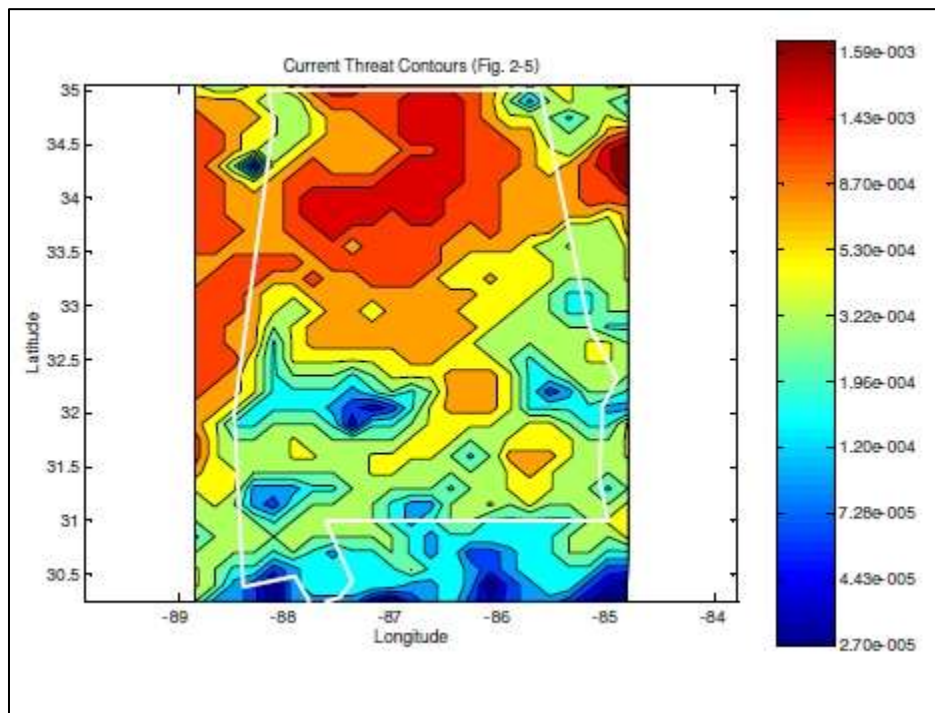
Probability of Future Tornado Events

Meteorologists are quick to point out that tornado frequency, intensity, and location are totally unpredictable. Past records are no guarantee of the probability of future events. The effect of climate change on tornadic activity is inconclusive. According to Jeff Trapp, a professor of atmospheric science at Purdue University, "while it's unclear how the intensity or frequency of tornadoes will increase, there may be more days featuring conditions ripe for twisters. We would see an increase in the number of days that could be favorable for severe thunderstorm and tornado formation. The tornado season, which varies by region, could be expanded".

If however, past trends continue, Marshall County can anticipate continued frequent and intense tornadic activity with substantial damages distributed uniformly

among all communities. Past trends indicate tornadoes would likely be annual events with infrequent breaks. Map 5-3 shows that Marshall County lays within a high threat area in North Alabama.

Map 5-3. Alabama Tornado Threat Contours



Source: VorTek, LLC. SATT 3.0 (Site Assessment of Tornado Threat) software

5.4.2 Severe Storms Profile

According to the Hazard Mitigation Planning Committee (see Appendix D “Hazard Ratings and Descriptions”), severe storms are the second highest natural hazard threat to Marshall County communities. NOAA records confirm these public perceptions. Severe storms bringing high winds, thunderstorms, lightning, and hail are common Marshall County occurrences, and often, tornadoes are associated with these severe storm events. On March 18, 2013, a severe thunderstorm produced extensive straight-line wind damage and spurred two tornadoes in Marshall County. Significant damage was sustained in the City of Albertville. The photo to the right shows debris on Hwy 431 in Albertville.



Source: WAFF 48 Storm Team

Location of Potential Severe Storms

All areas of Marshall County have experienced frequent severe storms, including thunderstorms, high winds, heavy precipitation, hail, and lightning and share equal risks for all types of severe storms. The locations of these historical events cannot be mapped.

Extent and Intensity of Potential Severe Storms

The extent of each storm event markedly varies according to storm severity and duration. Storm severity can be measured by the storm characteristics, which may include heavy precipitation, large hail, intense lightning, and high winds. The exact extent of severe storms is not predictable. Severe storms can also result in flooding due to heavy precipitation and wildfires due to lightning and will accompany hurricanes and tornadoes.

Large hail, though very rare, can cause injury or loss of life and major property damages. Normally, however, hail damage is limited to automobiles and minor building damage. Both lightning and high winds have the potential to cause loss of life and considerable property damage. The power of lightning's electrical charge and intense heat can electrocute on-contact, split trees, and ignite fires. High winds are often the cause of power outages and can cause severe damages to buildings and infrastructure by fallen trees and direct wind gusts.

Previous Occurrences of Severe Storms

National Climatic Data Center (NCDC) records indicate frequent annual severe storm occurrences since 1960. There have been over 300 severe storms reported for Marshall County with a frequency of 10.5 per year. Total damages have been substantial in some cases, with the most significant damage occurring in 2004 at approximately \$2.5 million.

Table 5-7. Annual Summary of Severe Storm Events, 1960-2013

Year	Type	Number	Deaths	Injuries	Total Damages
1960	Thunderstorm	1	0	0	\$0
1961	Thunderstorm	1	0	0	\$0
1964	Thunderstorm	1	0	0	\$0
1965	Thunderstorm	1	0	0	\$0
1967	Thunderstorm	1	0	0	\$0
1967	Hail	1	0	0	\$0
1968	Hail	1	0	0	\$0
1969	Thunderstorm	1	0	0	\$0
1973	Thunderstorm	1	0	0	\$0
1974	Thunderstorm	1	0	0	\$0
1974	Hail	1	0	0	\$0
1975	Thunderstorm	3	0	0	\$0

Year	Type	Number	Deaths	Injuries	Total Damages
1975	Hail	2	0	0	\$0
1977	Thunderstorm	1	0	0	\$0
1979	Thunderstorm	1	0	0	\$0
1981	Thunderstorm	2	0	0	\$0
1982	Thunderstorm	1	0	0	\$0
1983	Thunderstorm	2	0	0	\$0
1983	Hail	1	0	0	\$0
1984	Thunderstorm	2	0	0	\$0
1984	Hail	1	0	0	\$0
1985	Thunderstorm	11	0	0	\$0
1986	Thunderstorm	4	0	0	\$0
1986	Hail	1	0	0	\$0
1987	Thunderstorm	1	0	0	\$0
1988	Thunderstorm	3	0	0	\$0
1989	Thunderstorm	3	0	0	\$0
1989	Hail	4	0	0	\$0
1990	Thunderstorm	3	0	0	\$0
1990	Hail	1	0	0	\$0
1991	Thunderstorm	3	0	0	\$0
1992	Thunderstorm	4	0	0	\$0
1992	Hail	2	0	0	\$0
1993	Thunderstorm	1	0	0	\$0
1994	Thunderstorm	5	0	0	\$565,000
1994	Hail	3	0	0	\$5,000
1994	Precipitation	1	0	0	\$0
1994	Lightning	3	0	0	\$60,000
1995	Thunderstorm	6	0	0	\$51,000
1995	Hail	1	0	0	\$0
1995	Lightning	4	0	1	\$63,000
1996	Thunderstorm	9	0	0	\$751,000
1996	Hail	3	0	0	\$51,000
1996	Lightning	2	0	0	\$30,000
1997	Thunderstorm	8	0	0	\$73,000
1997	Hail	4	0	0	\$58,000
1997	Precipitation	1	0	0	\$50,000
1997	Lightning	1	0	0	\$7,000
1998	Thunderstorm	12	0	0	\$202,000
1998	Hail	10	0	0	\$193,000
1998	Lightning	1	0	0	\$30,000
1999	Thunderstorm	9	0	0	\$26,000

Year	Type	Number	Deaths	Injuries	Total Damages
1999	Hail	3	0	0	\$3,000
1999	Precipitation	1	0	1	\$0
1999	Lightning	2	0	0	\$17,000
2000	Thunderstorm	4	0	0	\$144,000
2000	Hail	3	0	0	\$4,000
2001	Thunderstorm	4	0	0	\$14,000
2001	Hail	3	0	0	\$2,000
2002	Thunderstorm	5	0	0	\$213,000
2002	Hail	4	0	0	\$0
2002	Lightning	1	0	0	\$25,000
2003	Thunderstorm	11	0	0	\$2,000
2003	Hail	18	0	0	\$0
2004	Thunderstorm	15	0	3	\$2,505,000
2004	Hail	2	0	0	\$0
2005	Thunderstorm	7	0	0	\$0
2005	Hail	9	0	0	\$0
2006	Thunderstorm	13	0	0	\$27,000
2006	Hail	16	0	0	\$35,000
2006	Lightning	1	0	0	\$2,000
2007	Thunderstorm	10	0	0	\$0
2007	Hail	1	0	0	\$0
2008	Thunderstorm	11	0	0	\$16,000
2008	Hail	7	0	0	\$0
2009	Thunderstorm	22	0	0	\$757,000
2009	Hail	19	0	1	\$0
2010	Thunderstorm	19	0	0	\$253,000
2010	Lightning	2	1	5	\$0
2010	Hail	4	0	0	\$50,000
2011	Thunderstorm	54	0	0	\$388,000
2011	Lightning	5	0	0	\$5,000
2011	Hail	9	0	0	\$5,000
2012	Thunderstorm	9	0	0	\$185,000
2012	Hail	8	0	0	\$0
2013	Thunderstorm	13	0	0	\$137,000
2013	Lightning	3	0	0	\$16,000
2013	Hail	3	0	0	\$0
TOTAL		302	0	5	*\$5,224,000
Annual Avg.		10.5	0	0.2	*\$156,000
*includes damages for Marshall and other Alabama counties					

Source: National Climatic Data Center, 2013

Probability of Future Severe Storm Events

Frequent annual events are certain. Past trends show annual occurrences of thunderstorms, hail, and lightning, which are likely to continue throughout all Marshall County jurisdictions. High winds are less frequent, and large, damaging hail is rare. Regarding the impact of climate change on severe storms, the National Climatic Data Center says “that heavy and extreme precipitation events often associated with thunderstorms and convection are increasing and have been linked to human-induced changes in atmospheric composition”.

5.4.3 Floods Profile

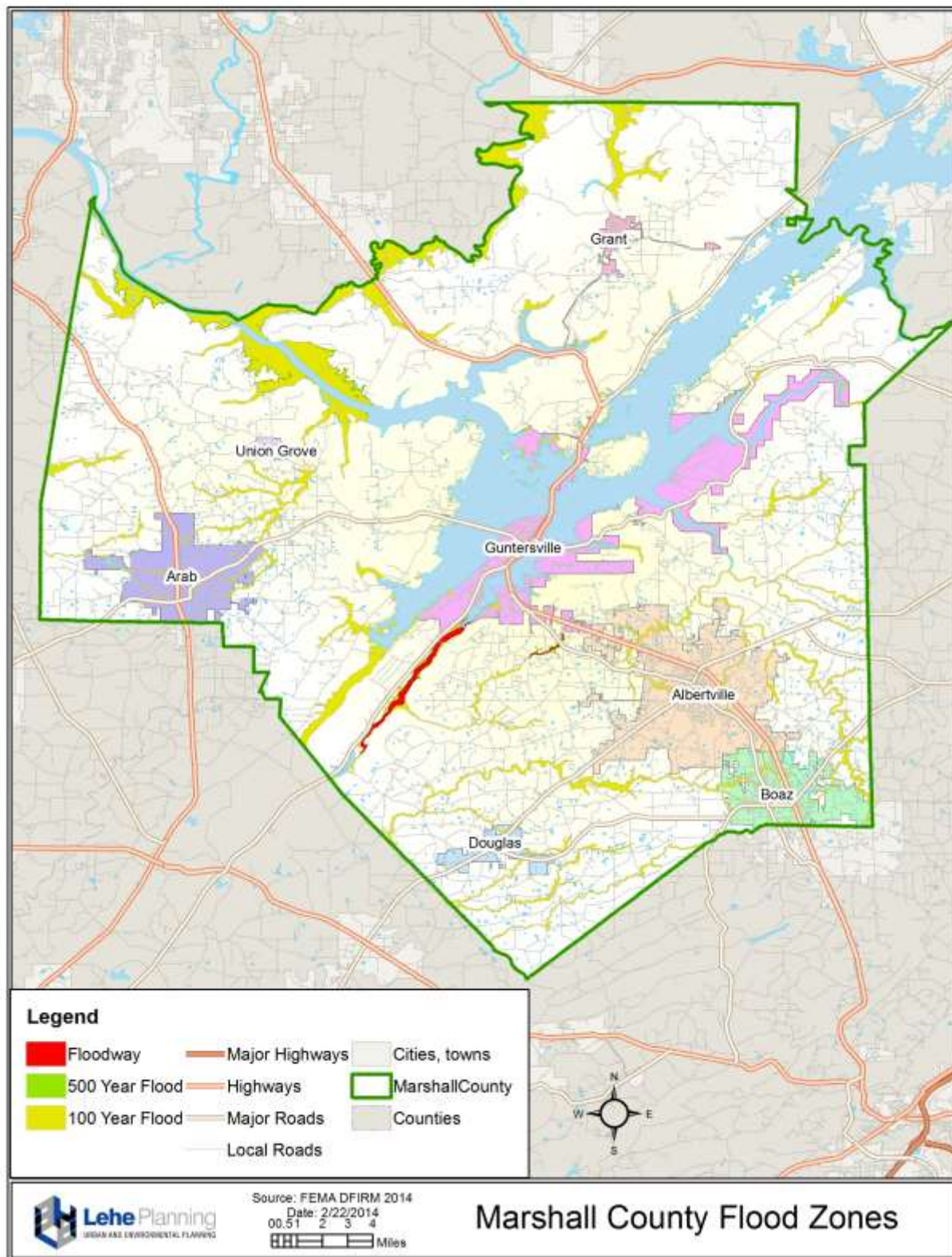
On December 9, 2004, a rainfall of several inches resulted in many road closures due to flash flooding throughout Marshall County. This is a typical flash flood event, a recurring problem throughout the County.

According to the Hazard Mitigation Planning Committee (see Appendix D “Hazard Ratings and Descriptions”) and surveys of community opinions, floods are of moderate concern to Marshall County communities. NOAA records confirm these public perceptions, and many other localized flooding events have been reported by local newspapers. These local news archives show that occasional storm bursts exceeding four inches of rain in a short period of time have forced evacuations of home, road and bridge closings, and flooding of buildings.

Location of Potential Floods

According to the Flood Insurance Rate Maps (FIRM's) of the National Flood Insurance Program (NFIP), Marshall County does not have extensive flood plains. Map 5-4 “Flood Zones” shows most flood zones are limited to rural locations in unincorporated areas of the County. The major concern is not riverine flooding of Lake Guntersville, the Tennessee River, and their tributaries; rather the concern is with more localized flash flooding of roads and bridges following heavy rain falls. These flash flood conditions are common throughout the County.

Map 5-4. Flood Zones



Extent and Intensity of Potential Floods

The extent of each flood varies according to the amount of rainfall, the rate of storm water flow, and the capacity of the receiving channel to discharge flood waters. Almost all of Marshall County waterways flow through a system of tributaries and drainage ways to Lake Guntersville and the Tennessee River. The Guntersville Dam on the Tennessee River is a control for Guntersville Lake capacity and is effective in preventing damages from major rainfall events. Consequently, most damaging events are as a direct result of inadequate local drainage systems unable to handle excessive rainfalls. This often results in flash flooding. These flash flood events can vary quite a bit in severity depending on the rate and amount of precipitation and local drainage conditions. Generally, however, Marshall County has moderate risk of damages due to floods. Extensive flood zones are primarily confined to rural locations below Guntersville Dam on the Tennessee River, along the northern county limit, and southwest of Lake Guntersville, where property damages from a 100-year flood would be minimal.

Previous Occurrences of Floods

National Climatic Data Center (NCDC) records (see Table E-9 in Appendix E for the complete NCDC listing) indicate frequent flooding over the period since 1997. There have been 54 floods reported for Marshall County with a frequency of four per year, as shown in Table 5-8. Total recorded damages have been minor, according to the NCDC estimates. The NCDC records and estimates, however, conflict with local news reports. See Table E-10 in Appendix E for select local newspaper accounts of flooding events, resulting in significant damages to buildings, roads, and bridges and evacuations of homes. Apparently, the impacts of flooding in Marshall County are much worse than the NCDC records indicate.

Table 5-8. Annual Summary of Flood Events, 1997-2013 (NCDC)

Year	Floods	Deaths	Injuries	Total Damage
1997	3	0	0	\$64,000
1998	1	0	0	\$55,000
1999	1	0	0	\$8,000
2000	1	0	0	\$10,000
2001	2	0	4	\$103,000
2003	5	0	0	\$250,000
2004	6	0	0	\$0
2008	2	0	0	\$27,000
2009	10	0	0	\$470,000
2010	2	0	0	\$0
2011	10	0	0	\$15,000
2012	5	0	0	\$105,000
2013	6	0	0	\$0
TOTAL	54	0	4	\$1,107,000
AVERAGE	4.2	0	0.3	\$85,154

Source: National Climatic Data Center, 2013

Probability of Future Flood Events

Past trends indicate regular occurrences of heavy rainfalls should continue to create conditions of flash flooding throughout Marshall County. The 100- and 500-year flood events will be unlikely from year to year, and damages should not be substantial and widespread. With respect to climate change, an increase in temperature and moisture in the air can lead to heavier precipitation events. However, the causes of flooding are varied, including improper land uses on floodplains, surface paving, quality of flood forecasting, settlement patterns, and warning systems.

5.4.4 Winter Storms/Freezes Profile

Although winter storms in Alabama are not as common as in more northern regions of the U.S., the most frequent Alabama occurrences are in the higher elevations of northern Alabama, such as the Sand Mountain communities of Marshall County. Still, such storms are usually relatively mild, characterized by an occasional dusting of snow or short freezing rain falls. On average, the county receives 2.6 inches of snowfall annually with about one event per year.

When the occasional snow storm or severe freeze does occur, major transportation disruptions and power outages may be experienced. This is largely due to local inexperience in coping with such infrequent occurrences. Consequently, the risks associated with this type of weather are largely a direct correlation to the community's ability to handle the storm. These risks include loss of life due to cold, loss

of electricity for extended periods of time, agricultural damage, and road hazards. Fallen trees and limbs and heavy snow loads can cause roof collapses and downed power and communications lines. Heavy snowfalls over two inches and long-lasting freezes are more infrequent, but create higher risks. Disruptions can last for several days following these extreme winter storm conditions. In addition, extreme cold temperatures can take a toll on propane and electric co-operatives.

Winter temperatures in Marshall County are generally moderate, with average temperature of 43.5° F and average minimums at 32.7° F. Extreme cold temperatures are rare, but do occur. These rare temperature lows could result in burst plumbing in homes and occasional deaths due to lack of sufficient heating or exposure to cold. The lowest recorded temperature of -11° F occurred in 1985. See Table 5-9.

Table 5-9. Winter Weather Observations

Item	Observation
Average Winter Temperature	43.5° F
Average Winter Minimum Temperature	32.7° F
Lowest Temperature (January 21, 1985)	-11° F
Average Season Snowfall	2.6 inches
Largest Snowfall (1940)	12.4 inches

Source: SE Regional Climate Center, 2012

Location of Potential Winter Storms/Freezes

Marshall County and its participating jurisdictions are equally likely to experience winter storms/freezes, which may include snow, freezing rains, and extreme temperature lows. All areas of the county are equally exposed to these types of weather events with somewhat colder temperatures and snowfall frequency in the higher elevations.

Extent and Intensity of Potential Winter Storms/Freezes

On average, Marshall County experiences annual disruptions and some damages due to severe winter storms/freezes. The average snowfall is 2.6 inches yearly, but some events have produced major disruptions and damages. Winter temperatures on average are above freezing, but occasional freezes do occur. The Hazard Mitigation Planning Committee (HMPC) (see Appendix D “Hazard Ratings and Descriptions”) rated the extent of winter storms/freezes as moderately high.

Previous Occurrences of Winter Storms/Freezes

Table 5-10 “Winter Storm Damages” provides a summary of the available historical data since 1993 for winter weather events in Marshall County. There have been 22 reported winter storm events since 1993 according to the National Climatic Data Center (refer to Table E-12 “Marshall County Snow and Ice Events, 1993-2013” in Appendix E). Table 5-11 reports extreme temperature lows. (Refer to Table E-13

“Marshall County Extreme Cold Events, 1996-2013” in Appendix E). Some of the most significant winter storm events over the last 53 years are described below.

The most recent recorded snow events occurred February 12-13, 2014 and January 28-30, 2014, the latter of which wreaked havoc on Alabama’s transportation network, leaving people stranded in their cars, at work, at school, and walking to the nearest shelter. More details of these events will be discussed in the next plan update.

The December 23-25, 1998, winter storm brought a mixture of freezing rain, sleet, and rain to the northern half of Alabama. Marshall County was especially hard hit. The precipitation began around 2 AM and lasted until early afternoon on the 24th, with temperatures at or below freezing for the majority of the event. Rain precipitation ranged from one to three inches, and ice accumulations of one half to one inch were common. Numerous trees were down. Significant power outages were not restored in many locations until the 26th or 27th. The National Guard was activated to help with the cleanup duties. Numerous roads were closed during the event, including Interstate 65 and 565 in the Huntsville area. Numerous multiple vehicle and single automobile accidents occurred due to the icy road conditions. These accidents resulted in at least five fatalities and numerous minor injuries in northern Alabama.

On February 4, 1998, a winter storm brought two to six inches of snowfall over the northeast region of the state. This storm resulted in vehicle accidents due to slick roads and downed power lines.

Record low temperatures affected much of North Alabama, when unusually cold temperatures of 15 to 22 degrees over the March 7-10, 1996, period caused major crop damages.

February 1-3, 1996, a winter storm brought freezing precipitation to North Alabama. Freezing rain, followed by light snow, brought halted traffic. Ice accumulations downed trees, resulting in widespread power outages. A number of commercial chicken houses collapsed under the weight of ice and snow. Marshall County School systems remained closed for a week. Freezing temperatures dipped below 10 degrees. Another winter storm occurred just one month earlier on January 6, 1996.

The most damaging winter storm in Alabama history was in March 1993 with damages totaling \$5.0 billion dollars. This event is commonly referred to as the “Blizzard of 1993,” which had severe impacts throughout the eastern U.S., affecting 26 states and parts of Canada. The storm began on Friday March 12, 1993, and lasted through mid-day Saturday, March 13, 1993. By mid-day Saturday snow had accumulated to 6 to 12 inches over North Alabama. An estimated 400,000 homes were without electricity, and many remained so for several days. Compounding the snow and power problems, temperatures fell well into the single digits and teens across much of the state Saturday night. There were at least 14 deaths associated with the storm. The entire state was declared a Federal Disaster Area.

The largest snowfall recorded in Marshall County occurred in January 1940 at 12.4 inches. Additional winter storms and extreme cold events since 1993 are described in Tables 5-10 and 5-11 below.

Table 5-10. Winter Storm Damages

Year	Winter Storm	Deaths	Injuries	Total Damages
1993	1	4	0	\$5,000,000,000
1995	2	0	0	\$0
1996	3	0	0	\$1,208,000
1997	2	0	0	\$64,000
1998	2	0	0	\$14,427,000
1999	1	0	0	\$0
2000	1	0	0	\$75,000
2001	1	0	0	\$0
2004	1	0	0	\$0
2008	1	0	0	\$0
2010	3	0	0	\$0
2011	2	0	0	\$0
2013	2	0	0	\$0
TOTAL	22	4	0	\$5,015,774,000
Annual Average	1.7	0.3	0	\$385,828,769
*Multiple counties affected; cannot compute averages for Marshall County				

Source: National Climatic Data Center

Table 5-11. Extreme Cold Events and Damages

Year	Extreme Cold	Deaths	Injuries	Total Damages
1996	2	1	0	\$52,000,000*
2009	1	0	0	\$0
TOTAL	3	1	0	\$52,000,000*
*Multiple counties affected				

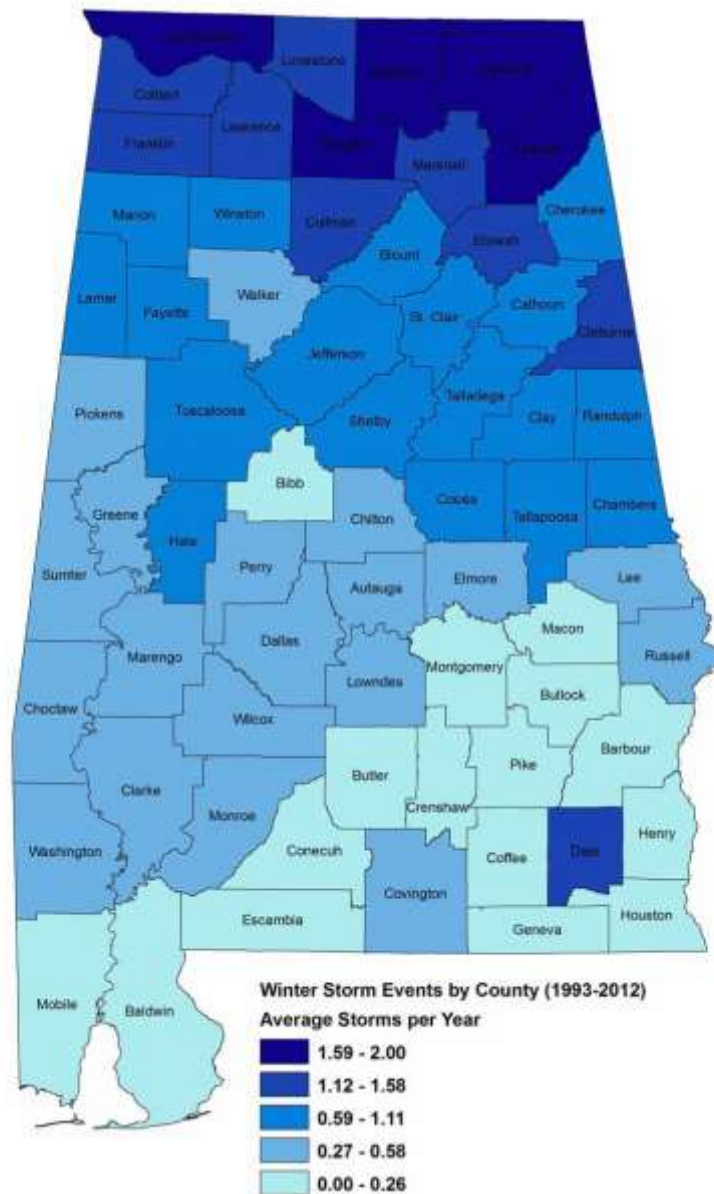
Source: National Climatic Data Center

Probability of Future Winter Storm/Freeze Events

Winter storms/freezes should continue to affect Marshall County on an annual basis to some extent. However, the historical records cannot determine future outcomes; frequency of these events is totally unpredictable. The risks associated with the average annual hazard are slight, but the more infrequent, severe winter storms/freezes have potentially severe risks. These severe winter events can cause

major transportation disruptions, lengthy power outages, substantial property damages, and some loss of life. Map 5-5, which follows, shows the higher relative frequency of winter storms in North Alabama from 1993-2012 and indicates that Marshall County has approximately 1.12 to 1.58 winter storms per year. With an increase of moisture in the atmosphere, it is probable that precipitation will get heavier and under the right conditions could lead to heavier snowfall.

Map 5-5. Alabama Winter Storm Interval (1993-2012)



Source: State of Alabama Hazard Mitigation Plan, 2013

5.4.5 Hurricanes Profile

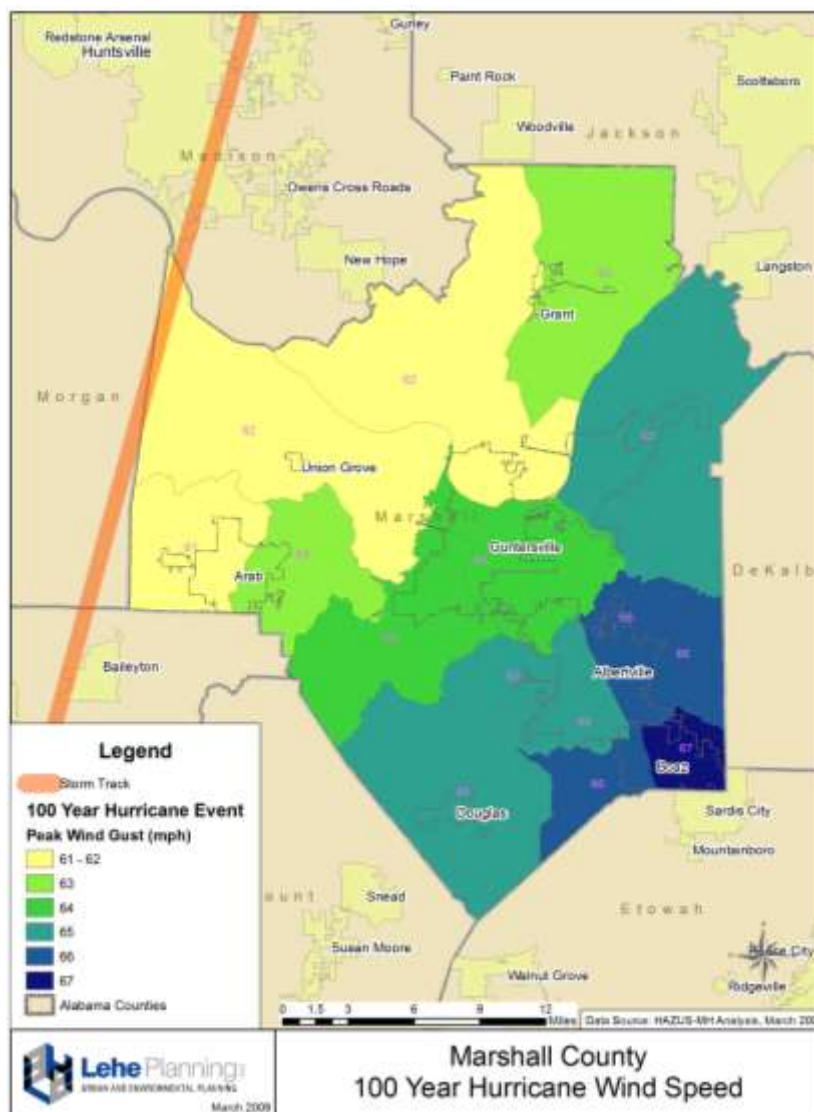
Nine Federal disaster declarations for hurricanes have included Marshall County from 1973 to 2012 (see Table 5-4). Beginning with Hurricane Opal on October 4, 1995 (declaration #1070), other hurricane declarations have included Ivan on September 15, 2004 (#1549), Dennis on July 10, 2005 (#1593), Katrina on August 29, 2005 (#1605 and #3237), Gustav on August 30, 2008 (#3292 and #1789), Ike on September 26, 2008 (#1797), and Isaac on September 21, 2012 (#4082). Although Marshall County is

approximately 296 miles inland from the Gulf Coast, it is not immune to the damaging effects of hurricanes.

Location of Potential Hurricanes

All Marshall County locations and jurisdictions generally share equal risk for hurricanes. According to a probabilistic model of hurricanes using FEMA's HAZUS-MH hurricane module, peak wind gusts from a 100-year probability hurricane event, approach 67 mph, decreasing slightly in the northern areas of Marshall County (see Map 5-6 "100-Year Hurricane Wind Speeds"). In this 100-year event scenario, the storm track lies immediately to the west of Marshall County, traveling to the northeast. This is similar to the Hurricane Opal track of October 1995 and the Hurricane Ivan track of September 2004.

Map 5-6. 100-Year Hurricane Wind Speeds



Extent and Intensity of Potential Hurricanes

Inland hurricanes will dissipate by the time they reach Marshall County, which is located over 300 miles from the closest Gulf Coast landfall location. Should the path pass through or very near Marshall County, the hurricane would be downgraded to a tropical depression with thunderstorms and maximum sustained winds of 38 mph or less. If rated as an inland tropical storm, maximum sustained winds could go as high as 73 mph. High wind gusts, as demonstrated through the HAZUS-MH 100-year scenario, of up to 67 mph can cause trees, signs, and power lines to topple, damaging buildings and causing sustained power outages. Some deaths may occur as a result of falling trees and electrocution from downed power lines.

Tropical storms and depressions often bring torrential rains and flooding, which may last for days after the storm has passed. The dissipated strength of the inland storm does not necessarily affect the amount of rainfall and resultant flood levels. A weak tropical storm or depression moving slowly or lingering can cause more damage due to flooding than a fast moving hurricane.

Tornadoes may also occur – some hurricanes produce none, while others spawn numerous ones. According to hurricane records, half produce one or more tornadoes with capabilities to compound wind damages. If a tornado is going to spawn as a result of a hurricane, it will typically occur within 12 hours of landfall and during daylight hours. This timeframe is within reach of Marshall County. Normally, a tornado watch will usually follow the projected inland path of a hurricane.

Previous Occurrences of Hurricanes

One of Alabama's most significant inland hurricane events of record, Hurricane Opal, came ashore in the Florida Panhandle on October 4, 1995, and moved across the state of Alabama to its northeast corner of Alabama, having direct impacts on Marshall County. Wind damage was extensive and no Alabama County was spared impact, with many trees, signs, and power lines downed. At its worst, 2.6 million people in Alabama were without electricity, some for over a week. The center of the storm moved just west of the City of Montgomery, near the City of Talladega, and near Fort Payne before exiting the state. Wind speeds varied across the state; at nearby Huntsville, winds were recorded at 55 mph and to the southeast in Etowah County, two people were killed from a toppled tree. Heavy rains caused streams to swell to bank full and beyond. Water damage occurred to structures in many locations where wind or falling trees damaged roofs. One death occurred in Marshall County, as a result of this hurricane (CDC, 1998).

Map 5-7. Hurricane Opal Track

Source: National Hurricane Center

Ivan made landfall around 1:00 AM CST near Gulf Shores, Alabama on September 16, 2004. By 10 PM, the storm had passed through Marshall County as a tropical depression with sustained winds of 35 mph and gusts of up to 60 mph. The following maps show the path and strength of Ivan as it passed through Marshall County.

Map 5-8. Hurricane Ivan Track

Source: National Hurricane Center

Map 5-9. Hurricane Ivan Alabama Path



Source: National Weather Service, Birmingham

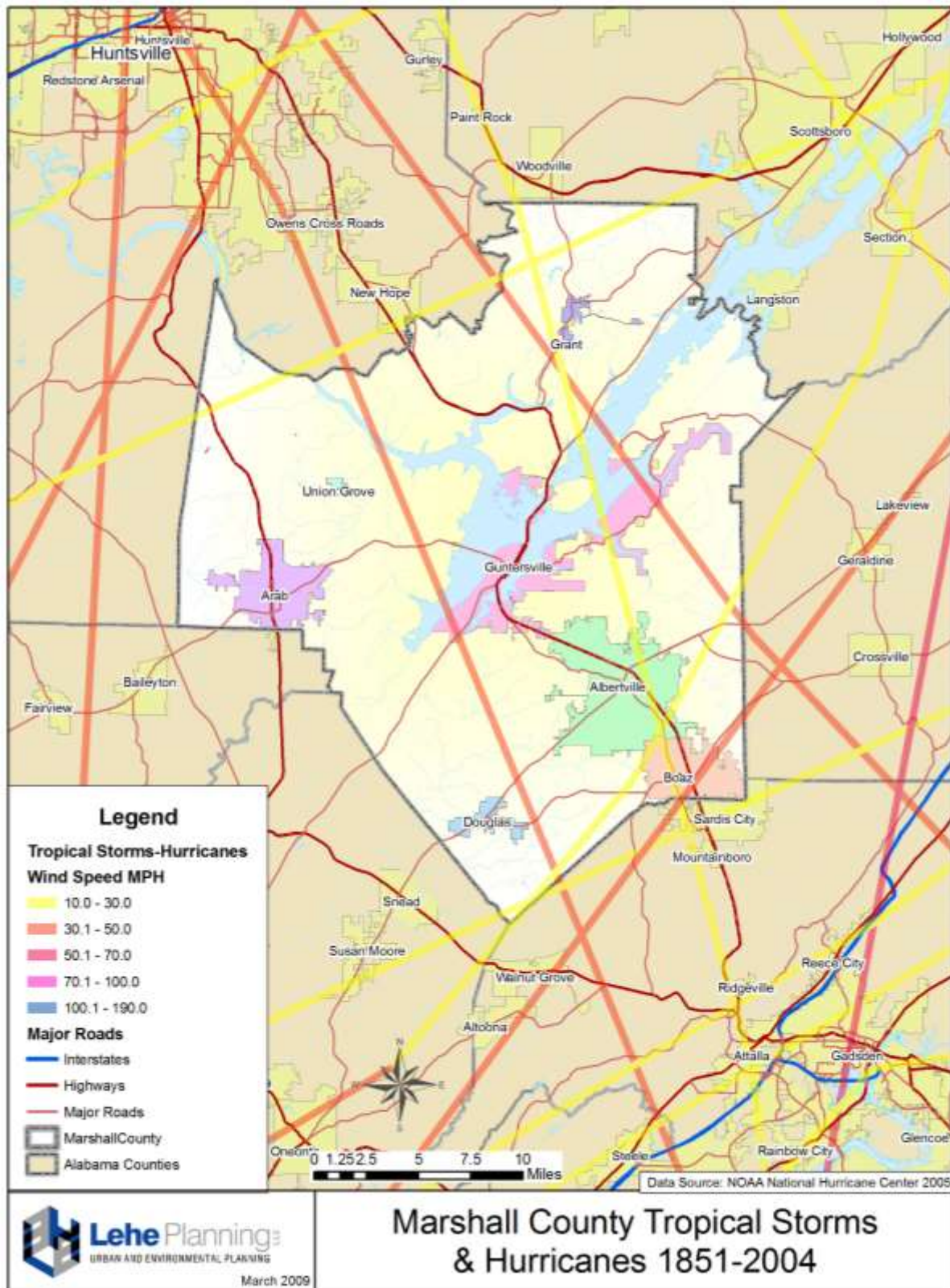
Map 5-10. Hurricane Ivan Alabama Peak Wind Gusts



Source: National Weather Service, Birmingham

Prior to Hurricane Ivan in 2004, many hurricanes have affected Marshall County. The paths of these storms since 1851 are shown on Map 5-11. “Hurricane Paths, 1851-2013,” which shows all areas of Marshall County equally affected. Other hurricanes affecting Marshall County since 2004 include the remnants of Dennis on July 10, 2005, Katrina on August 29, 2005, and Isaac, September 21, 2012.

Map 5-11. Hurricane Paths, 1851-2004



Probability of Future Hurricane Events

As is the case with most natural hazards, past records are no guarantee of the probability of future hurricane events affecting Marshall County. Given its inland location within about 300 miles of the Gulf Coast, however, Marshall County can continue to expect the remnants of frequent Gulf Coast hurricanes and occasional direct impacts of tropical depressions. Hurricane path records since 1851 show the likelihood of continued direct paths through or nearby Marshall County. The county's location within ten hours of a Gulf Coast hurricane landfall would cause the hurricanes to dissipate to tropical depression status. The probable impacts of tropical depressions directly passing through or near Marshall County would be damages resulting from high wind gusts above 65 mph, heavy rainfall causing localized flooding of streams and drainage ways, and possible tornadoes.

Climate changes affect future hurricane events in that the hurricane season has been expanded in recent years. The typical April through November hurricane season is lasting longer. According to Meteorologist Jeff Masters, this is likely due to warmer seawater and an increase of moisture in the atmosphere. Hurricanes most significant damage is caused by high winds and storm surges. While the effect of climate change on winds is debatable, there is a general consensus that sea levels are rising and water temperatures are increasing as a direct result of global warming.

5.4.6 Droughts/Heat Waves Profile

Four drought events in Marshall County have occurred in recent years (2010 and 2011); however the most significant drought occurred in 2007. The 2007 drought broke all records making it the driest year for Marshall County on record. With drought conditions carrying over from 2006, by late spring of 2007 the drought moved up to a D4 Exceptional Drought intensity, the highest intensity, which is characterized by widespread crop and pasture losses, wildfires, and severe shortages of water resources in reservoirs, streams, and wells. The 2007 drought was not limited to Marshall County and Central Alabama; it became widespread, affecting most of the southeastern U.S. Drought conditions persisted throughout the remainder of the year and through the end of 2008. These exceptional conditions affected every segment of the population: crop yields were greatly below normal; livestock suffered as ponds and wells dried up; forestry weakened; trees became more brittle and vulnerable to snapping during severe weather events; lake levels fell with many boats and docks in Central Alabama standing on dry land and marinas closing; major shipping routes throughout Alabama became almost impassable; and lawns and gardens dried up as many communities imposed strict water restrictions. The Exceptional Drought intensity rating persisted throughout 2008 until being lifted on December 16.

Location of Potential Droughts/Heat Waves

Droughts and heat waves occur countywide, affecting all Marshall County jurisdictions. Some areas may be more susceptible to the effects of drought such as agricultural areas and areas with vulnerable water supplies.

Extent and Intensity of Potential Droughts/Heat Waves

The drought event that occurred during 2007 was the driest time in recorded history, which dates back over a century. The National Weather Service in Huntsville indicated that Marshall County was in a mild to moderate drought as early as June 2006 that continued to worsen through 2007. It ranks as the driest calendar year in history with only 16.49 inches of rainfall. The second driest year on record occurred in 1902. On June 5, 2007, Marshall County was included in a D4 exceptional drought classification, which is the worst intensity of the five-category system used by the U.S. Drought Monitor. During the spring of 2008, there was some needed rain when the drought status was downgraded and lifted by year's end.

Previous Occurrences of Potential Droughts/Heat Waves

According to the National Climatic Data Center (NCDC) records, there have been 21 drought occurrences that have occurred between 2007 and 2013 (Table 5-12). Prior to 2007, there was no information available in the NCDC database for Marshall County. There are four instances of droughts/heat waves recorded in local news reports. These events are recorded in Table E-17 in Appendix E "Hazard Profile Data". According to the NCDC, there have been reports of nine extreme heat events (Table 5-13). These are provided in Table E-16 "Marshall County Extreme Heat Events" in Appendix E. Also included in Appendix E are summaries of recent news articles about the drought events that occurred.

Table 5-12. Drought and Damages

Year	Drought	Deaths	Injuries	Total Damages
2007	10	0	0	\$0
2008	7	0	0	\$0
2010	3	0	0	\$0
2011	1	0	0	\$0
TOTAL	21	0	0	\$0
AVERAGE	5.25	0	0	\$0

Source: National Climatic Data Center, 2013

Table 5-13. Extreme Heat and Damages

Year	Extreme Heat	Deaths	Injuries	Total Damages
1996	1	0	0	\$0
2000	1	1	0	\$0
2007	1	0	0	\$0
2010	3	0	0	\$0
2012	3	0	0	\$0
TOTAL	9	1	0	\$0
AVERAGE	1.8	0.2	0	\$0

Source: National Climatic Data Center, 2013

Probability of Future Drought/Heat Wave Events

Marshall County is susceptible to drought and heat waves. Although there is not a great deal of historical record of drought conditions, it can occur. According to the National Climatic Data Center, “scientists know that atmospheric moisture plays an important role in heat waves. They tend to occur more frequently in dry conditions with low humidity, but heat waves in high humidity can take their toll on the population, livestock, and wildlife”.

5.4.7 Wildfires Profile

The two primary categories of wildfires experienced in Marshall County are wild land fires and interface fires. Wild land fires are fueled exclusively by natural vegetation. Marshall County has vast forested lands, grass lands, and brush to fuel wildfires. Map 5-12 “Marshall County Forest Fuels” shows the extensive coverage of forest fuels throughout the county, as well as developed urban areas in close proximity to the forest fuels. Interface fires are fueled by both vegetation and the built up environment. Due to the current growth in Marshall County, many families are pushing urbanization into rural landscapes. This is known as the wild land-urban interface. With this urban-to-rural movement comes the increased risk of human-caused wildfires.

A major problem in relation to wildfires is non-permitted burns. These burns tend to rage out of control, leading to damaging fires. Without the practice of prescribed burns, thinning, mowing and the use of herbicides, vegetation that will spread fires can proliferate causing more of a threat with the additional fuel sources for wildfires. The practice of prescribed burns not only helps reduce the fuels available for wildfires, but also aids in the development of certain habitats and the regeneration of certain species.

Location of Potential Wildfires

Primarily rural areas of unincorporated Marshall County are susceptible to wildfires; however, wildfires can occur in any area where there is the proper fuel, topography, and weather mix. The vulnerable wild land-urban interface makes all cities and towns equally susceptible. Map 5-13 “Marshall County Wildfire Risk,” denotes areas throughout the county at various risk levels for wildfires.

Extent and Intensity of Potential Wildfires

Marshall County has multiple fuel sources and is prone to drought and thunderstorms which increase the potential severity of wildfires significantly. The county has an abundant fuel source with 150,446 acres of forestland. Weather conditions, given the high frequency of severe storms with lightning and periodic severe drought conditions, can exacerbate wildfires.

Another factor that has direct impact on wildfire formation and increase the risk for wildfires in Marshall County is topography. Topography can have a powerful influence on wildfire behavior. Slope, canyons, gulches, and hollows can greatly increase the rate of spread and hamper access. These slopes lend themselves to rapid spreading fires due to their angle. The greater the slope, the faster the flames move and

the longer the flames endure. Wildfires can reach into overhanging canopies, allowing spread not only through the lower areas of the forest, but the ability to jump to other trees. According to the local Alabama Forestry Commission office, the terrain is extremely rough over parts of Marshall County, making suppression efforts extremely difficult and time consuming.

The degree of exposure of properties at the wild land-urban interface also affects the extent of wildfires in Marshall County, especially at the edge of developed areas of cities and town. High-risk properties located within these interface areas have the greatest potential for property damages and threats to life.

Finally, firefighting resources can also impact the severity of wildfires. Rural fire departments are almost exclusively made up of volunteers and usually have limited resources that are stretched during periods when numerous fires occur. These limited firefighting resources can compound the risk and extent of wildfire damages.

Past Occurrences of Wildfires

On December 3, 2012, Marshall County experienced a 100-acre wildfire in a mountainous area littered with storm debris from 2011. According to the Alabama Forestry Commission, Marshall County averaged 17.2 fires per year with an average of 284.2 acres burned per year, based on figures from the ten-year period from 1999 through 2008. The county ranks 56 among 67 Alabama counties for number of fires and 49th for acres burned. Of the approximately 150,446 acres of forestland, the 284.2 acres burned per year accounts for a relatively small proportion of less than 0.2% of the total forestland. Most of the reported fires occurred during the months of February, March and April, which are most susceptible to fires.

The relatively low rankings of Marshall County wildfire extent and frequency in comparison to other Alabama counties may be credited to the local fire departments' ability to respond to the fires and their effectiveness in containing the blaze. The number of fires has decreased over the last twenty years due to public education and the increase in the number and effectiveness of volunteer fire departments throughout the county. Maps on the following pages show the broad distribution of firefighting resources throughout the county.

Map 5-14 "Marshall County Fire Observations" shows the location of wildfire occurrences over the 2000 to January 2014 period. These are generally random locations. Map 5-15 "Marshall County Fires per 1,000 Acres" shows areas at various levels of wildfire occurrences from low to extreme. These wildfire occurrence areas generally coincide with areas denoted as medium- to high-risk areas on Map 5-13 "Marshall County Wildfire Risk."

The weather is a natural contributor to wildfire occurrences. Extreme dry weather creates the perfect conditions for woodlands ready to spread fire rapidly. Droughts increase the inflammability of vegetation and pose greater difficulty in suppressing fires. In the midst of the 2006-2008 drought, in March 2007, a very dry month, there were approximately 1,000 acres a day burned in the State of Alabama. In

addition to drought, lightning can strike woodlands setting them on fire and trees that had been downed through severe weather events can add to the vegetative fuels to make timber for fires.

During the height of the drought in 2007, Marshall County had two relatively large wildfires. One occurred on Bishop Mountain on May 26, 2007 and the other occurred on Gunter Mountain on October 7, 2007. The fire on Bishop Mountain burned approximately 100 acres, and the fire on Gunter Mountain burned approximately 75 acres. These two fires burned a combined 175 acres, which is nearly 62% of the yearly average of 284.2 acres. The severe drought conditions contributed to the size of these two fires.

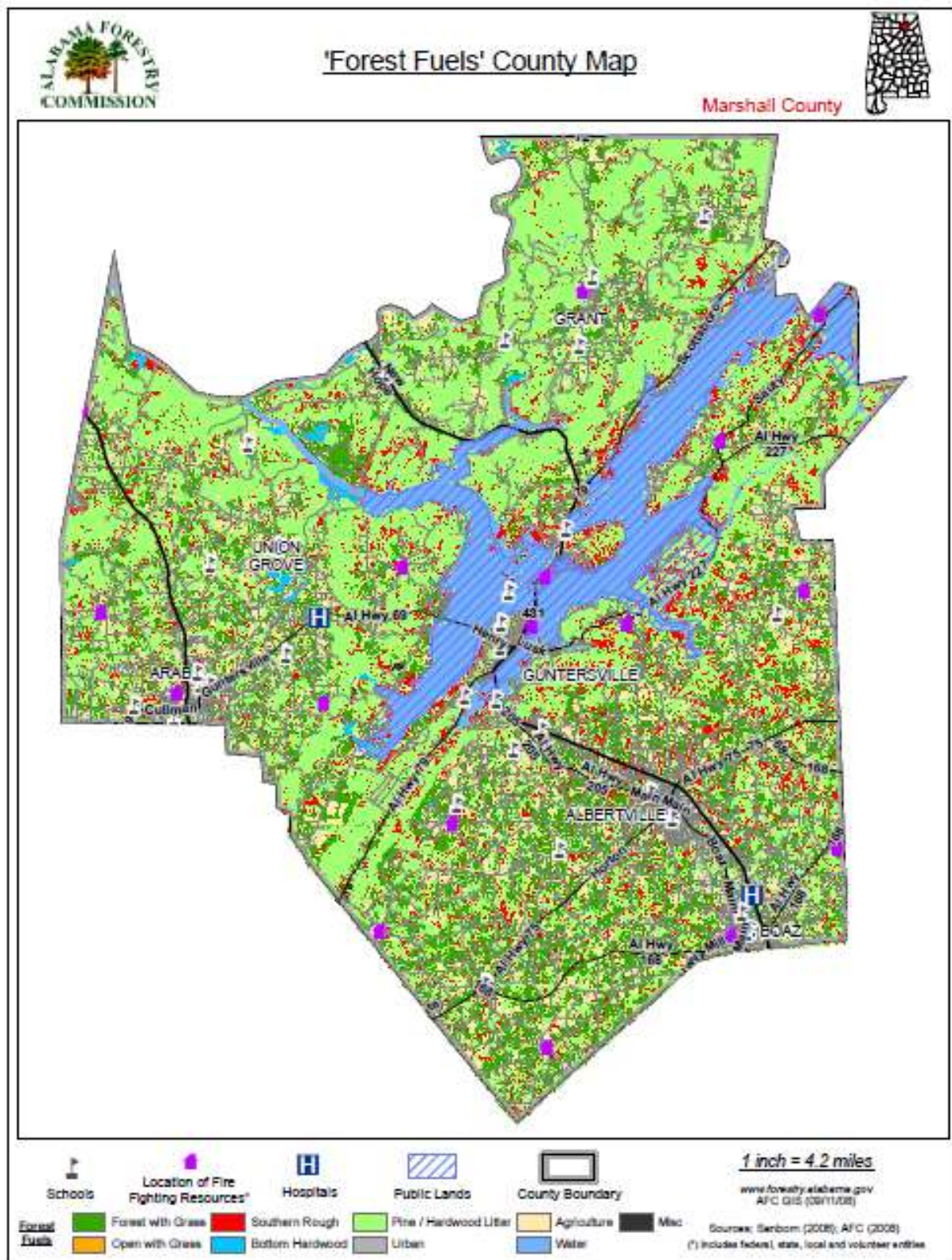
Probability of Future Wildfire Events

The average of 17.2 fires a year over the ten year period ending in 2008 has increased only slightly as result of recent drought conditions, but has generally held steady within a range of approximately 14 to 20 fires per year. Over the five-year period from 2004 to 2008, the number of fires per year increased to 20, but the 2008 incidence was 14. Unless there are major changes in the weather or the urban-wild land interface, the probability, based on recent trends should remain close to 16 fires per year.

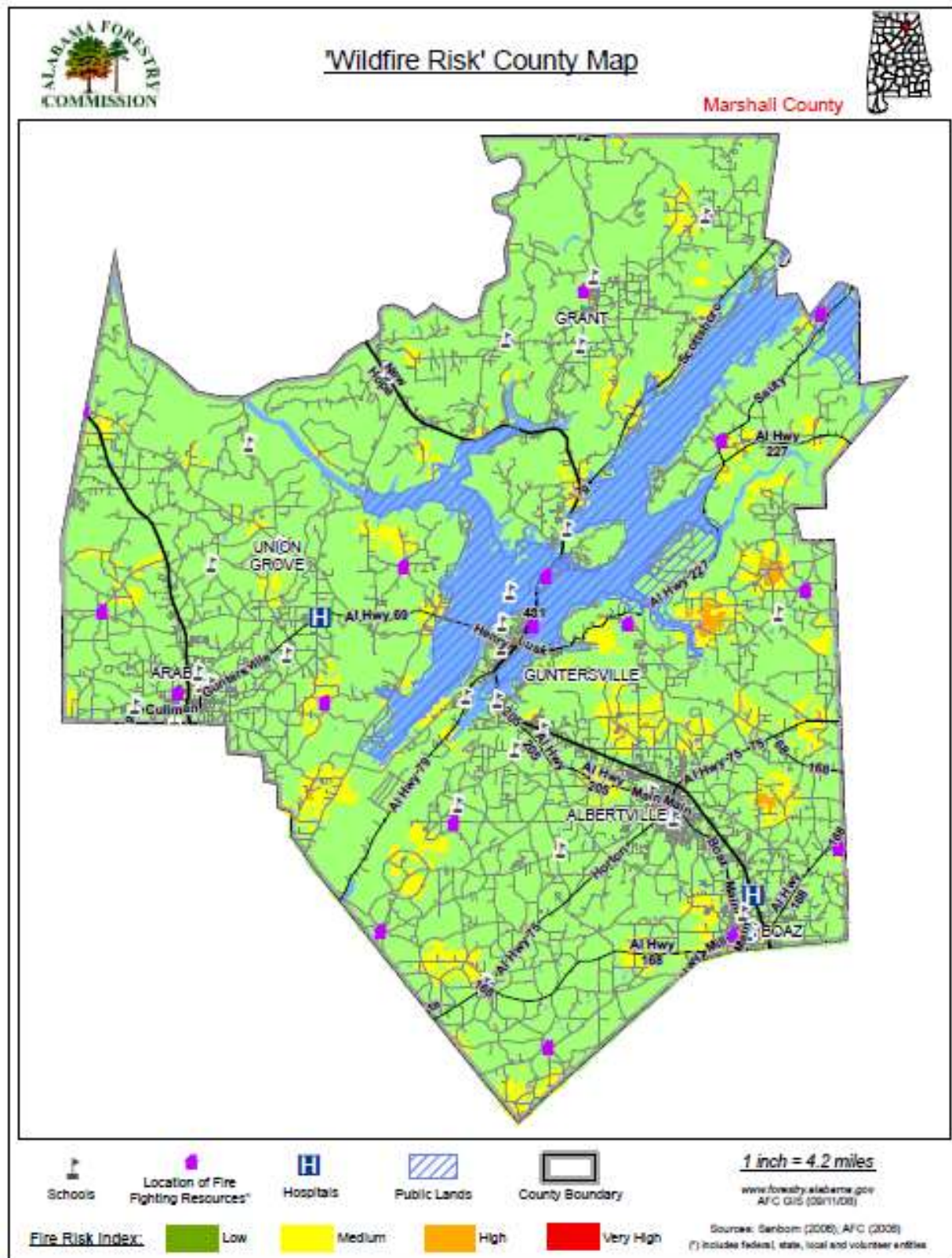
Based on historical information, Marshall County can expect an average of sixteen significant wildfires per year that damage or destroy an average of 204 acres. Although one can extract data and probability of occurrence from historical information, the risk of a wild fire occurring and the location of damage appear to be random.

Map 5-16. "Marshall County Communities Fire Risk" shows the wildfire risk by community. This is a new map developed by the Alabama Forestry Commission since the 2009 plan. This map depicts the level of risk for each community in Marshall County as moderate.

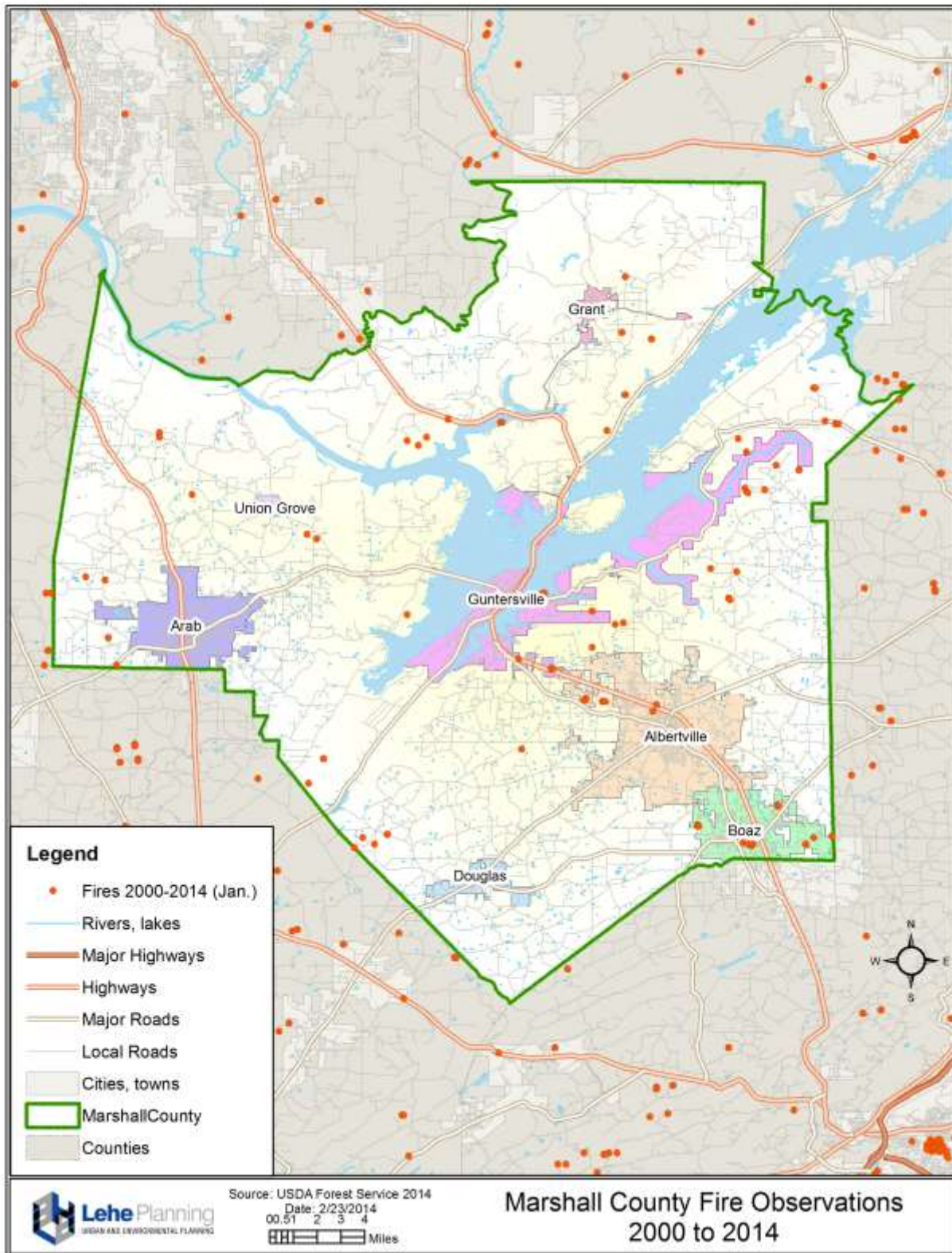
Map 5-12. Marshall County Forest Fuels



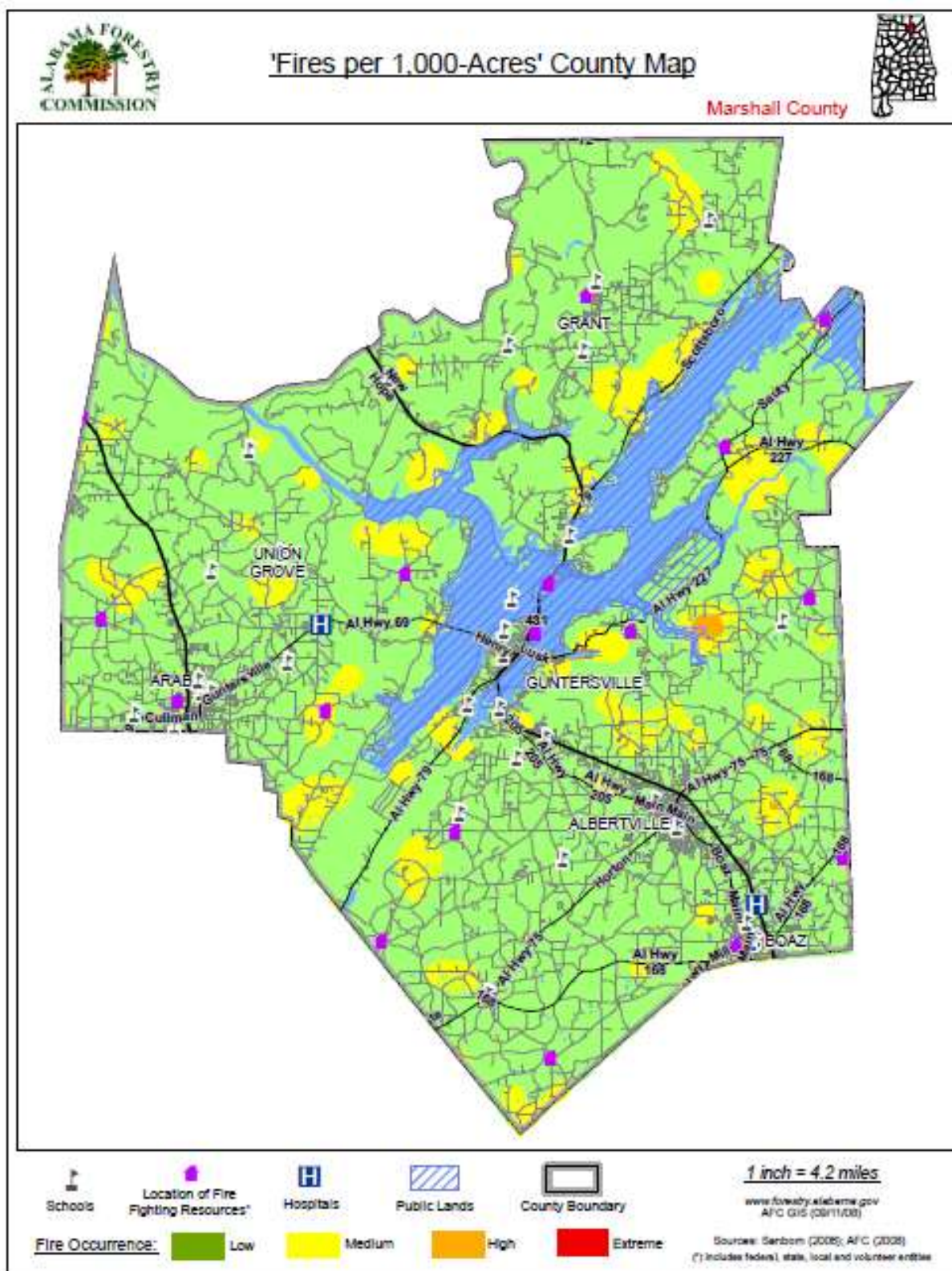
Map 5-13. Marshall County Wildfire Risk



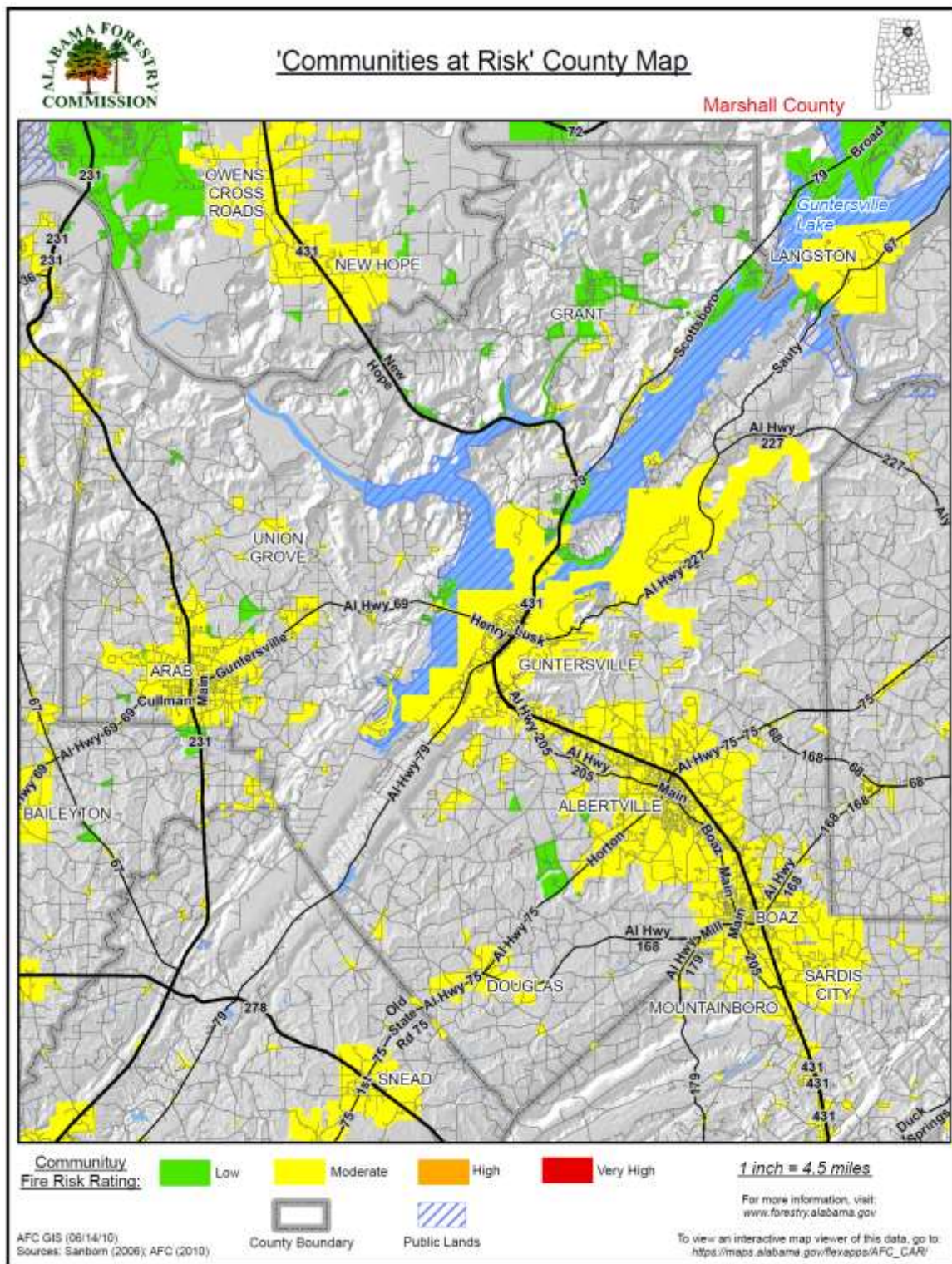
Map 5-14. Marshall County Fire Observations



Map 5-15. Marshall County Fires per 1,000 Acres



Map 5-16. Marshall County Communities Fire Risk



5.4.8 Dam/Levee Failures Profile

Marshall County has five dams and one levee within its jurisdiction. The principal Tennessee Valley Authority dam, Guntersville Dam, creates the Guntersville Reservoir with over 900 miles of shoreline within the County. Nickajack Dam located 70 miles northeast of Guntersville in Tennessee could also have dam failure impacts within Marshall County. Dam/levee failures are rare occurrences but the potential downstream damages could be significant due to the force and surge of huge volumes of water.

Alabama is one of only two states in the U.S. that currently has no statewide dam safety and inspection program. There have been numerous attempts, beginning in 2002, to pass dam safety legislation, with the last failed effort introduced in the Alabama legislature in February 2008 by HB 454, "Alabama Dam Inventory and Classification Act." This bill would have established the Alabama Dam Security and Safety Program within the Alabama Department of Economic and Community Affairs (ADECA) Office of Water Resources. This is the agency which also administers the National Flood Insurance Program. Once established, the program would provide for a full inventory of dams throughout the State and help benefit public safety and emergency response operations in the event of a natural disaster. The new program would also provide for the permitting and certification of dams that meet specified criteria designed to reduce dam failure.

Location of Potential Dams/Levee Failures

As shown on Map 5-17 "Dams/Levees," there are five dams and one levee located within the County. The Guntersville Dam is the largest of the five and is also considered a high hazard dam; this indicates that its failure will likely cause loss of human life. This classification is not an indicator of the dam's soundness and quality of construction but rather the potential damage a failure would cause. Marshall County could also suffer damage from the failure of the Nickajack Dam located outside of the County. Both of these dams are monitored by the Tennessee Valley Authority (TVA) and have emergency action plans. The other four dams are earthen, and two are located on private property. The first two dams would not cause significant damage if failure occurred. The other two earthen dams could cause damage to surrounding properties if they failed. One is located near Grant in the northern portion of the County. It helps form Woodall Lake and is maintained by the Marshall County Commission. The other is within the City of Arab. It is located at Pine Lake Village and is maintained by the City.

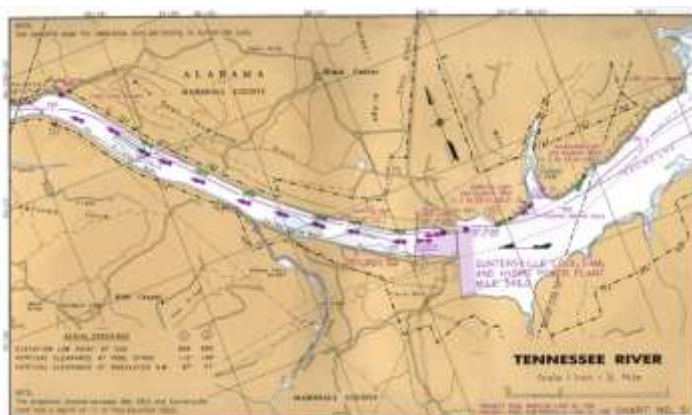


Figure 5-2. Guntersville Dam Plan Details

Guntersville Dam is the largest dam within the County. It stretches across the Tennessee River to create the Guntersville Reservoir. The Guntersville Dam was completed in 1939; it is 94 feet high and stretches 3,979 feet across the river. The dam provides almost 890 miles of shoreline and 67,900 acres of water surface. This shoreline provides most of the County's recreation including 3 State parks, 3 County parks, 8 municipal parks, 4 State wildlife centers, 30 public access areas and 23 commercial recreation areas. The generating capacity of Guntersville Dam is 140,400 kilowatts of electricity.



Figure 5-3. Photo of Guntersville Dam

A failure of Guntersville Dam would cause flood inundation from Union Grove to along the Madison/Marshall County line along the Tennessee River. Impacts would also occur along the tributaries of the river. The failure of the dam would impact the affected area at a 100 and 500 year flood level.

Located outside of the County, Nickajack Dam also would cause substantial property damage if failure occurred. It is located upstream in Marion County, Tennessee. Nickajack Dam was completed in 1967. It is 81 feet high and stretches 3,767 feet across the Tennessee River. It is the sixth step in the set of locks and dams that carry barges up and down the river. The 110 by 600 foot lock now in operation can lift as many as nine barges at one time.



Figure 5-4. Nickajack Dam Plan Details

During construction, the foundation for another 800-foot lock was also built so that it can be completed when the need arises. The Nickajack Dam provides 179 miles of shoreline and 10,370 acres of water surface.

If the Nickajack Dam failed, the shorelines of Guntersville Reservoir would be impacted from a sudden flood of water. In a failure during a non-flood condition, the limit of downstream impact would occur along the Jackson/Marshall County line south of Deal Creek. Much of the flooding would occur along the tributaries of the Tennessee River and Guntersville Lake.

One levee is located within Marshall County. The levee is located in the City of Guntersville along the Guntersville Reservoir. It is in the downtown area and is utilized as a walking trail. The City maintains it, and the TVA monitors the water level.

Extent and Intensity of Potential Dam/Levee Failures

Marshall County could experience damages from the two TVA dams along the Tennessee River (Guntersville and Nickajack Dams). The 100 and 500-year frequency dam inundation areas identified by TVA are shown on Map 5-18 “Dam Failure Inundation Areas.” Inundation studies for smaller dams and levees have not been completed.

The Guntersville Reservoir serves as a flood control impoundment with water surface elevations controlled by the dam. As a result, areas around Lake Guntersville and within the City of Guntersville have minimal areas of special flood hazard identified. Downstream of Guntersville Dam, the 500-year inundation extents would be similar to the 500-year flood heights and have equivalent impacts. In the event of major failure of Nickajack Dam, 100- and 500-year flood inundations would be limited to the shoreline of Lake Guntersville. Travel distance from Nickajack Dam is approximately 70 miles. This long distance allows for the timing of the peak flow to be forecasted. Consequently, emergency preparedness actions could allow for evacuation and protection of vulnerable properties. Most affected areas are rural and outside of incorporated jurisdictions.

The failure of two earthen dams on public property could cause downstream property damages. These public dams include Woodall Lake Dam northwest of the Town of Grant and maintained by the Marshall County Commission and the City of Arab’s Pine Lake Village Dam within the Arab city limits.

Previous Occurrences of Dam/Levee Failures

There have been no documented dam/levee failures within Marshall County.

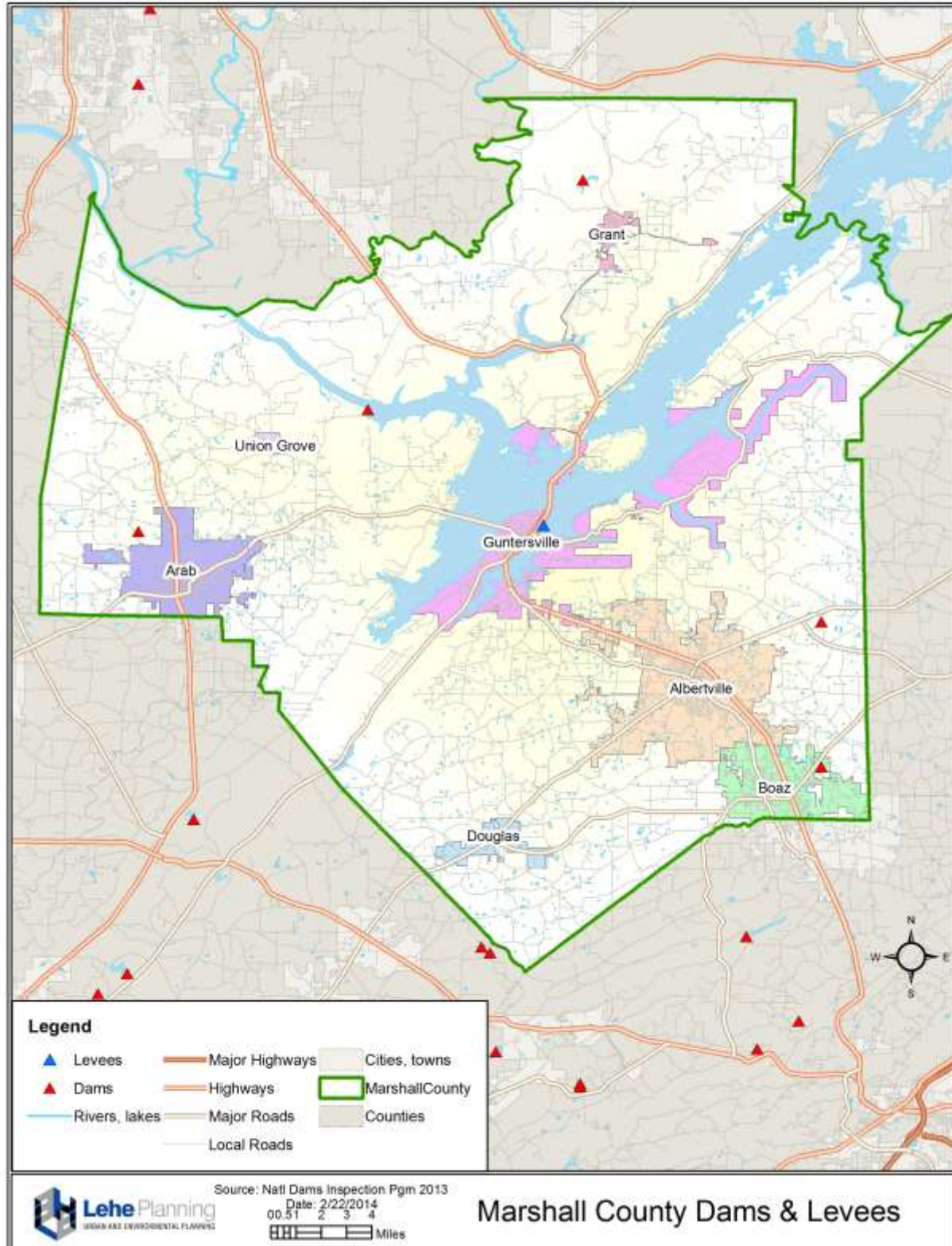
Probability of Future Dam/Levee Failure Events

The risks to Marshall County associated with dam/levee failure are minimal. TVA has emergency action plans in place for Guntersville and Nickajack Dams, which are constantly monitored and inspected for safety. The action plans address failures that could occur under normal conditions, a 100-year flood event, and an extreme flood event. Each plan provides for emergency response guidelines in the event of failure. The TVA plans are kept on file with the Marshall County EMA. Earthen dams

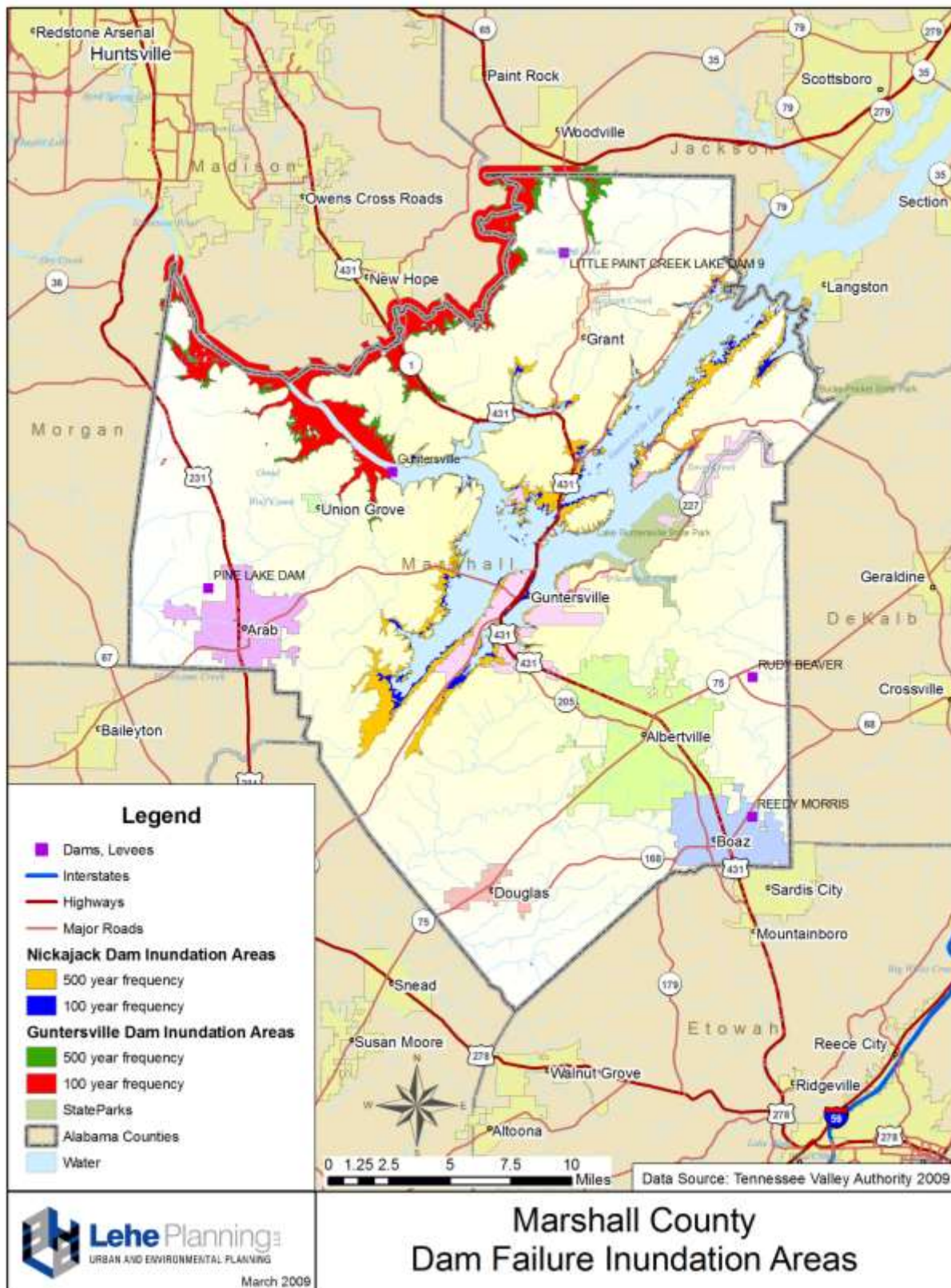
maintained by the Marshall County Commission and the City of Arab pose little risk of failure.

Major earthquakes in Marshall County and East Tennessee have some potential to threaten Marshall County dams and Nickajack Dam. Refer to the hazard profile for earthquakes for the probability of these future events.

Map 5-17. Dams/Levees



Map 5-18. Dam Failure Inundation Areas



5.4.9 Landslides Profile

Marshall County, with over 200 feet in elevation differences between the low-lying lands along Lake Guntersville and the Tennessee River and surrounding mountain tops, has vast areas of steep and rugged terrain. Rugged areas, such as these, are usually susceptible to landslides, which are confirmed by reports of periodic occurrences of landslides over the last 40 years. Generally landslides are caused by high precipitation, changes in ground-water level, seismic activity, construction or mining activity, over-steepening of slopes, changes in surface water runoff or heavy loads on slopes.

The Geologic Survey of Alabama (GSA) has studied the potential for landslides throughout Alabama. Geographic Information System (GIS) data provided by the GSA for this plan, classifies landslide incident and susceptibility shown on Map 5-19 "Landslides Areas," as follows:

1. Landslide susceptibility. Susceptibility is the probable degree of response to landslide triggers, that is, the response to cutting or excavation, loading of slopes, or to unusually high rainfall. Generally, unusually high rainfall or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced numerous landslides in the past. The potential for landslides is classified into one of the following categories:
 - *High susceptibility* - greater than 15% of a given area is susceptible to land sliding;
 - *Medium susceptibility* – 1.5% to 15% of a given area is susceptible to land sliding; or
 - *Low susceptibility* – less than 1.5% of a given area is susceptible to land sliding.
 - *No susceptibility indicated* - susceptibility is the same as or lower than incidence.
2. Landslide incidence. Landslide incidence is the number of landslides that have occurred. These areas are classified according to the percentage of the area affected by landslides, as follows:
 - *High incidence* - greater than 15% of a given area has previously experienced land sliding;
 - *Medium incidence* - 1.5% to 15% of a given area has previously experienced land sliding; or
 - *Low incidence* – less than 1.5% of a given area has previously experienced land sliding.

Location of Potential Landslides

As shown on Map 5-19 “Landslide Areas,” almost the entire county has some degree of susceptibility to landslides, and incidences appear random. The degrees of susceptibility and incidence vary, however, as explained in the next section on the extents of the landslide hazard.

Extent and Intensity of Potential Landslides

According to the GSA data, most of Marshall County is an area of moderate to high susceptibility to landslides, with the highest susceptibility in the southeast portion of the county, encompassing Albertville, Boaz, Douglas and surrounding unincorporated areas. These same areas, however, have a low incidence. The northwest areas of the county, including Arab, Union Grove, and Grant are moderately susceptible with a moderate incidence of landslides. Most of the City of Guntersville and some areas immediately surrounding Lake Guntersville have low susceptibility and incidence. Damage reports of reported incidents have been relatively minor.

Previous Occurrences of Landslides

There have been five instances of landslides reported in the local media since 1970. On May 13, 1978, the Arab Tribune reported that a landslide occurred on Georgia Mountain shutting down Arab Water until 9:00 Sunday. The Advertiser-Glean reported that the weekend of April 25-26, 1970, landslides blocked roads, washed away roads, and caused water to be turned off in some areas. In 1977, a landslide affected a water tank and piping, causing \$22,000 in damages and in April 1979 - \$1,000 in damages occurred, according to The Advertiser-Glean. On May 1-3, 1997 a storm caused a landslide ruining roadways, as reported in The Advertiser-Glean.

Source: GSA, 2014



GSA reports of infrequent landslides are shown on Map 5-19 “Landslide Areas.”

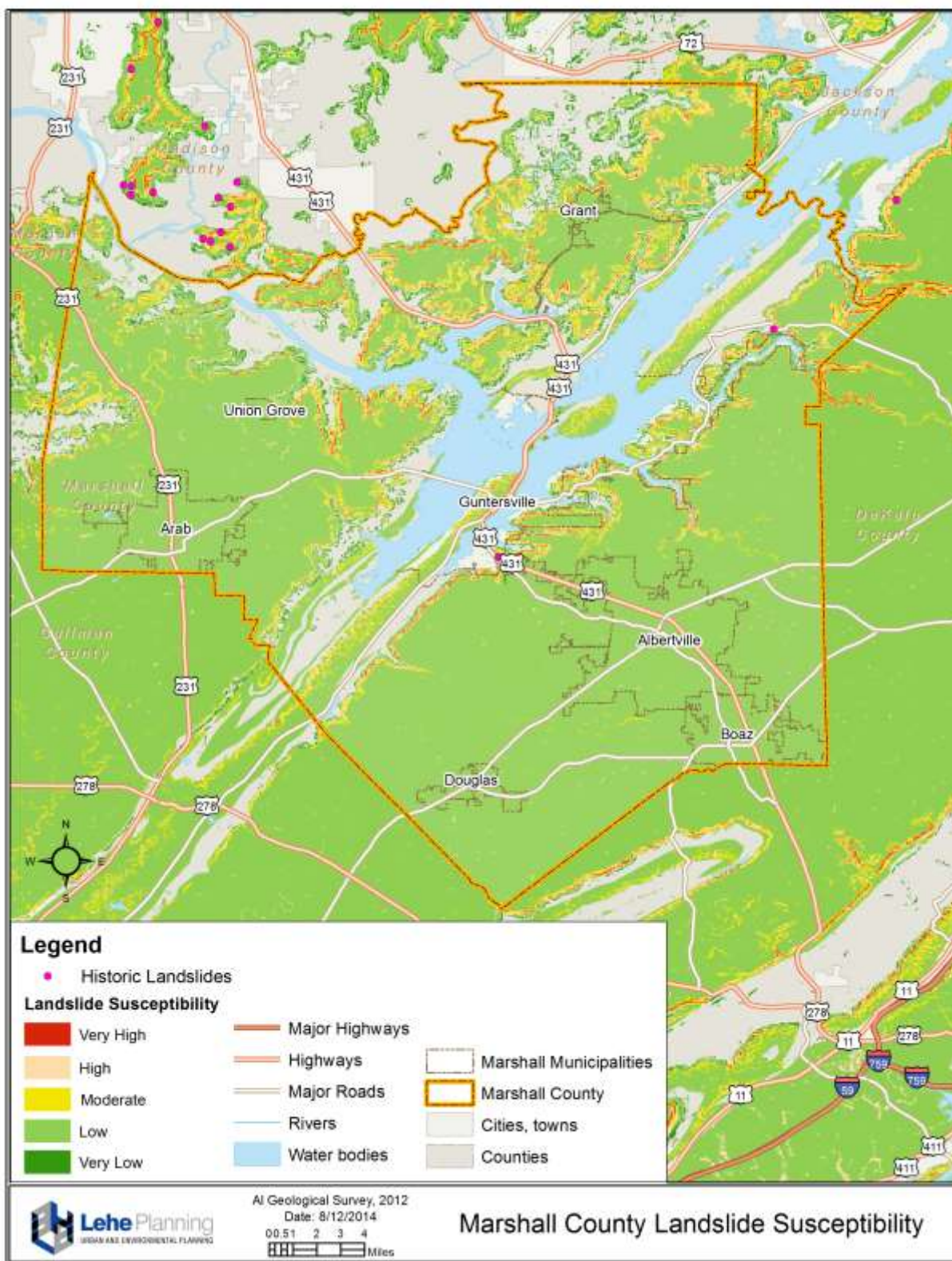
Probability of Future Landslide Events

Although the GSA map data locates the general degrees of risk for landslides in Marshall County, the actual probability varies according to specific site locations and the presence of activities or conditions that might trigger a landslide, such as rock type, slope, excavation, hillside development, deforestation, heavy rainfall, or seismic activity. GSA records of landslides have occurred even in areas mapped as “low incidence.”

Given the terrain, record of incidents, and the widespread susceptibility of the county to landslides, the probability of future landslide occurrences is certain. According

to GSA data, the areas most at risk are atop Sand Mountain - the communities of Albertville, Boaz, Douglas, and surrounding unincorporated communities. The location and annual probability of a landslide, however, are completely unpredictable and could occur anywhere within the county. Although the probable location of a landslide is widespread throughout the county, the frequency and damage potential, based on past records, is low. Consequently, the risk level of landslides is low, relative to other natural hazards affecting Marshall County.

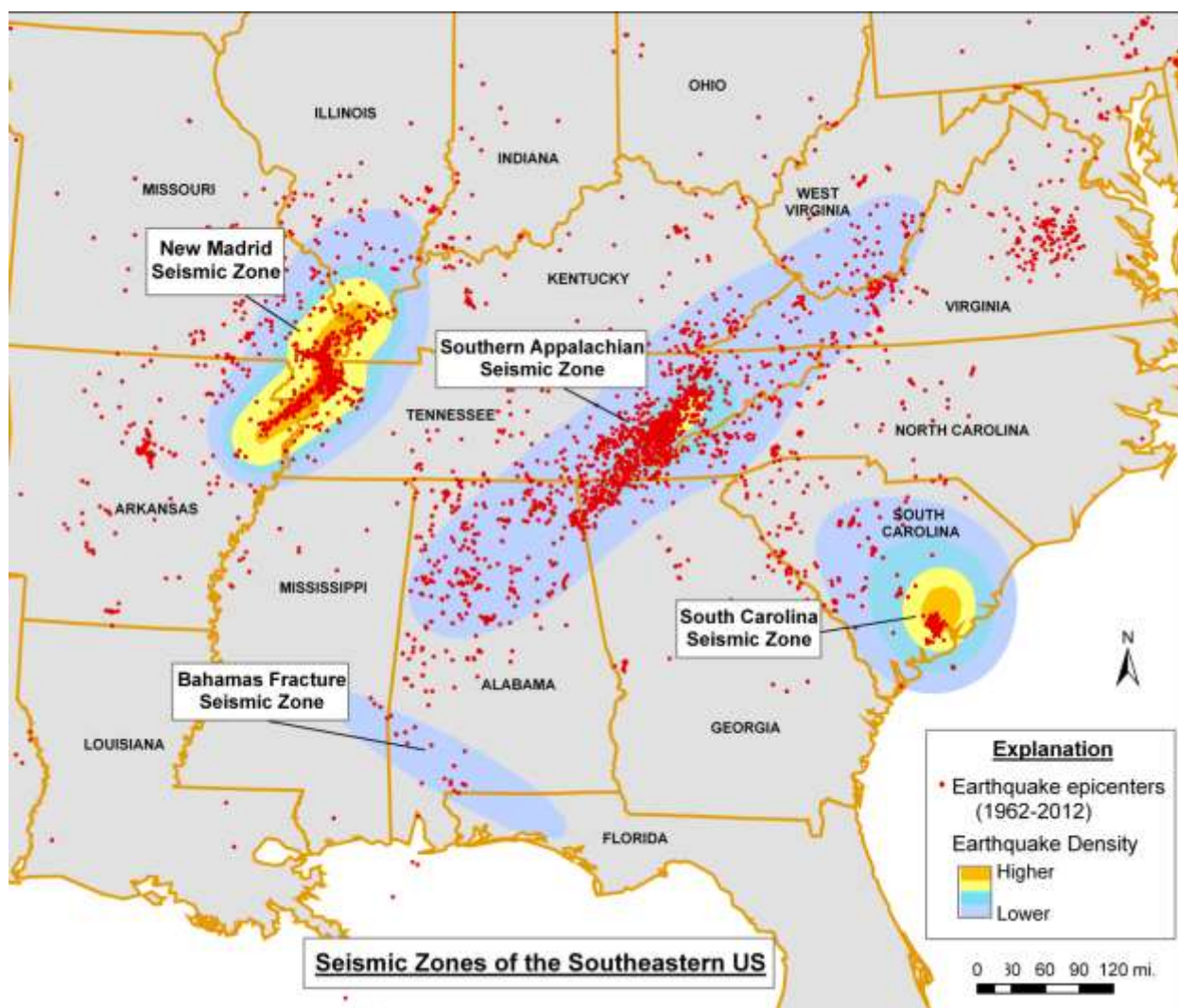
Map 5-19. Landslide Areas



5.4.10 Earthquakes Profile

Earthquakes are not uncommon in Alabama, with hundreds of recorded events since 1886. Most of these Alabama earthquakes have been associated with the Southern Appalachian Seismic Zone, as shown on Map 5-20 “Seismic Zones.” Although the Southern Appalachian Seismic Zone extends into an area of low seismic hazard in northern and central Alabama, the impacts of Alabama’s largest earthquake of record, the 5.1 magnitude Irondale earthquake of 1916, could be felt in Marshall County and far beyond. The April 29, 2003, earthquake near Fort Payne measured 4.9 in magnitude in adjacent DeKalb County. Many aftershocks followed.

Map 5-20. Seismic Zones

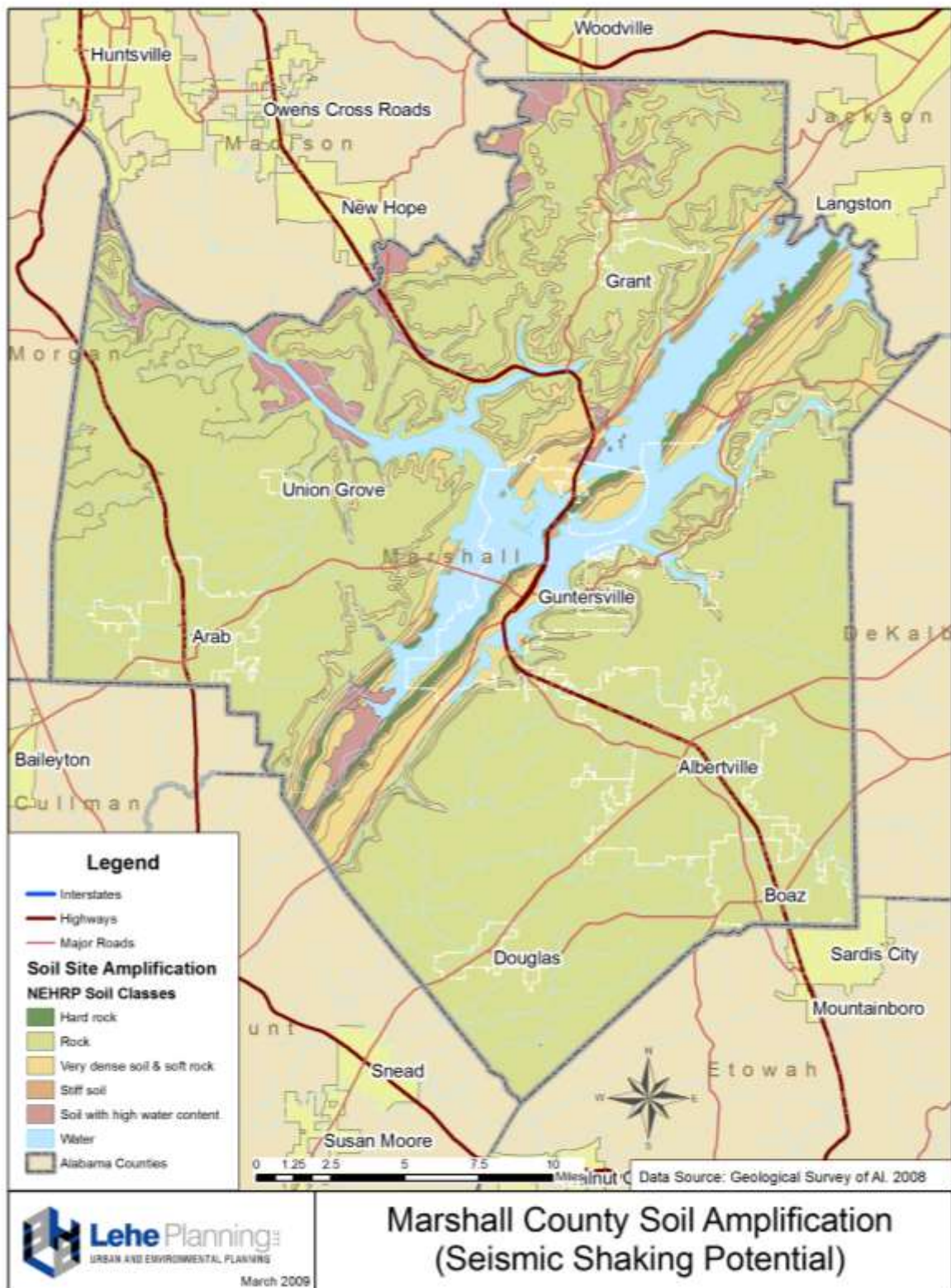


Source: Geological Survey of Alabama

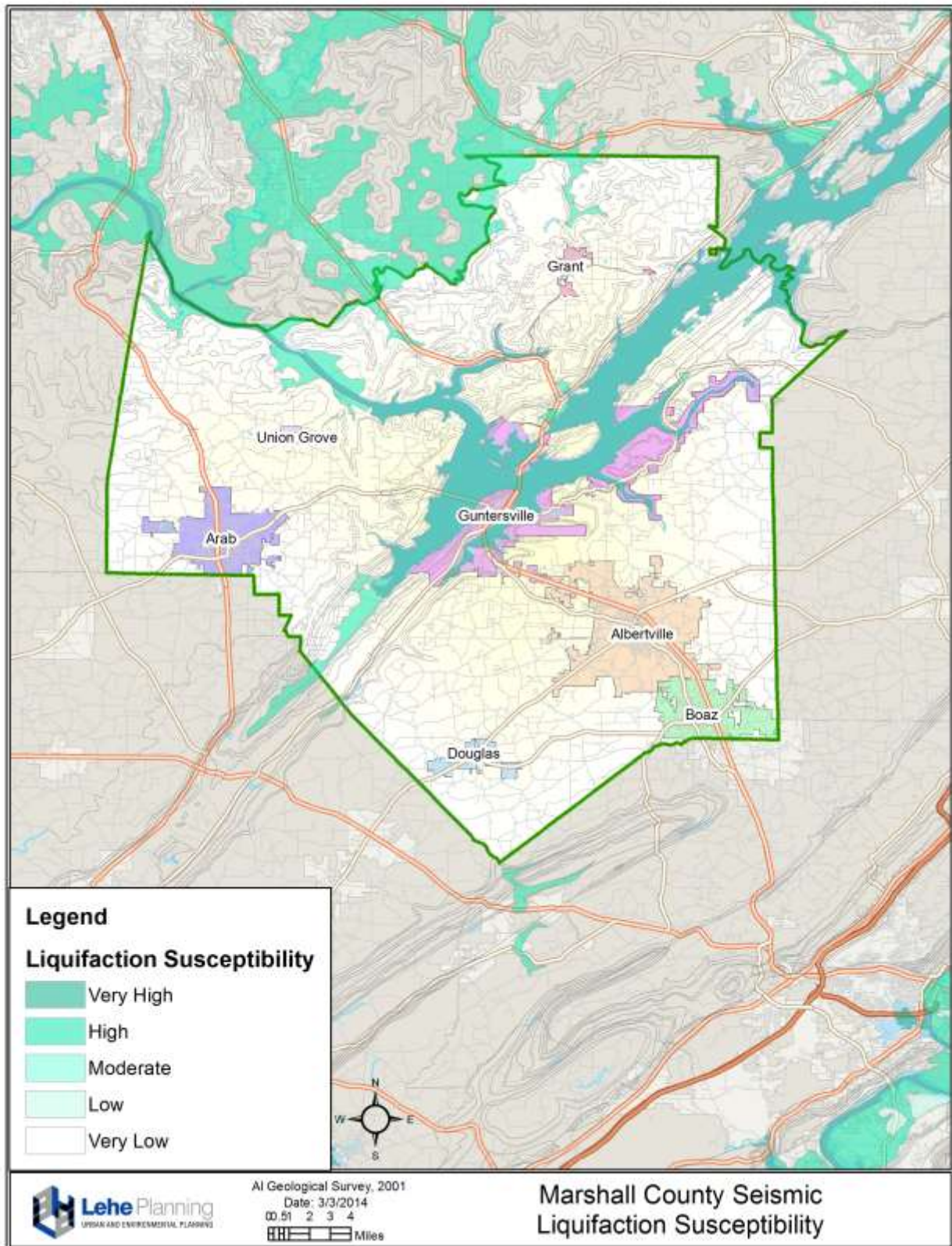
Location of Potential Earthquakes

All of Marshall County has a low degree of susceptibility to earthquakes, but the impacts can vary depending on the magnitude and epicenter location. The following maps (Maps 5-21 and 5-22), generated from 2011 GIS data supplied by the Geological Survey of Alabama (GSA), show locational variations in ground shaking and soil liquefaction throughout Marshall County. Damages to buildings and infrastructure depend not only on the energy released during an earthquake but also underlying soils and geological characteristics. For instance, structures built upon loose sediments of riverine floodplains along the Tennessee River and Lake Guntersville are more likely to be damaged than structures built on bedrock in the upper elevations, such as Sand Mountain. Liquefaction is most likely to occur in soils with high water content within parts of these flood plains. Given the natural physical features of Marshall County, ground-shaking potential and seismic liquefaction susceptibility are very low in all developed municipal locations.

Map 5-21. Earthquake Ground Shaking Potential



Map 5-22. Earthquake Liquefaction Potential



Extent and Intensity of Potential Earthquakes

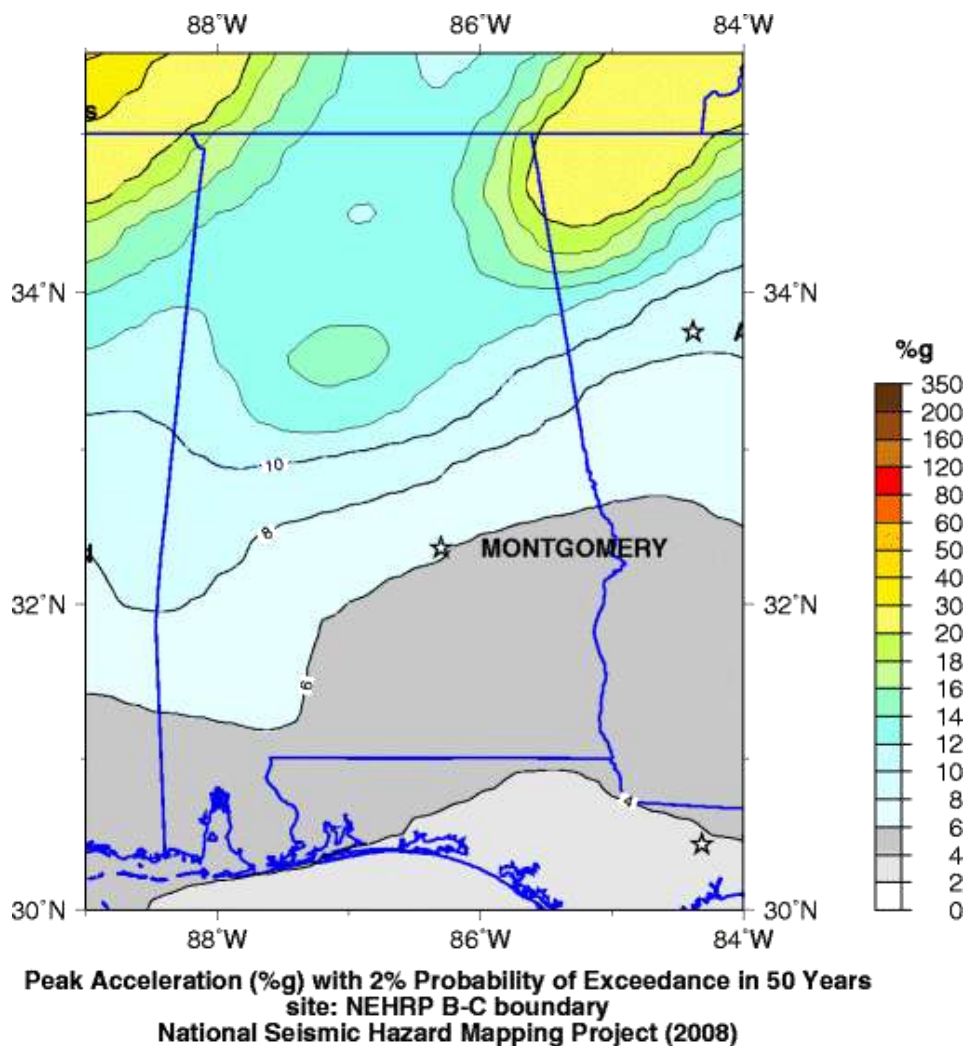
According to the Geological Survey of Alabama (GSA), recent seismograph records indicate that earthquakes are frequent but often small enough that they are not felt. Earthquakes can occur anywhere at any time in Alabama, but most are likely to do little or no damage. Damage reports of incidents have been relatively minor. Potential impacts of earthquakes could result from damages to Guntersville Dam. As discussed in Section 5.3.11 “Earthquakes Description” in this chapter, the intensity of shaking and observed effects of an earthquake is measured according to the Modified Mercalli Intensity Scale, shown again in Table 5-14 below, and the magnitude is the measure of energy released by the earthquake on a scale of 1 to 10, with a magnitude 4 being felt on land and causing some damage. The State of Alabama Hazard Mitigation Plan indicates that Marshall County is in the top ten of all counties in terms of seismic risk. It estimates (based on HAZUS-MH) approximately \$380,363 of annualized direct physical losses to buildings and building contents, as a result of earthquakes (see Table 5.4-18 of Alabama State Hazard Mitigation Plan).

Table 5-14. Modified Mercalli Intensity Scale

Modified Mercalli Intensity Scale	
I.	Not felt.
II.	Felt by persons at rest, on upper floors, or favorably placed.
III.	Felt indoors. Vibration like passing of light trucks.
IV.	Vibration like passing of heavy trucks.
V.	Felt outdoors. Small unstable objects displaced or upset.
VI.	Felt by all. Furniture moved. Weak plaster/masonry cracks.
VII.	Difficult to stand. Damage to masonry and chimneys.
VIII.	Partial collapse of masonry. Frame houses moved.
IX.	Masonry seriously damaged or destroyed.
X.	Many buildings and bridges destroyed.
XI.	Rails bent greatly. Pipelines severely damaged.
XII.	Damage nearly total.

USGS national seismic hazard maps are used to assess probability of exposure to shaking within a given time period. These maps measure the probability of exceeding a peak ground motion measured as peak ground acceleration (PGA) within a given period of years. Map 5-23 is a section from the USGS 2008 National Seismic Hazard Map showing ground shaking in Alabama with a 2% probability of being exceeded within the next 50 years. Shaking is peak ground acceleration (PGA) as a percent of g (or shaking as a percent of 3.8 meters per second squared). For Marshall County, there is only a 2% chance that shaking will exceed 12-14% g within the next 50 years.

Map 5-23. Peak Ground Acceleration



Previous Occurrences of Earthquakes

Map 5-24 “Alabama Earthquake Locations” shows the location and magnitude of recorded earthquakes from 1886 through 2013. A few earthquakes with a magnitude

greater than 4.0 have been recorded. Table 5-15 “Historical Earthquakes” lists records of earthquakes from 1886 through 2013 for Marshall and surrounding counties. Only the Irondale and Fort Payne earthquake of 2003 measured over 4.0 in magnitude, and only four minor events occurred within Marshall County over this 123 year period.

Map 5-24. Alabama Earthquake Locations

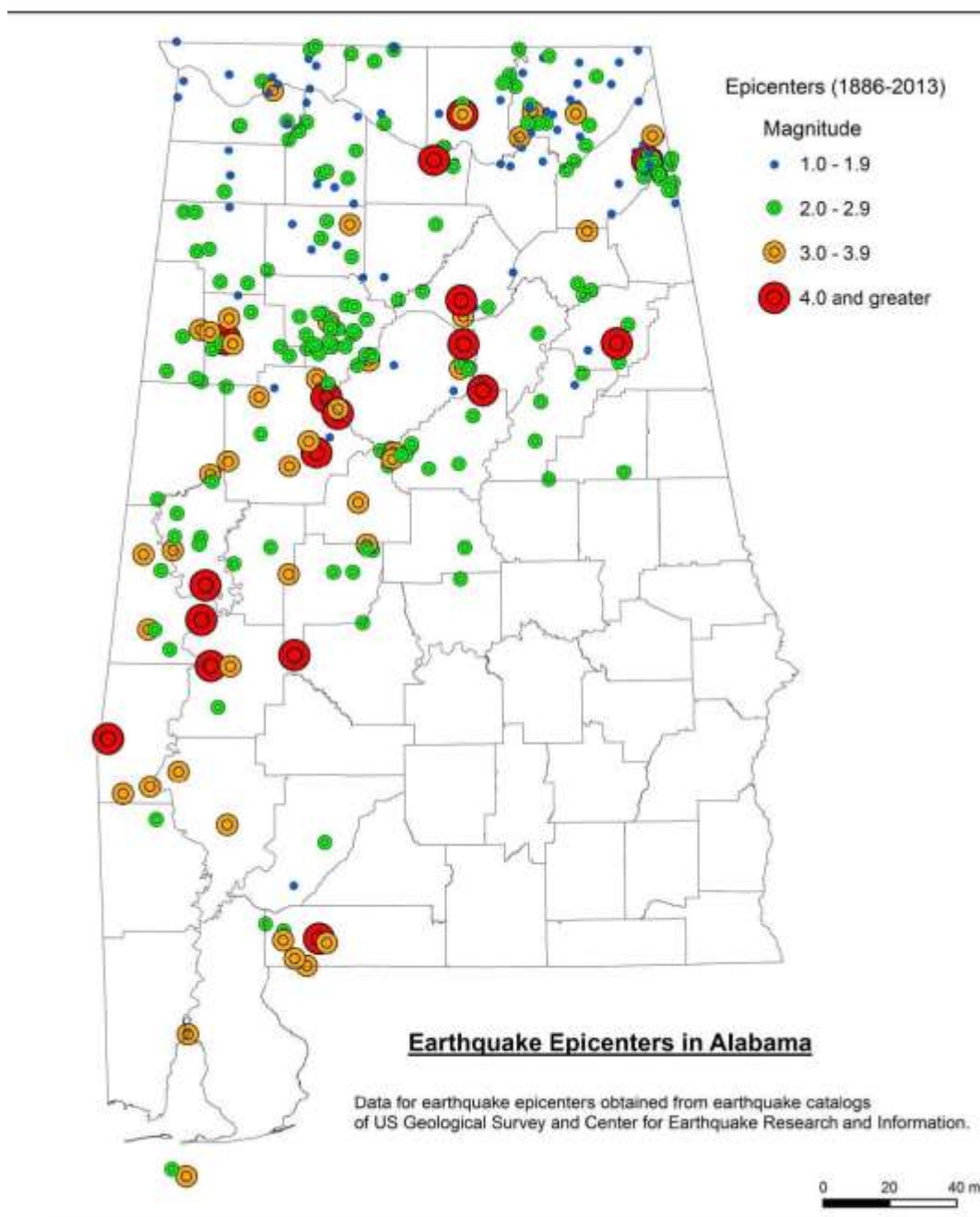


Table 5-15. Historical Earthquakes, 1886-2013

Date	County	Nearest City or Town	Magnitude	Impacts/Notes
2/4/1886	DeKalb	Valley Head	-	(III)
10/18/1916	Jefferson	Irondale	5.1	(VII)
6/16/1927	Jackson	Scottsboro	-	(IV)
6/24/1939	Madison	Huntsville	-	(IV)
4/23/1957	Madison	Farley	-	(VI)
2/18/1964	DeKalb	Ala.-Ga.	-	(IV)
9/28/1975	Blount	Cedar Springs	-	(VI)
5/7/1981	Cullman	Cullman	2.1	Not felt
8/9/1984	Madison	Huntsville	2.9	Not felt
8/24/1984	Madison	Huntsville	1.4	Not felt
8/26/1984	Jackson	Mud Creek	1.3	Not felt
2/19/1985	Jackson	Bridgeport	1.1	Not felt
1/28/1986	Blount	Hendrix	0.9	Not felt
9/3/1986	Jackson	Fackler	1.8	Not felt
11/7/1987	DeKalb	Fort Payne	1.2	Not felt
2/3/1987	Jackson	Hollytree	2.4	Not felt
2/20/1989	Madison	Huntsville	1.3	Not felt
4/23/1989	Cullman	Jones Chapel	1.7	Not felt
6/11/1989	Jackson	Stevenson	0.8	Not felt
9/26/1989	Cullman	Lewis Smith Lake	1.7	Not felt
12/15/1990	Morgan	Decatur	1.8	Not felt
1/21/1991	Marshall	Guntersville Dam	1.9	Not felt
3/28/1991	Madison	Huntsville	1.8	Not felt
11/4/1991	Cullman	Cullman	2.3	Not felt
11/10/1991	DeKalb	Dugout Valley	1.8	Not felt
11/17/1991	Cullman	Cullman	1.9	Not felt
3/17/1992	Morgan	Decatur	2	Not felt
4/20/1994	Blount	Blount Springs	2.3	Not felt
5/25/1994	Jackson	Stevenson	2.3	Not felt
7/4/1994	Marshall	Guntersville	0.8	Not felt
10/5/1994	Jackson	Scottsboro	1.2	Not felt
7/31/1997	Jackson	Stevenson	1.6	Not felt (possible blasting event)
8/20/1997	Jackson	Scottsboro	2.3	8 mi SE of Scottsboro
9/14/1997	DeKalb	Fort Payne	1.6	

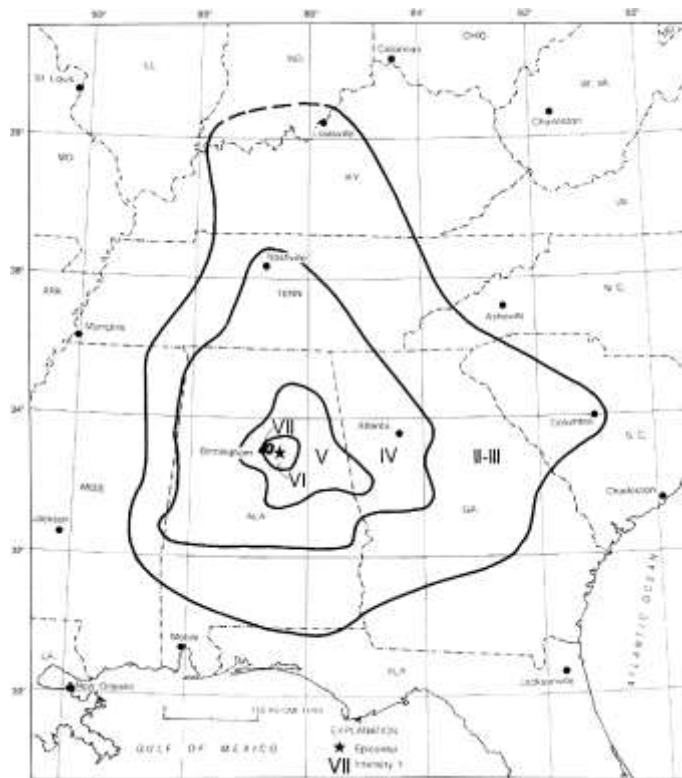
Date	County	Nearest City or Town	Magnitude	Impacts/Notes
5/10/1998	Etowah	Gadsden	2.5	
7/30/1998	Jackson	Scottsboro	2	7 mi west of Scottsboro
10/22/1998	Jackson	Scottsboro	1.6	Scottsboro
10/11/1999	Blount	Oneonta	2.5	16 km (10 mi) NE of Oneonta
4/21/2000	Blount	Oneonta	2.4	12 km (7 mi) SW of Oneonta
3/12/2001	Marshall	Guntersville	2.3	9 miles (15 km) NW of Guntersville
6/21/2001	Jackson	Stevenson	2.3	3 miles (5 km) W of Stevenson
9/10/2001	Marshall	Guntersville	1.7	10 miles (16 km) NE of Guntersville
12/7/2001	Jackson	Scottsboro	1.6	11 miles (18 km) WNW of Scottsboro
12/24/2001	Jackson	Scottsboro	2.4	12 miles (19 km) WNW of Scottsboro. Only 24 miles (38 km) to TVA dam at Guntersville
2/4/2003	Jackson	Scottsboro	1.9	
4/29/2003	DeKalb	Fort Payne	4.9	10 miles (15km) ENE of Fort Payne
6/22/2003	DeKalb	Mentone	1.9	7 miles (12 km) NNE of Fort Payne
7/6/2003	DeKalb	Mentone/aftershock	2.4	
7/15/2003	DeKalb	Mentone/aftershock	2.5	
7/25/2003	DeKalb	Rainsville	2	12 miles WSW of Rainsville
8/16/2003	DeKalb	Alpine/aftershock	2	
6/21/2004	DeKalb	Fort Payne	2.2	3 miles NE of Fort Payne
11/23/2006	Jackson	Larkinsville	1.8	18 Scottsboro, AL - 9km (5 miles) WNW (289 degrees)

Date	County	Nearest City or Town	Magnitude	Impacts/Notes
6/2/2008	Jackson	Dutton	2.2	5 km (3 mi) NNW of Dutton, AL
7/18/2008	Jackson	Francisco	2.3	4.7 km (2.9 mi) WSW of Francisco, AL
8/1/2008	Jackson	Lim Rock	2.3	1.7 km (1 mi) SW of Lim Rock, AL
5/3/2009	Jackson	Woodville, AL	2.2	4 km (2 miles) NNE (20°) from Woodville, AL

Source: Geological Survey of Alabama & USGS

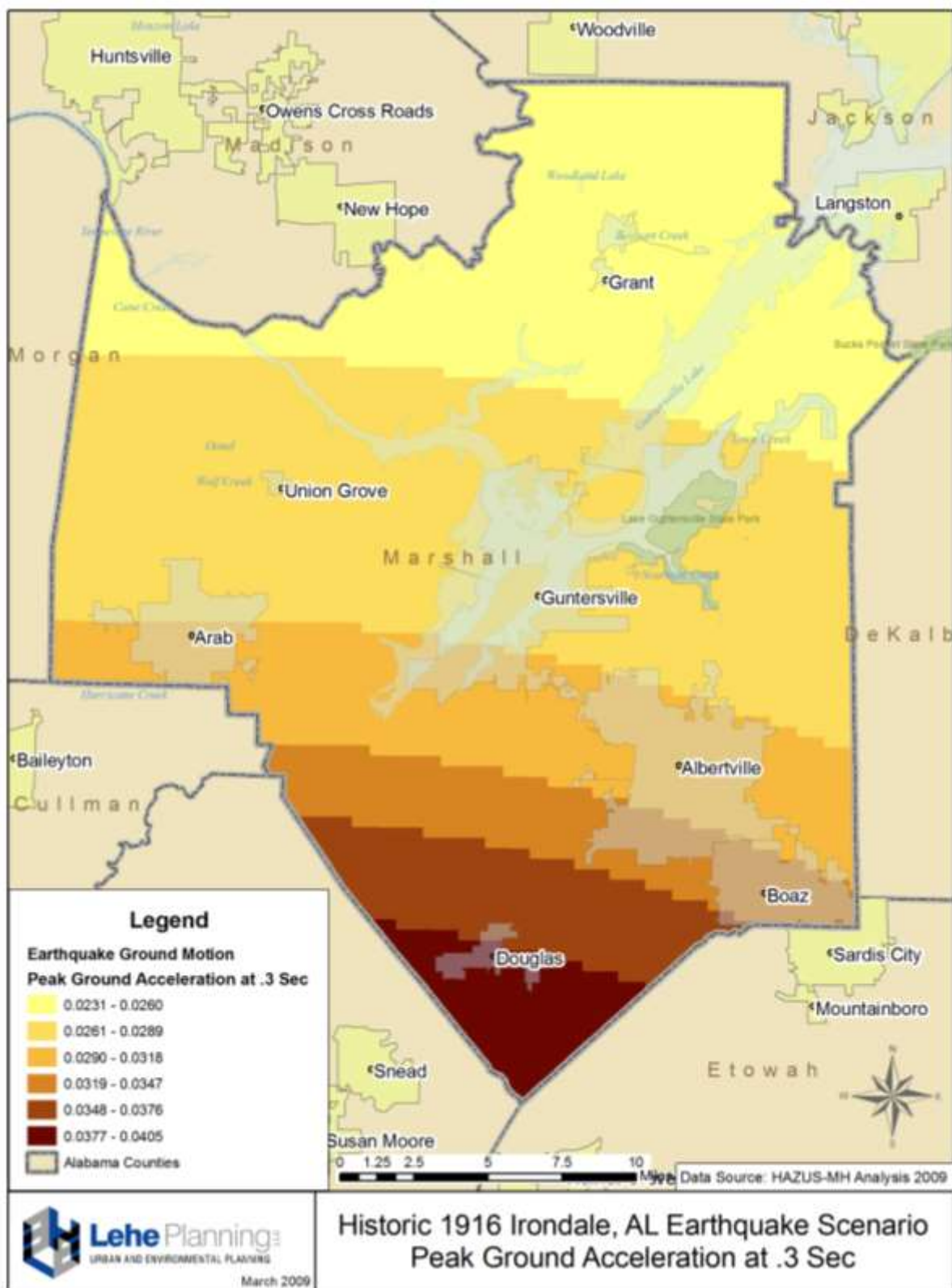
Map 5-25 “1916 Irondale Earthquake” below shows the impact of the 1916 Irondale earthquake on Marshall County, where the measured intensity was between IV and V, where shaking was felt and some disruption occurred. This scenario was also evaluated using the HAZUS-MH earthquake module, and the ground shaking results, measure in Peak Ground Acceleration, in Marshall County are shown on Map 5-26 “Marshall County PGA for 1916 Earthquake.”

Map 5-25. 1916 Irondale Earthquake



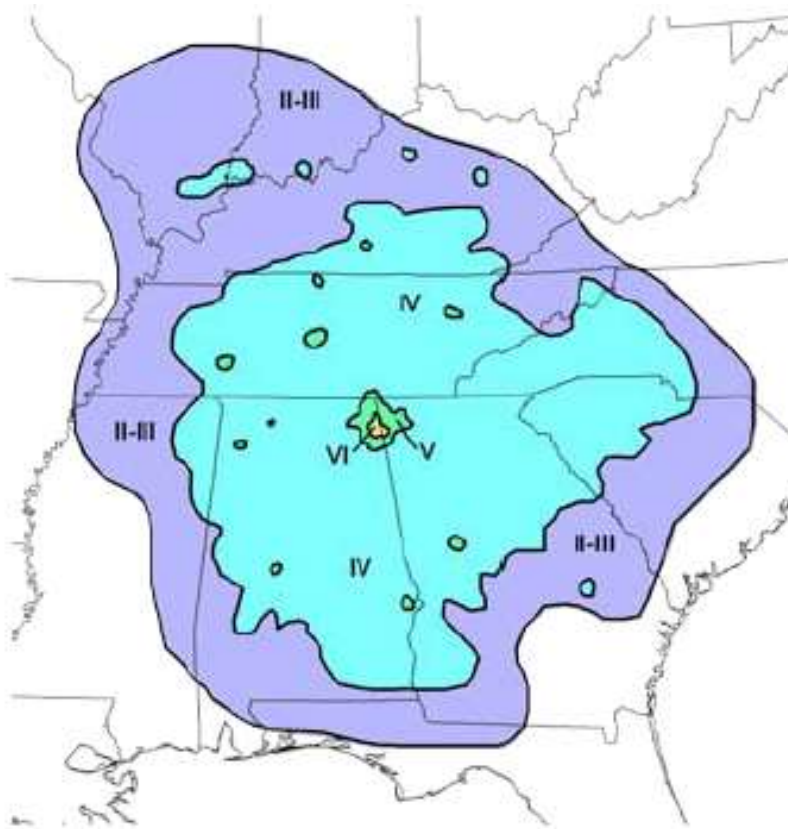
Source: U.S Geological Survey

Map 5-26. Marshall County PGA for 1916 Earthquake



On Tuesday morning, April 29, 2003, a 4.9 magnitude earthquake occurred near Fort Payne, in DeKalb County, Alabama, an adjacent county directly east of Marshall County. This earthquake was felt in 13 states, as shown on Map 5-27 “2003 Regional Earthquake Impacts.” Fortunately, the earthquake was deep and consequently did not cause significant structural damages in Fort Payne, the closest major city.

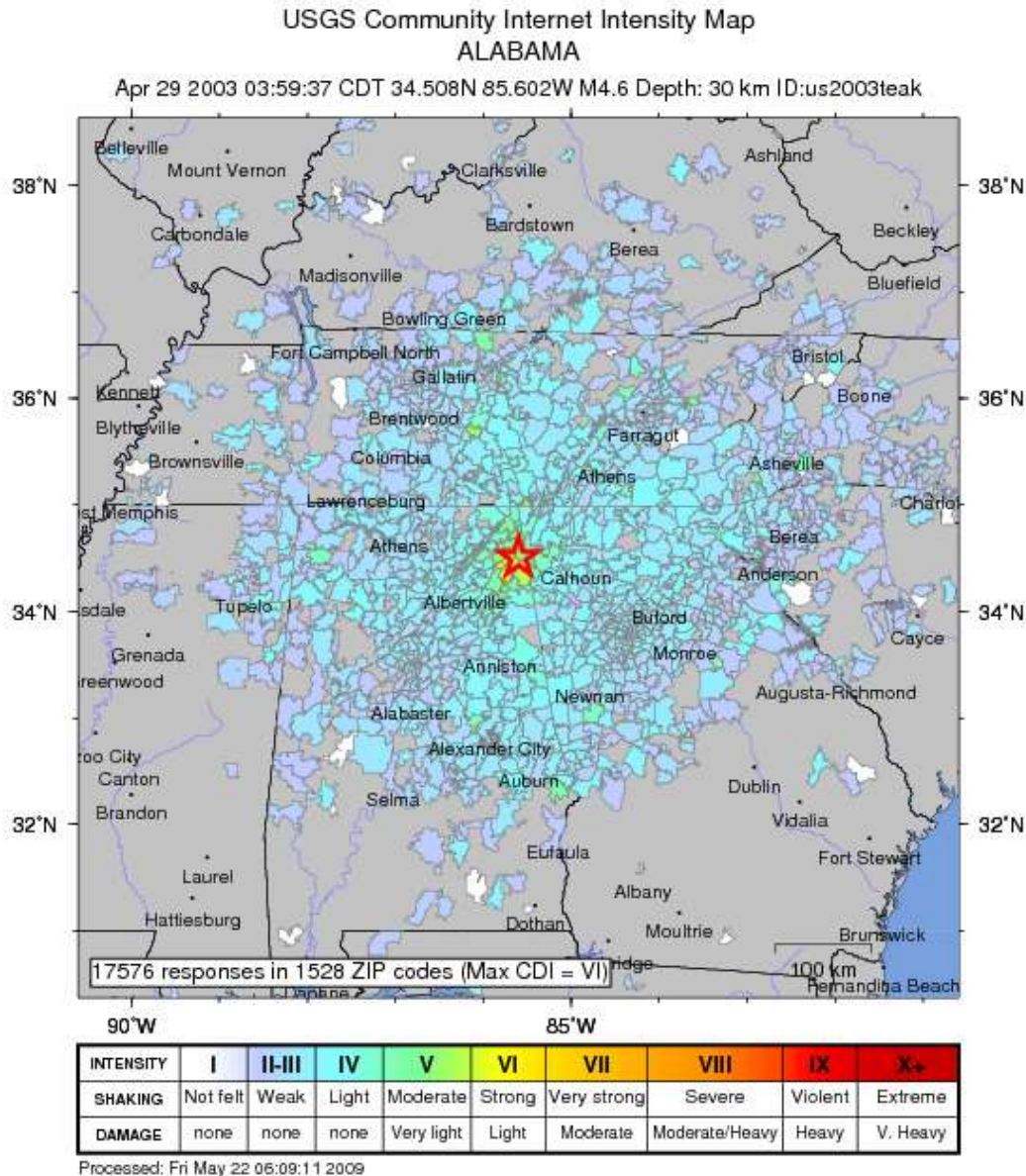
Map 5-27. 2003 Regional Earthquake Impacts



Source: Geological Survey of Alabama

To assess the impacts of the 2003 Fort Payne Earthquake, 10 miles north of Fort Payne, in adjacent DeKalb County, the USGS prepared a “Community Internet Intensity Map,” which is shown below as Map 5-28. According to the USGS, the “Community Internet Intensity Map (CIIM) summarizes the online questionnaire responses provided by Internet users. An intensity number is assigned to each community from which a filled-out CIIM questionnaire was received; each intensity value reflects the effects of earthquake shaking on the people and structures in the community. The color-coded ZIP Code zone on the map represents the average of the individual intensity values in that ZIP Code zone.

Map 5-28. 2003 Fort Payne Earthquake Intensity



Probability of Future Earthquake Events

Although the GSA records show frequent earthquake occurrences in the vicinity of Marshall County, the likelihood of a damaging earthquake is very low. Even though the probability of an event is high (Marshall County can expect occasional incidents) the likelihood of a high magnitude earthquake is extremely low. There are no historical records of an earthquake of magnitude 5.0 or greater within close proximity to Marshall County, suggesting moderate to large magnitude seismic activity in the area is rare. Only one earthquake of record in 1916 has exceeded a 5.0 magnitude over the last 123 years and that was in Irondale.

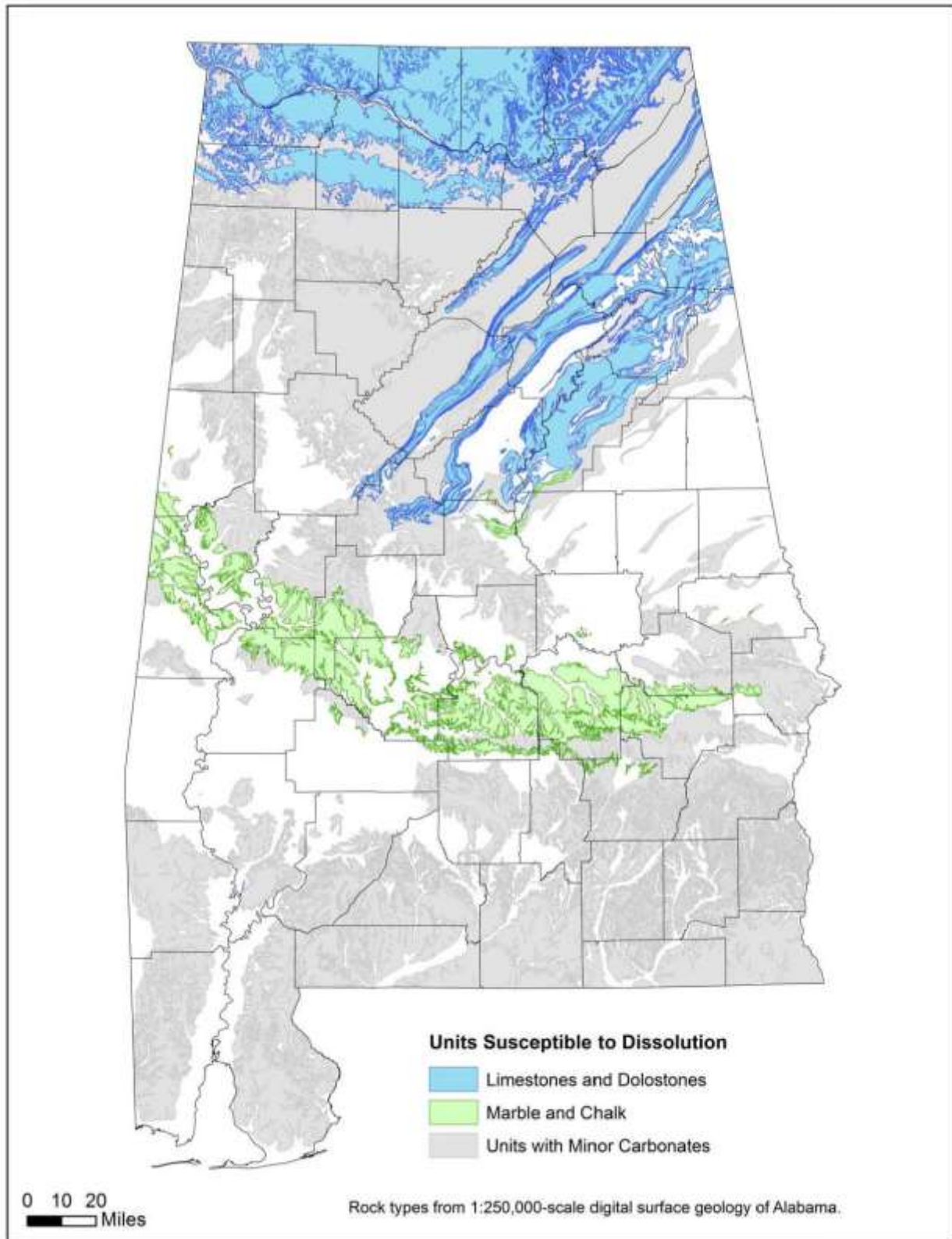
According to GSA records and GIS map data, the areas of Marshall County most susceptible to damages from ground shaking and liquefaction are areas of wet soils within the flood plains along the Tennessee River and parts of Lake Guntersville. First, however, an earthquake of great enough magnitude would need to take place within close enough proximity to Marshall County. The probability of such an event is very low; consequently, all developed areas within the incorporated areas of Marshall County have extremely low risks of earthquake damages. The results of the Hazard Mitigation Planning Committee hazard ratings and descriptions (refer to Appendix D) supports this same conclusion by giving an average rating for all jurisdictions of low for both probability and extents.

5.4.11 Sinkholes (Land Subsidence) Profile

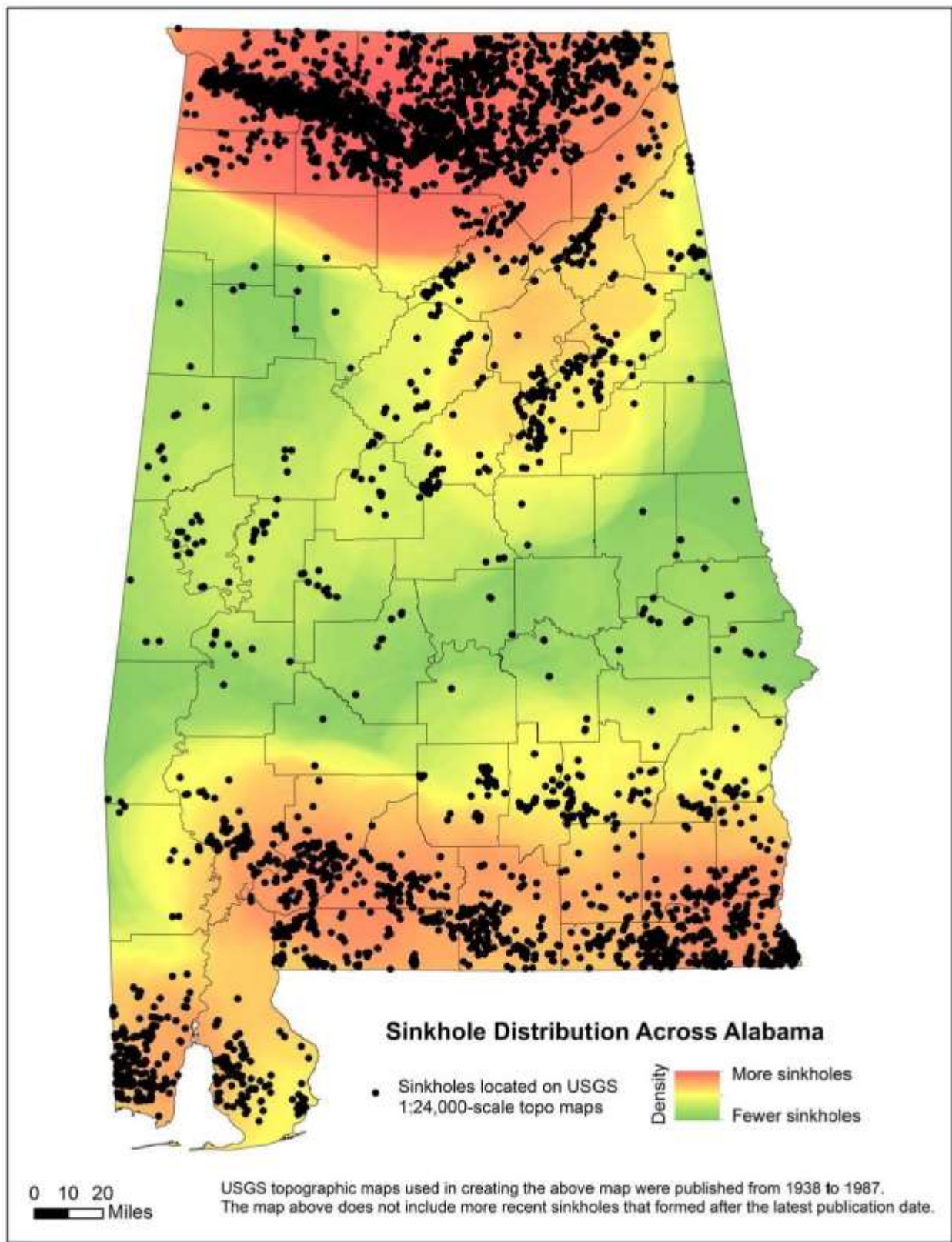
Marshall County, located in the northeast part of the state, is covered with a significant amount of limestone formations. When limestone interacts with underground water, the water dissolves the limestone to form karst topography which is an amalgamation of caves, underground channels, and a rough and bumpy ground surface. The underground water carves channels and caves that are susceptible to collapse from the surface. Alabama contains over 2,000 caves because of the karst topography. Map 5-29 depicts karst topography in Alabama and Marshall County. While most land subsidence is caused by natural dissolving of limestone over time, human activity can also trigger subsidence.

Building on or near karst areas can pose potential problems and great expense because of damage to buildings or cave-ins forming along roads. When subsidence occurs in developed areas, it can have significant community impacts, including loss of property value, increased cost of insurance and potential injury. According to the Geological Survey of Alabama, Marshall County is characterized by a significant number of sinkholes, as shown on Map 5-30 "Sinkhole Density in Alabama."

Map 5-29. Karst Geography, Alabama



Map 5-30 Sinkhole Density in Alabama



In general, the primary cause of land subsidence is human activity. The human activities that may trigger subsidence include mining and the withdrawal of groundwater. Vibrations from machinery, cars, and drilling equipment can exacerbate sinkholes.

In addition to human activity, droughts and excessive rainfall can also lead to the formation of sinkholes. According to University of Alabama at Birmingham (UAB) geologist Scott Brande, Ph.D., much of the recent sinkhole activity in Alabama is likely due to the drought of the summer of 2000. Another major period of droughts occurred in 2007 and 2008. During a drought, the groundwater table falls and caves that are normally filled with water may lose the support that the water provided. Eventually, cracks formed during the drought period will cause the roof of the cavity to fail.

Location of Potential Sinkholes

According to a statewide mapping project of sinkholes completed in 2010 by the GSA, land subsidence has occurred in a number of locations in Marshall County, mainly in the northern half of the county.

Extent and Intensity of Potential Sinkholes

Large areas of Marshall County are susceptible to the development of sinkholes. Those that do occur are primarily due to the limestone formations or from underground mines. When subsidence occurs in developed areas, it can have a significant impact on the communities including loss of property value, increased cost on insurance and potential injury. Sinkholes usually create minor nuisances but have the potential to cause substantial damages and destruction of buildings and infrastructure, including roads, bridges, and utility lines. The communities of Grant, Guntersville, and Union Grove are in areas of highest susceptibility.

Previous Occurrences of Sinkholes

The GSA estimates over 6,400 sinkholes in Alabama based on historic USGS 1:24,000-scale topographic maps; 178 of these are in Marshall County. There are no regulations requiring individuals to report developing sinkholes, but local and news reports provide further insight. To address this informational gap, the GSA is currently creating a new statewide inventory of sinkholes.

Of the available records, several sinkholes have been reported in or in close proximity to Guntersville. The largest sinkhole in the county is in Grant, with other large sinkholes along Highway 231 and around the unincorporated communities of Ruth and Oleander. In fact, one of Alabama's largest caves and leading tourist attractions, Cathedral Caverns is located near Grant.

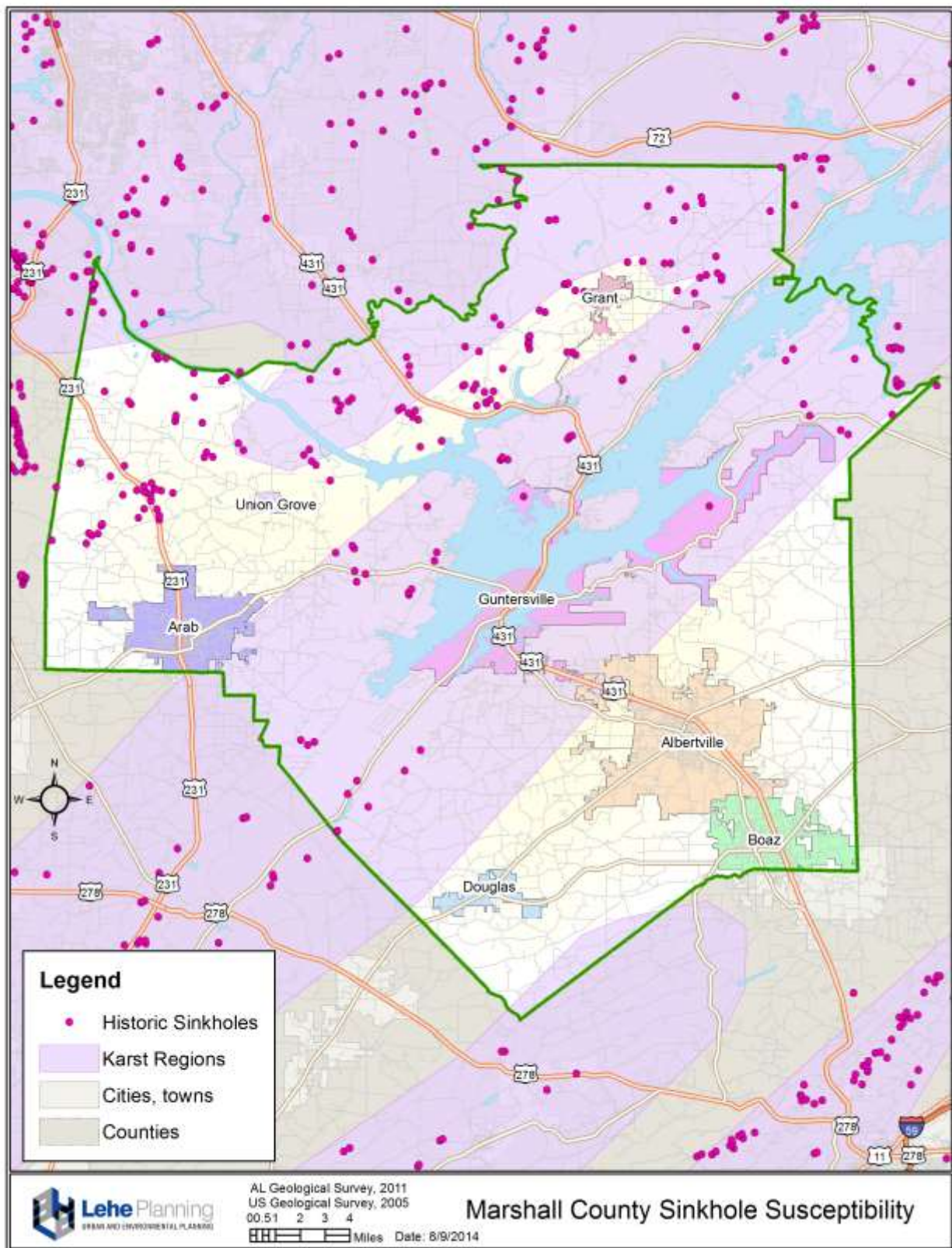
Northeast of Guntersville is a well-known sinkhole located in Bucks Pocket State Park along a trail that leads to Point Rock. Another location of sinkholes, caves and other karst features is the Honeycomb Creek Small Wild Area which covers 274 acres and is a popular whitewater rafting recreation area. It is located along CR 593 north of Guntersville Lake.

Probability of Future Sinkhole Events

The probability of future occurrences cannot be accurately predicted. Sinkholes are random events, which can be influenced by man's activity, ground water withdrawals, or drought. However, because the county has active sinkholes within areas of increasing urbanization, the probability of future events will likely remain high, and past trends will likely continue. According to the FEMA insurance reports, the number of sinkholes in the U.S. has steadily increased over the last several decades, and insurance claims for damages as a result of sinkholes have increased dramatically. The new data collection efforts by the GSA may help geologists better predict sinkhole activity within Marshall County.

(The information presented in this section was derived from the following sources: Geological Survey of Alabama, Geological Hazards Program, Sinkholes and Subsistence; "On Shaky Ground: Alabama's Sinkhole Heritage," UAB Magazine, Winter 2002 (Volume 22, Number 1) by Kathleen Yount; "Induced and Natural Sinkholes in Alabama – A Continuing Problem Along Highway Corridors," Accession Number 00158164, Transportation Research Board, Washington, DC.; Alabama Department of Conservation and Natural Resources, Montgomery, Alabama.)

Map 5-31. Marshall County Sinkhole Susceptibility



5.4.12 Human-Caused and Technological Hazards Profile

From 1987 through 2012, there have been 1,411 hazardous materials releases in Marshall County (EPA's Toxic Release Inventory, 2012). The potential impact from a major release on the Tennessee River and Lake Guntersville can be far reaching. Depending on the location and type of material accident, the water supply for those who depend on the river could become contaminated and many of the fish and wildlife that live in or near the river and lake could be in danger.

Hazardous material accidents are the main type of human-caused hazard that concerned the Hazard Mitigation Planning Committee (HMPC) members, as reported in the hazard identification exercise (see Appendix D "Hazard Ratings and Descriptions") and discussed at committee meetings. These types of human-caused accidents are the ones that occurred most often. The accidents range from manufacturing to storage to transportation and delivery. From April 19 through May 7, 2007, a grain bin silo was on fire, which presented the threat of explosion. There have been fuel spills at gas stations that required clean up by the local fire stations, and there has been a diesel pipeline leaking into a stream. There have been instances of people burning materials that are dangerous to the air and abandoned drums have been found with hazardous materials leaking out of them. There have been multiple motor accidents with tanker trucks or other vehicles with large quantities of hazardous materials.

In addition to the hazardous material accidents, there have been hostage situations and bomb threats. These have all been local incidents which were resolved quickly. Some of the HMPC members did report that they feel a threat from terrorism due to their proximity to Redstone Arsenal in Huntsville. The Arsenal does rate highly as a potential target for a terrorist attack and, depending on the type of attack; the residual effects could possibly spread to Marshall County. Cyber security threats always pose a risk and likely more so today than five years ago. Threats include social engineering (via Facebook, Twitter, LinkedIn), advanced persistent threats (gaining access to information in an organization), cloud security breaches, malware, and botnets. Also, now that more organizations are using alternative devices, such as iPads, iPhones, Android and Windows-operating smart phones for work-related purposes, this gives the attackers more opportunity to gain access via the Web or through apps.

Location of Potential Human-Caused and Technological Hazards

All Marshall County jurisdictions are subject to human-caused and technological hazards and are equally at risk. There are 79 facilities listed in CAMEO. CAMEO is a listing provided by the EPA on places in which hazardous chemicals are stored; however, the listing does not include gasoline stations. These 79 facilities are found throughout the county with most of them located within the main cities of Arab, Albertville, Boaz, and Guntersville. They range from the neighborhood hardware store, which might sell fertilizer to the chemical manufacturing plant. Those locations all have the potential to have a spill or accident of some type that could lead to a hazardous chemical release. In addition to the fixed facilities, there are trains that transport hazardous materials through Marshall County as well as the many tractor trailers that

haul similar materials across the county. The area that has had the most releases throughout the years is the Tennessee River. See Map 5-32 “Hazardous Materials Storage.”

As described above, hazardous materials events can occur anywhere those materials are manufactured, stored, or transported. Also, depending on the type of material, the threat could be far reaching if it is able to be transported through the air or water.

Acts of terrorism or cyber security attacks can occur anywhere, at any time and therefore the potential for an attack on anyone living in Marshall County is present.

Extent and Intensity of Potential Human-Caused and Technological Hazards

Marshall County has a number of hazardous materials events per year ranging from chemicals released in the air from burning tires to fuel spills in the Tennessee River. The events occur throughout the county, and some of them are caused by people deliberately performing an action that releases the chemical without regard for its impact on the air and water. The extent of technological hazards impacts and terrorist attacks can be quite severe, with potential for widespread damage to property and infrastructure and major loss of life and casualties, within any jurisdiction.

Previous Human-Caused and Technological Hazard Occurrences

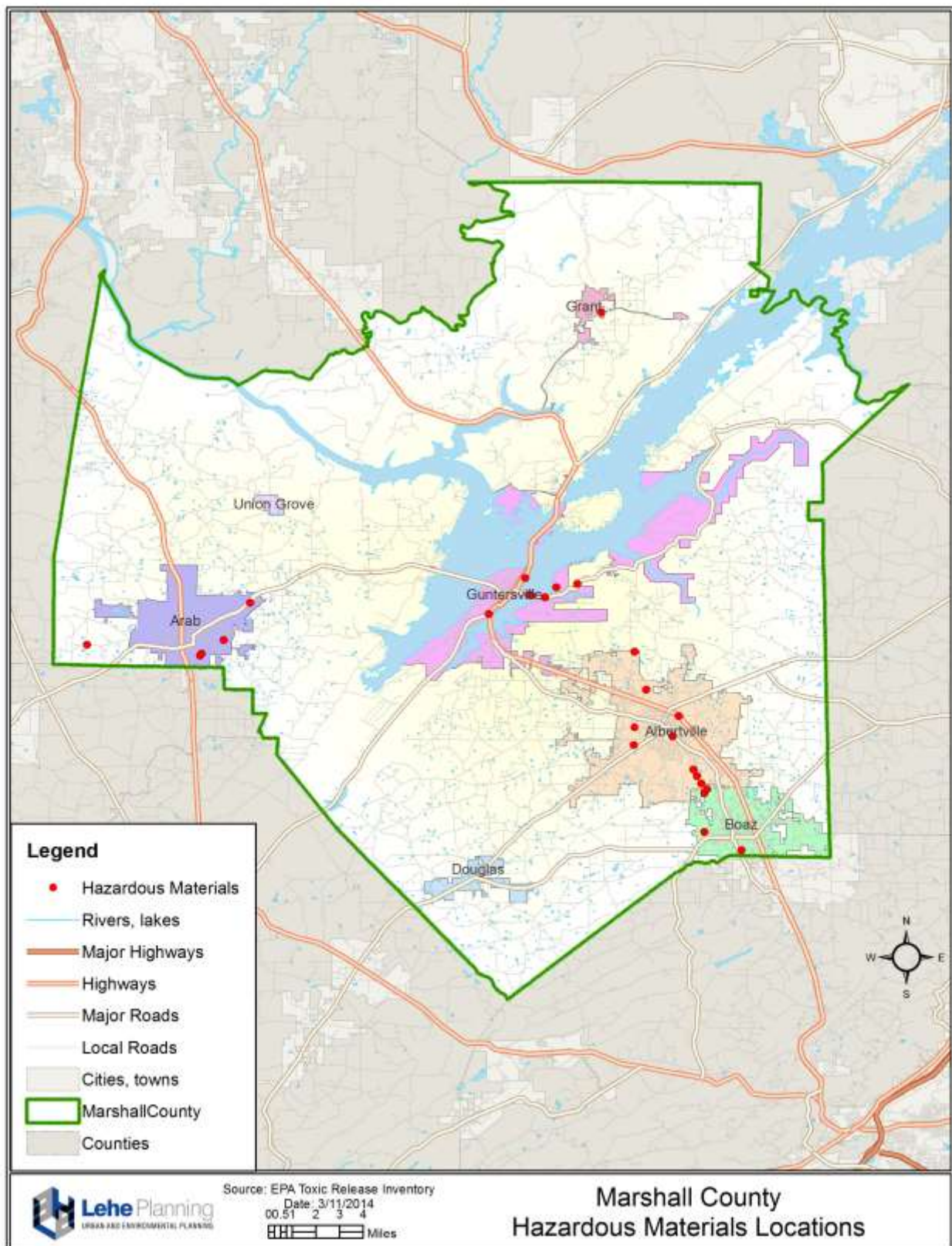
The principal human-caused hazard events that have occurred in Marshall County are hazardous materials accidents. These have occurred at manufacturing sites, storage sites, and even during transport. In 2007, the Marshall County EMA director stated that within the last 18 years there had been 63 hazardous materials incidents with 21 of them happening on the Tennessee River. In addition to the typical facilities such as plants, warehouses, and stores, there has been an increase in hazards at residences and even hotels in the manner of methamphetamine laboratories. These labs have been stationed in residences and are even mobile. They provide a unique threat when they are in transit as there are no markings on the vehicles to let other people in the surrounding area know there is a potential danger.

There have been other occasional human-caused occurrences in Marshall County - a hostage crisis and a bomb threat. The principal human-caused hazard threats, however, are accidental releases of a hazardous material.

Probability of Future Human-Caused and Technological Hazard Events

One of the hardest features to grasp of a human-caused or technological hazard is its unpredictability. There is no way to determine if there is going to be a human-caused or technological hazard at any certain time. For many natural hazards there is a season (e.g., hurricanes and tornadoes), a map of probable locations (e.g., floods and earthquakes) or forecasts (e.g., severe storms). For human-caused and technological hazards, events can happen anytime and virtually anywhere, and they do not need any specific circumstances in which to occur.

Map 5-32. Hazardous Materials Storage



5.5 Vulnerability of Structures within Each Jurisdiction

5.5.1 Scope of Structure Inventory

Section 5.5 presents an inventory of existing and future buildings, critical facilities, and infrastructure. For the purposes of this risk assessment, *vulnerability* refers to the exposure of buildings, critical facilities, and infrastructure to a particular hazard and their susceptibility to damage from the hazard. The inventory in this section forms the loss estimates in Section 5.6 “Estimate of Dollar Losses to Vulnerable Structures.”

Many Marshall County hazards are county-wide, including severe storms, hurricanes, tornadoes, winter storms/freezes, droughts/heat waves, wildfires, and earthquakes. Floods, sinkholes, landslides and dam failures, on the other hand, are location-specific hazards.

5.5.2 Inventory Methodology

The planning team assembled structure inventories in three steps.

First, a countywide inventory of the number and property values of structures was created using FEMA’s HAZUS-MH, which is a risk assessment software tool for projecting losses from floods, hurricane winds, and earthquakes. The planning team used the latest edition of HAZUS-MH software (version 2.1). HAZUS-MH modeled scenarios for Marshall County using a Level 1 analysis, which utilizes data provided with the software and calculates damages at the county level. Calculations below the county level are not recommended, because accuracy tends to diminish.

Second, the planning team used local GIS data to create maps and lists of critical facilities located in vulnerable areas. The GIS data came from Marshall County, Geological Survey of Alabama, U.S.G.S., National Weather Service, NFIP, U.S. Census Bureau, Alabama State Data Center, and the Alabama Forestry Commission.

Third, to estimate future building values and exposures, the planning team applied population projections from the Alabama State Data Center to the HAZUS-MH tables of existing building values. It is important to note that both population projections and HAZUS-generated structure counts and values are approximate; however, the planning team’s estimates are useful for prioritizing mitigation measures by place and hazard, since the *relative* values of existing and future populations, values, and rates of exposure are probably accurate.

The designation *building*, as used in this risk assessment, includes all walled and roofed structures. The designations *critical facilities* and *infrastructure* include the following structures, as classified by HAZUS-MH:

Critical Facilities

- Essential Facilities. These critical facilities are essential to the health and welfare of the entire Marshall County population and are particularly critical following hazard events. Emergency response facilities (police, fire, and emergency management), medical care facilities (hospitals and other care facilities), schools, and shelters for evacuation are all examples of essential facilities.
- High Potential Loss Facilities. These critical facilities include military installations, nuclear power plants and dams.

Infrastructure

- Transportation Systems Lifeline. These facilities include highways, bridges, tunnels, heavy/light railways, airports, buses, ports, and waterways.
- Lifeline Utility Systems Lifeline. These facilities are essential lifelines that include potable water, wastewater, natural gas, oil, electric, and communications systems.

Other

- User-Defined Facilities. The user may include additional facilities or systems unique to their study region which are not included in the general HAZUS-MH listing of critical facilities and infrastructure.

Critical facilities and infrastructure have been apportioned to each jurisdiction on the basis of population distribution, as follows:

Table 5-16. 2012 Population Distribution by Jurisdiction

Jurisdiction	Est. 2012 Population	% of Total
Albertville	21,516	22.7%
Arab	8,237	8.7%
Boaz	9,653	10.2%
Douglas	758	0.8%
Grant	912	0.9%
Guntersville	8,343	8.8%
Union Grove	78	0.1%
Unincorporated	45,279	47.8%
Marshall County	94,776	100%

Source: U.S. Census, American Fact Finder

The plan projects future numbers of buildings, critical facilities, and infrastructure to the year 2030 using the Alabama State Data Center's projection of Marshall County population growth. Since no projections existed for individual jurisdictions, the method described here was developed to provide a 2030 projected population for each jurisdiction. To project populations for each jurisdiction, the annual growth rate for each

jurisdiction has been calculated based upon population growth between 1990 and 2012. In the case of the overall population of Marshall County, the Alabama State Data Center 2030 county estimate has been used, and the unincorporated area projection is the countywide population less the total of all municipal populations.

The 2030 populations of Marshall County and its jurisdictions are used to compute *growth multipliers*. The growth multiplier is equal to 1 + the 2012-2030 percentage increases for each jurisdiction. For example, if 1,000 residential buildings are presently exposed, then a 2030 Growth Multiplier of 1.24 (where a jurisdiction's population is projected to increase 24 percent) would project 1,240 residential buildings will be exposed in 2030. The Growth Multiplier is applied to all present day estimates to project future conditions. This growth projection method is not precise, but it does provide a good indication of how growth might affect future exposure of structures to hazards.

Table 5-17. 2030 County Growth Projection

	2012	2030	Number	Percent
Marshall County	94,776	114,839	20,063	21.2%

Source: Alabama State Data Center

Table 5-18. Annual Growth Rates by Jurisdiction

Jurisdiction	1990	2010	Estimated 2012	1990-2012 Growth	Percent Change 1990-2012	Annual Growth Rate
Albertville	14,507	21,160	21,516	7,009	48.3%	1.81%
Arab	6,321	8,050	8,237	1,916	30.3%	1.21%
Boaz	6,928	9,551	9,653	2,725	39.3%	1.52%
Douglas	474	744	758	284	59.9%	2.16%
Grant	638	896	912	274	42.9%	1.64%
Guntersville	7,038	8,197	8,343	1,305	18.5%	0.78%
Union Grove	119	77	78	-41	-34.5%	-1.9%
Unincorporated	34,770	44,344	45,279	10,509	30.2%	1.21%
Marshall County	70,832	93,019	94,776	23,944	33.8%	1.33%

Source: Derived from the US Census

Table 5-19. 2030 Growth Projections and Multipliers

Jurisdiction	Estimated 2012	Annual Growth Rate	Projected 2030	Projected Change 2012-2030	Percent Increase 2012-2030	2030 Growth Multiplier
Albertville	21,516	1.81%	29,188	7,672	35.7%	1.36
Arab	8,237	1.21%	10,106	1,869	22.7%	1.23
Boaz	9,653	1.52%	12,475	2,822	29.2%	1.29
Douglas	758	2.16%	1,090	332	43.8%	1.44
Grant	912	1.64%	1,203	291	31.9%	1.32
Guntersville	8,343	0.78%	9,521	1,178	14.1%	1.14
Union Grove	78	-3.10%	46	-32	-41.5%	0.59
Unincorporated	45,279	*	51,211	5,932	13.1%	1.13
Marshall County	94,776	*	114,839	20,063	21.2%	1.21
*Countywide population is provided by the Alabama State Data Center; unincorporated is the remaining County population						

Source: Derived from Alabama State Data Center and the U.S. Census

Table 5-20. 2030 Population Distribution by Jurisdiction

Jurisdiction	2030 Population	% of Total
Albertville	29,188	25.4%
Arab	10,106	8.8%
Boaz	12,475	10.9%
Douglas	1,090	0.95%
Grant	1,203	1.0%
Guntersville	9,521	8.3%
Union Grove	46	0.05%
Unincorporated	51,211	44.6%
Marshall County	114,839	100%

Source: Derived from Alabama State Data Center

5.5.3 HAZUS-MH Structure Inventory

The percent exposure can be applied to the structure inventories to derive a general estimate of vulnerable structures by hazard. Most hazards are county-wide, but location-specific hazards, such as flooding, wildfires, dam/levee failures, sinkholes and landslides can vary from minimal vulnerability to as much as 100% of a community's total geographic area. In cases where exposure is 1% or less, a 1% exposure rate has been applied.” Although this does not yield a precise estimate, it provides a general indication of the number and types of structures exposed to each hazard within each jurisdiction. This data is shown in Table 5-21 below.

Table 5-21. Hazard Exposure Rates by Jurisdiction

Identified Hazard	Albertville	Arab	Boaz	Douglas	Grant	Guntersville	Union Grove	Unincorporated	Marshall Co.
Tornadoes	100%	100%	100%	100%	100%	100%	100%	100%	100%
Severe Storms	100%	100%	100%	100%	100%	100%	100%	100%	100%
Floods	1%	1%	1%	1%	1%	1%	1%	1%	1%
Winter Storms/Freezes	100%	100%	100%	100%	100%	100%	100%	100%	100%
Hurricanes	100%	100%	100%	100%	100%	100%	100%	100%	100%
Droughts/Heat Waves	100%	100%	100%	100%	100%	100%	100%	100%	100%
Wildfires	100%	100%	100%	100%	100%	100%	100%	100%	100%
Dam/Levee Failures	0%	0%	0%	0%	0%	0%	0%	<1%	<1%
Landslides	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Earthquakes	100%	100%	100%	100%	100%	100%	100%	100%	100%
Sinkholes	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Human-Caused & Technological Hazards	100%	100%	100%	100%	100%	100%	100%	100%	100%

General Description of the Planning Region

HAZUS-MH refers to the geographic study area as the *region*, which is all of Marshall County, including all unincorporated areas and seven municipalities. A more complete description of the planning region is presented in Chapter 3 “Community Profiles.” The descriptions provided here were generated by the HAZUS-MH Global Reports for county-wide assessments of hurricanes. The Marshall County region is generally described by HAZUS-MH, as follows:

- The geographical size of the region is 567 square miles.
- The region contains 15 census tracts and 3,279 census blocks.

- There were close to 38,000 households in the region, with a total population of 82,231 persons.

Table 5-22. HAZUS-MH Population and Building Value Data

State	County Name	2010 Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Alabama	Marshall	93,019	\$3,702	\$1,562	\$5,264

Table 5-23. HAZUS-MH Building Inventory by Occupancy

Occupancy	Count	Share
Agriculture	173	0.4%
Commercial	2,038	5.0%
Education	42	0.1%
Government	59	0.2%
Industrial	590	1.5%
Religion	189	.5%
Residential	37,381	92.3%
Total	41,066	100%

Building Inventory

- HAZUS-MH estimates that there are over 41,000 buildings in the region, which have an aggregate replacement value of \$5.3 million.
- In terms of building construction types found in the region, wood frame construction makes up 70% percent of the building inventory. Manufactured housing accounts for approximately 16% of buildings, a considerable amount.

Table 5-24. HAZUS-MH Building Inventory by Construction Type

Construction Type	Count	Share
Wood	28,784	70.1%
Steel	1,553	3.8%
Concrete	394	1.0%
Precast	92	0.2%
Reinforced Masonry	718	1.7%
Unreinforced Masonry	3,067	7.5%
Manufactured Housing	6,459	15.7%
Total	41,067	100.00%

Critical Facilities Inventory

HAZUS-MH breaks critical facilities into the two groups described below and estimates the number of each type of facility.

- (1) **Essential facilities** - which include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. HAZUS-MH estimates the numbers and types of essential facilities within the region, as follows:
 - ✓ 2 hospitals with a total bed capacity of 192 beds;
 - ✓ 34 schools;
 - ✓ 18 fire stations;
 - ✓ 10 police stations; and
 - ✓ 2 emergency operations facilities.
- (2) **High potential loss facilities** - which include dams, levees, military installations, and nuclear power plants. HAZUS-MH estimates the numbers and types of high potential loss facilities, as follows:
 - ✓ 5 dams, with one classified as “high hazard;”
 - ✓ 37 hazardous materials sites;
 - ✓ 0 military installations; and
 - ✓ 0 nuclear power plants.

Transportation and Utility Lifeline Inventories

HAZUS-MH breaks lifeline inventories into the two groups described below and estimates the number of each type of facility. HAZUS-MH estimates the total value of the lifeline inventory at \$1.1 billion. A more detailed breakdown is provided in Table 5-31 “HAZUS-MH Transportation System Lifeline Inventory.”

- (1) **Transportation systems**, which include highways, railways, light rail, bus, ports, ferry and airports. HAZUS-MH estimates the length of highways and the number of bridges, as follows:
 - ✓ 36 miles (57.9 kilometers) of highways;
 - ✓ 116 bridges;
 - ✓ 17 port facilities;
 - ✓ 2 airports with 2 runways; and
 - ✓ 13 miles of railway.
- (2) **Utility systems**, which include potable water, wastewater, natural gas, crude and refined oil, electric power, and communications. HAZUS-MH estimates the length of pipes, as follows:
 - ✓ 3,163 miles (4,339 kilometers) of potable water pipes;
 - ✓ 1,898 miles (3,054 kilometers) of wastewater pipes; and
 - ✓ 1,265 miles (2,035) of natural gas pipes.

5.5.4 Existing and Future Structure Vulnerabilities by Hazard and Jurisdiction**Buildings**

The building exposure totals generated by HAZUS-MH are gross estimates that show relative vulnerability of buildings to earthquakes, hurricane winds, and flooding. The numbers provided in the HAZUS-MH reports are not based on actual field inventories, which is beyond the scope of this planning process. Many of the numbers provided by HAZUS-MH are generated from formulas based on national standards. Where values are given for future conditions, the values are in 2006 dollars.

Building exposure in Marshall County is mostly residential at about 70 percent. This ratio should remain constant through the 2030 plan horizon, and occupancy ratios are assumed constant for the purposes of this analysis.

Table 5-25. Building Exposure by Occupancy

Occupancy	Existing Exposure (\$1,000)	Future Exposure (\$1,000)	% of Total (Future)
Agriculture	\$26,365	\$31,902	0.5%
Commercial	\$933,683	\$1,129,756	17.7%
Education	\$54,756	\$66,255	1.0%
Government	\$37,527	\$45,408	0.8%
Industrial	\$390,787	\$472,852	7.4%
Religious	\$118,651	\$143,568	2.3%
Residential	\$3,701,748	\$4,479,115	70.3%
Total	\$5,263,517	\$6,368,856	100%

Building values within each jurisdiction are expected to increase according to (a) growth in Marshall County's population; and (b) the growth in each jurisdiction's share of the county population. Communities need to be cognizant of the increasing risks and exposure resulting from growth.

Marshall County is projected to grow 21.2 percent from 2012 to 2030, with increases projected as high as 43.8 percent for Douglas and declines as sharp as 41 percent for Union Grove. Occupancy of buildings by jurisdiction is assumed to generally follow the county-wide distribution, and is projected to change according to each jurisdiction's growth multiplier.

Table 5-26. Building Values by Jurisdiction

Jurisdiction	Building Value					
	Existing Residential	Future Residential	Existing Non-Residential	Future Non-Residential	Existing Total	Future Total
Albertville	\$840,297	\$1,139,576	\$354,522	\$480,787	\$1,194,819	\$1,620,363
Arab	\$322,052	\$394,814	\$135,874	\$166,572	\$457,926	\$561,386
Boaz	\$377,578	\$489,031	\$159,300	\$206,322	\$536,878	\$695,353
Douglas	\$29,614	\$42,622	\$12,494	\$17,982	\$42,108	\$60,604
Grant	\$33,316	\$44,865	\$14,056	\$18,929	\$47,372	\$63,794
Guntersville	\$325,754	\$372,381	\$137,436	\$157,108	\$463,190	\$529,489
Union Grove	\$3,702	\$2,243	\$1,562	\$946	\$5,264	\$3,190
Unincorporated	\$1,769,436	\$2,000,987	\$746,526	\$844,217	\$2,515,962	\$2,845,205
Marshall County	\$3,701,748	\$4,486,519	\$1,561,769	\$1,892,864	\$5,263,517	\$6,379,383

Note: Totals of all municipalities and unincorporated areas may not equal Marshall County totals due to rounding.

Table 5-27. Building Count by Occupancy and Jurisdiction

Jurisdiction	Building Count by Occupancy															
	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
	Agric.		Commercial		Education		Govt.		Industrial		Religion		Single Family		Other Res.	
Albertville	40	54	471	639	10	13	14	18	136	184	44	59	5970	8096	2638	3578
Arab	15	19	181	221	4	5	5	6	52	64	17	21	2288	2805	1011	1240
Boaz	18	23	212	274	4	6	6	8	61	79	20	25	2682	3474	1186	1535
Douglas	1	2	17	24	0	0	0	1	5	7	2	2	210	303	93	134
Grant	2	0	19	3	0	0	1	0	5	1	2	0	237	32	105	14
Guntersville	15	18	183	209	4	4	5	6	53	60	17	19	2314	2645	1023	1169
Union Grove	0	0	2	1	0	0	0	0	1	0	0	0	26	16	12	7
Unincorporated	84	95	992	1122	21	23	29	32	286	324	92	104	12570	14215	5556	6283
Marshall County	175	212	2075	2515	43	52	60	73	599	726	193	234	26298	31873	11623	14087

Note: Totals of all municipalities and unincorporated areas may not equal Marshall County totals due to rounding.

Table 5-28. Building Exposure by Jurisdiction and Hazard

Identified Hazard	Building Exposure (\$1000s) by Jurisdiction																	
	Albertville		Arab		Boaz		Douglas		Grant		Guntersville		Union Grove		Unincorporated		Marshall County	
	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future	Existing	Future
Tornadoes	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Severe Storms	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Floods	\$12	\$16	\$5	\$6	\$5	\$7	\$0	\$1	\$0	\$1	\$5	\$5	\$0	\$0	\$25	\$28	\$53	\$64
Hurricanes	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Winter Storms/Freezes	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Droughts/Heat Waves	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Wildfires	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Dam/Levee Failures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$25	\$28	53	\$64
Landslides	\$12	\$16	\$5	\$6	\$5	\$7	\$0	\$1	\$0	\$1	\$5	\$5	\$0	\$0	\$25	\$28	\$53	\$64
Earthquakes	\$1,195	\$1,630	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379
Sinkholes (Land Subsidence)	\$12	\$16	\$5	\$6	\$5	\$7	\$0	\$1	\$0	\$1	\$5	\$5	\$0	\$0	\$25	\$28	\$53	\$64
Human-Caused & Technological	\$1,195	\$1,620	\$458	\$561	\$537	\$695	\$42	\$61	\$47	\$64	\$463	\$529	\$5	\$3	\$2,516	\$2,845	5,264	\$6,379

Note: Totals of all municipalities and unincorporated areas may not equal Marshall County totals due to rounding.

Critical Facilities

HAZUS-MH estimates there are 66 essential facilities within Marshall County. Additional facilities will be added as population increases. There are 42 high potential loss facilities, including 5 dams and 37 hazardous materials sites. By 2030, dams are expected to increase to 6 and hazardous materials sites to 45, for a total of 51 high potential loss facilities.

Table 5-29. HAZUS-MH Essential Facilities Data

Classification	Existing Estimate	Future Estimate (2030)
Hospitals	2 (192 total bed capacity)	2.4 (232 total bed capacity)
Fire Stations	18	21.8
Police Stations	10	12.1
Schools	34	41.1
EOCs	2	2.4

Table 5-30. HAZUS-MH High Potential Loss Facilities Data

Classification	Existing Estimate	Future Estimate (2030)
Dams	5	6
Hazard Materials Sites	37	45
Military Installations	0	0
Nuclear Power Plants	0	0

Infrastructure

Infrastructure inventories appear below. Infrastructure expansion is not directly related to population growth; consequently, no projections are given here. Most of the at-risk transportation system components are highway road segments and bridges, which are most vulnerable to flooding.

Table 5-31. HAZUS-MH Transportation Systems Lifeline Inventory

System	Component	# Locations/Segments	Replacement Value (\$ millions)
Highway	Bridges	116	\$87.50
	Segments	36	\$1,120.40
	Tunnels	0	\$0.00
		<i>Subtotal</i>	\$1,207.90
Railways	Bridges	0	\$0.00
	Facilities	1	\$2.70
	Segments	13	\$27.20
	Tunnels	0	\$0.00

System	Component	# Locations/Segments	Replacement Value (\$ millions)
		<i>Subtotal</i>	\$29.90
Light Rail	Bridges	0	\$0.00
	Facilities	0	\$0.00
	Segments	0	\$0.00
	Tunnels	0	\$0.00
		<i>Subtotal</i>	\$0.00
Bus	Facilities	0	\$0.00
		<i>Subtotal</i>	\$0.00
Ferry	Facilities	0	\$0.00
		<i>Subtotal</i>	\$0.00
Port	Facilities	17	\$33.90
		<i>Subtotal</i>	\$33.90
Airport	Facilities	2	\$21.30
	Runways	2	\$75.90
		<i>Subtotal</i>	\$97.20
		Total	\$1,369.00

The types of utilities most vulnerable to hazards are wastewater treatment plants, water treatment and distribution facilities, and electric power lines and substations. Hurricanes, severe storms, and flooding pose the greatest threat to these facilities.

Table 5-32. HAZUS-MH Utilities Systems Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (\$ millions)
Potable Water	Distribution Lines	NA	\$63.30
	Facilities	2	\$59.90
	Pipelines	0	\$0.00
		<i>Subtotal</i>	\$123.20
Waste Water	Distribution Lines	NA	\$38.00
	Facilities	7	\$419.60
	Pipelines	0	\$0.00
		<i>Subtotal</i>	\$457.50
Natural Gas	Distribution Lines	NA	\$25.30
	Facilities	0	\$0.00
	Pipelines	0	\$0.00
		<i>Subtotal</i>	\$25.30
Oil Systems	Facilities	0	\$0.00
	Pipelines	0	\$0.00

System	Component	# Locations / Segments	Replacement value (\$ millions)
		<i>Subtotal</i>	\$0.00
Electrical Power	Facilities	1	\$99.00
		<i>Subtotal</i>	\$99.00
Communication	Facilities	4	\$0.70
		<i>Subtotal</i>	\$0.70
		Total	\$705.70

Local Inventories of Critical Facilities and Infrastructure

The following maps and tables show the locations of major critical facilities, including Government Facilities, Public Safety Facilities, Schools, Hospitals and Elderly Care Facilities, Emergency Shelters, Communications, Warning Sirens, Utilities, and the Transportation System (derived from US Company Database, 2013 and revised by Marshall County EMA).

Table 5-33. Government Facilities

Agency	Type	Address	City
Alabama Alcoholic Beverage Control Bd.	Regulation, Miscellaneous Commercial Sectors	511 Gunter Ave	Guntersville
Alabama Cooperative Extension	Legislative Bodies	424 Blount Ave # G21	Guntersville
Alabama Department Human Res Food Stamps	Administration Of Social And Manpower Programs	1925 Gunter Ave	Guntersville
Alabama Department Transportation	Regulation, Administration Of Transportation	15 Dunn Dr.	Albertville
Alabama Department Transportation Main	Regulation, Administration Of Transportation	23445 Us Highway 431	Guntersville
Alabama Forestry Commission	Forestry Services	336 Yacht Club Rd	Guntersville
Alabama Health Department Public	Administration Of Public Health Programs	88 Henryville Cir	Guntersville
Alabama Human Resources-Family Options	Legislative Bodies	2017 Obrig Ave	Guntersville
Alabama State Judicial System	Courts	133 S Emmett St	Albertville
Albertville City Hall	Executive Offices	116 W Main St	Albertville
Albertville Magistrate Office	Courts	200 Sand Mountain Dr. # A	Albertville
Albertville Maintenance Shop	Legislative Bodies	404 Highland Ave	Albertville
Albertville Maintenance Shop	Legislative Bodies	700 Half Section Line Rd	Albertville
Albertville Neighborhood Center	Legislative Bodies	915 W McKinney Ave	Albertville
Albertville Senior Citizen Center	Legislative Bodies	221 E Main St	Albertville
Arab City Hall	Executive Offices	740 N Main St	Arab
Arab City School District	Administration Of Educational Programs	750 Arabian Dr. Ne	Arab
Arab Community Center	Legislative Bodies	232 City Park Dr. NE	Arab
Arab Community Center	Legislative Bodies	772 Shoal Creek Trail NE	Arab
Boaz City Hall	Executive Offices	112 N Broad St	Boaz
Boaz City Municipal Court	Courts	101 Line Ave	Boaz
Boaz Complex Maintenance Shop	Legislative Bodies	280 Collier St	Boaz
Boaz Housing Authority	Housing Programs	199 S Broad St	Boaz
Boaz Neighborhood Center	Legislative Bodies	314 N King St	Boaz
Boaz Softball Complex	Legislative Bodies	204 Collier St	Boaz
Douglas Town Hall	Executive Offices	55 Highway 168	Douglas

Agency	Type	Address	City
Farm Service Agency	Regulation Of Agricultural Marketing	1206 Gunter Ave	Guntersville
Grant Clerk's Office	Legislative Bodies	5379 Main St	Grant
Grant Town Hall	Executive Offices	4766 Main St	Grant
Guntersville City Garage	Legislative Bodies	325 Gunter Ave	Guntersville
Guntersville City Hall	Executive Offices	341 Gunter Ave	Guntersville
Guntersville City School District	Administration Of Educational Programs	2208 Ringold St # 2a	Guntersville
Guntersville Housing Authority	Housing Programs	1205 Wyeth Dr.	Guntersville
Guntersville Municipal Court	Courts	325 Gunter Ave	Guntersville
Guntersville Public Transportation	Legislative Bodies	1741 Blount Ave	Guntersville
Guntersville Traffic Court	Courts	425 Gunter Ave	Guntersville
Lake Guntersville State Park	Land, Mineral, And Wildlife Conservation	7966 Highway 227	Guntersville
Marshall County Council On Aging	Administration Of Social And Manpower Programs	436 Blount Ave	Guntersville
Marshall County Child Support Svc	Administration Of Social And Manpower Programs	1925 Gunter Ave	Guntersville
Marshall County Commission Dist. #2	Legislative Bodies	21 1st Ave W # B	Grant
Marshall County Commission	Legislative Bodies	3850 Eddy Scant City Rd	Arab
Marshall County Courthouse	Legislative Bodies	425 Gunter Ave	Guntersville
Marshall County Courts	Courts	200 W Main St	Albertville
Marshall County Emergency Tele. Serv.	Public Order And Safety	655 4th Ave NW	Arab
Marshall County Even	Administration Of Educational Programs	12316 US Highway 431	Guntersville
Marshall County Food Stamps	Administration Of Social And Manpower Programs	1925 Gunter Ave	Guntersville
Marshall County Garage	Regulation, Administration Of Transportation	2251 Oneonta Cut Off Rd	Albertville
Marshall County Health Department	Administration Of Public Health Programs	4200 Highway 79 S # B	Guntersville
Marshall County Legislative	Legislative Bodies	412 Gunter Ave # A	Guntersville
Marshall County Maintenance Department	Legislative Bodies	12380 Us Highway 431	Guntersville
Marshall County Offices	Courts	424 Blount Ave	Guntersville
Marshall County Probate Office	Legislative Bodies	301 N Main St	Arab
Marshall County Senior Program	Legislative Bodies	1805 Gunter Ave # A1	Guntersville
Marshall County Sign Shop	Legislative Bodies	123 Hustleville Rd	Albertville

Agency	Type	Address	City
Marshall Mobile Home Division	Legislative Bodies	424 Blount Ave # 124	Guntersville
Marshall Public Safety-Drivers' License	Regulation, Administration Of Transportation	357 Blount Ave	Guntersville
Tennessee Valley Authority	Land, Mineral, And Wildlife Conservation	2325 Henry St	Guntersville
Tennessee Valley Authority	Land, Mineral, And Wildlife Conservation	3969 Highway 69	Guntersville
Top of Alabama Reg. Housing Authority	Housing Programs	923 Denson Ave	Boaz
Union Grove Town Hall	Executive Offices	3680 Union Grove Rd	Union Grove
US Army Corps of Eng. Reservoir Maintenance	Legislative Bodies	3780 Guntersville Dam Rd	Guntersville
US Army Corps Of Engineers	National Security	3780 Guntersville Dam Rd	Grant
US Army National Guard	National Security	3550 Creek Path Rd	Guntersville
US Army National Guard Recruit	National Security	505 E McKinney Ave	Albertville
US Army National Guard Recruiter	National Security	1644 Cullman Rd	Arab
US Army Recruiting	National Security	7419 Us Highway 431 # E	Albertville
US Department of Agriculture	Land, Mineral, And Wildlife Conservation	6232 US Highway 431	Albertville
US Navy Recruiting	National Security	1208 Gunter Ave # A	Guntersville
US Post Office	U.S. Postal Service	819 N Main St	Arab
US Post Office	U.S. Postal Service	3935 Union Grove Rd	Union Grove
US Post Office	U.S. Postal Service	5319 Main St	Grant
US Post Office	U.S. Postal Service	210 S Hambrick St	Albertville
US Post Office	U.S. Postal Service	109 S Snead St	Boaz
US Post Office	U.S. Postal Service	9365 AL Highway 75	Horton
US Post Office	U.S. Postal Service	520 Gunter Ave	Guntersville
US Post Office	U.S. Postal Service	6396 Highway 75	Horton
US Social Security Administration	Administration Of Social And Manpower Programs	301 W Main St	Albertville
US Veterans Affairs Department	Administration Of Veterans' Affairs	424 Blount Ave	Guntersville
USDA Federal-State Grain Inspection	Regulation Of Agricultural Marketing	3209 Lake Guntersville Park	Guntersville

Map 5-33. Marshall County Government Facilities

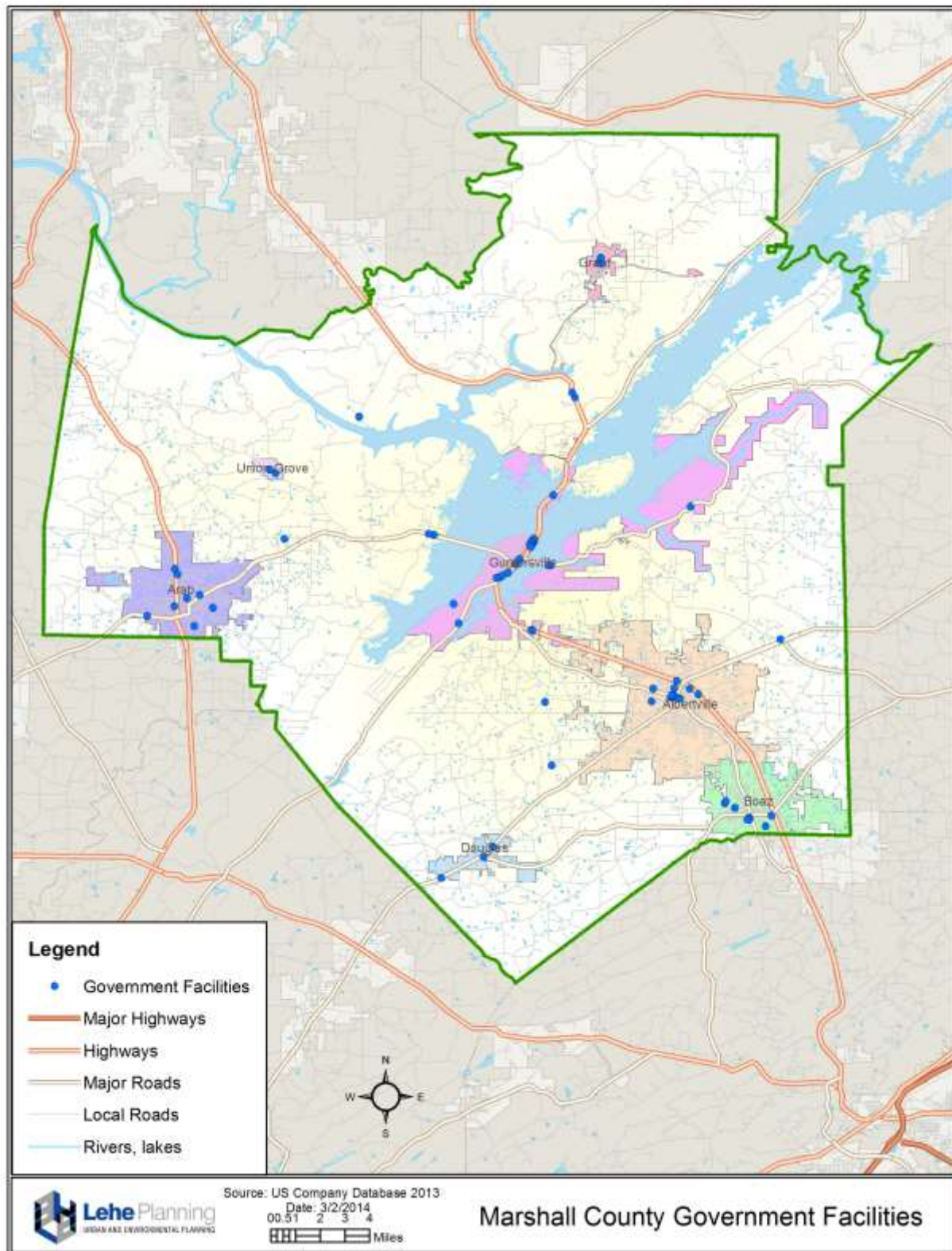


Table 5-34. Marshall County Public Safety Facilities

Agency	Type	Address	City
4-C Volunteer Fire Dept.	Fire	3921 Brashiers Chapel Rd	Arab
Alabama Marine Police District One	Police	4242 Aubrey Carr Scenic Dr.	Guntersville
Albertville City Police Dept.	Police	201 S Broad St	Albertville
Albertville Fire Rescue Station 1	Fire / Rescue	212 S Broad St	Albertville
Albertville Fire Rescue Station 2	Fire / Rescue	590 Medlock Rd	Albertville
Albertville Fire Rescue Station 3	Fire / Rescue	402 Mitchell Ave	Albertville
Alder Springs Volunteer Fire Dept.	Fire	5915 Hustleville Rd	Albertville
Arab Fire Rescue Station 1	Fire / Rescue	653 4th Ave NW	Arab
Arab City Police Dept.	Police	740 N Main St	Arab
Asbury Volunteer Fire Dept.	Fire	4104 Martling Gap Rd	Albertville
Beulah Mountain Volunteer Fire Dept.	Fire	2686 Beulah Rd	Boaz
Boaz City Police Dept.	Police	101 Line Ave	Boaz
Boaz Fire Rescue	Fire / Rescue	201 Brown St	Boaz
Brindle Mountain Volunteer Fire Dept. Station 1	Fire	4434 US Hwy 231	Union Grove
Brindle Mountain Volunteer Fire Dept. Station 3	Fire	12302 US Hwy 231	Union Grove
Douglas Police Dept.	Police	55 AL Hwy 168	Douglas
Douglas Volunteer Fire Dept.	Fire	165 Al Hwy 165	Douglas
Georgia Mountain Volunteer Fire Dept. Station 1	Fire	2485 Georgia Mountain Rd	Guntersville
Georgia Mountain Volunteer Fire Dept. Station 2	Fire	115 water Works Rd	Guntersville
Grant Police Dept.	Police	4766 Main St	Grant
Grant Volunteer Fire Dept.	Fire	4077 Main St	Grant
Guntersville City Police Dept.	Police	340 Blount Ave	Guntersville
Guntersville Fire Rescue Station 1	Fire / Rescue	1745 Blount Ave	Guntersville
Guntersville Fire Rescue Station 2	Fire / Rescue	12901 US Highway 431	Guntersville
Guntersville Fire Rescue Station 3	Fire / Rescue	311 Buck Island Dr.	Guntersville
Guntersville Rescue Squad	Rescue	2350 Miller St	Guntersville
Hebron Volunteer Fire Dept. Station 1	Fire	90 Hebron School Rd	Grant
Hebron Volunteer Fire Dept. Station 2	Fire	1755 Merrille Mt Rd	Grant
Lake Guntersville State Park Police	Police	1157 Lodge Drive	Guntersville
Marshall County 911 Center	Emergency	655 4th Ave NW	Arab
Marshall County Community Corrections	Corrections	119 Sand Mountain Dr.	Albertville
Marshall County District Attorney	Investigation	425 Blount Ave	Guntersville

Agency	Type	Address	City
Marshall County Drug Enforcement	Law Enforcement	435 Blount Ave	Guntersville
Marshall County Emergency Management	Emergency Management	3550 Creek Path Rd	Guntersville
Marshall County Sheriff's Office	Law Enforcement	423 Blount Ave	Guntersville
Mt Hebron Volunteer Fire Dept.	Fire	3038 Mount Hebron Rd	Boaz
Nixon Chapel Volunteer Fire Dept.	Fire	7925 Nixon Chapel Rd	Horton
Pleasant Grove Volunteer Fire	Fire	7275 Section Line Rd	Albertville
Ruth Volunteer Fire Dept.	Fire	3075 Matt Morrow Rd	Arab
South Sauty Volunteer Fire Dept.	Fire	122 Murphy Hill Dr.	Langston
Swearengin Volunteer Fire Dept.	Fire	5120 Swearengin Rd	Scottsboro
TVA Police	Police	3464 Snow Point Rd	Guntersville
Union Grove Volunteer Fire Dept.	Fire	3680 Union Grove Rd	Union Grove
Union Rescue Squad	Rescue	500 Double Bridges Rd	Boaz
Wakefield Volunteer Fire Dept.	Fire	777 South Sauty Rd	Langston
Waterfront Volunteer Fire Dept.	Fire	5515 Scottsboro Highway	Scottsboro

Map 5-34. Marshall County Public Safety Facilities

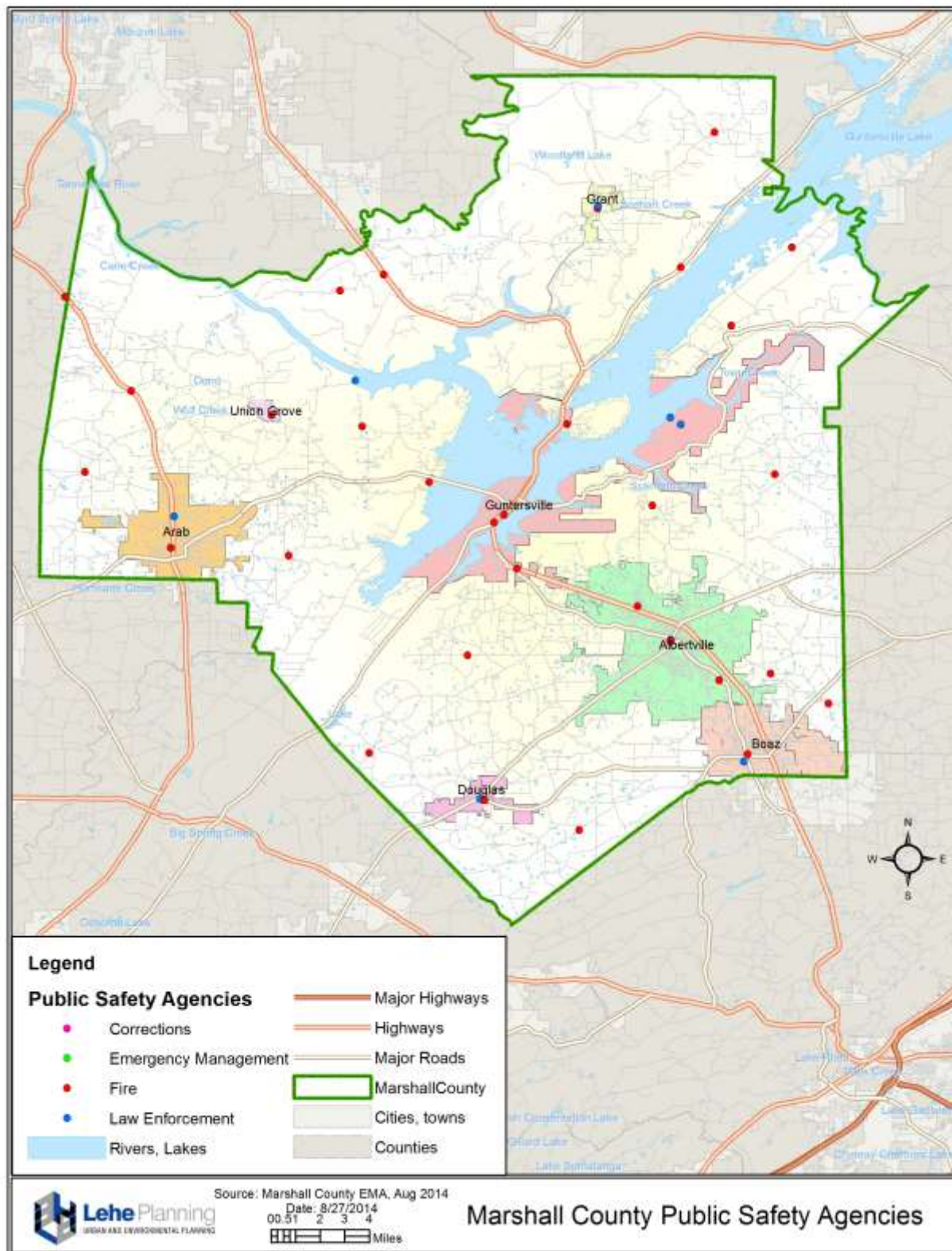


Table 5-35. Marshall County Schools

Name	Type	Address	City
Albertville Elementary School	Elementary/Secondary	1100 Horton Rd	Albertville
Albertville High School	Elementary/Secondary	402 E McCord Ave	Albertville
Albertville Middle School	Elementary/Secondary	600 E Alabama Ave	Albertville
Albertville Primary School	Elementary/Secondary	1100 Horton Rd	Albertville
Arab Elementary School	Elementary/Secondary	241 8th Ave NE	Arab
Arab High School	Elementary/Secondary	511 Arabian Dr. NE	Arab
Arab Junior High School	Elementary/Secondary	911 Old Cullman Rd SW	Arab
Arab Primary School	Elementary/Secondary	121 Mimosa St NE	Arab
Asbury Elementary School	Elementary/Secondary	1966 Asbury Rd	Albertville
Asbury High School	Elementary/Secondary	1990 Asbury Rd	Albertville
Big Spring Lake Elementary School	Elementary/Secondary	257 Country Club Rd	Albertville
Boaz Elementary School	Elementary/Secondary	362 Collier St	Boaz
Boaz High School	Elementary/Secondary	907 Brown St	Boaz
Boaz Intermediate School	Elementary/Secondary	11 Newt Parker Dr.	Boaz
Boaz Middle School	Elementary/Secondary	140 Newt Parker Dr.	Boaz
Brindlee Mountain Elementary School	Elementary/Secondary	2233 Shoal Creek Rd	Arab
Brindlee Mountain High School	Elementary/Secondary	994 Scant City Rd	Guntersville
Brindlee Mountain Middle School	Elementary/Secondary	994 Scant City Rd	Guntersville
Brindlee Mountain Primary School	Elementary/Secondary	3685 Union Grove Rd	Union Grove
Cherokee Elementary School	Elementary/Secondary	3300 Highway 79 S	Guntersville
Claysville Junior High School	Elementary/Secondary	140 Claysville School Rd	Guntersville
Corley Elementary School	Elementary/Secondary	505 Mount Vernon Rd	Boaz
DAR High School	Elementary/Secondary	6077 Main St	Grant
DAR Elementary School	Elementary/Secondary	6077 Main St	Grant

Name	Type	Address	City
DAR Middle School	Elementary/Secondary	6077 Main St	Grant
Douglas Elementary School	Elementary/Secondary	151 Eagle Dr.	Douglas
Douglas Middle School	Elementary/Secondary	205 Eagle Dr.	Douglas
Douglas High School	Elementary/Secondary	225 Eagle Dr.	Douglas
Evans Elementary School	Elementary/Secondary	900 W McKinney Ave	Albertville
Guntersville Elementary School	Elementary/Secondary	1800 Lusk St	Guntersville
Guntersville High School	Elementary/Secondary	14227 US Highway 431	Guntersville
Guntersville Middle School	Elementary/Secondary	901 Sunset Dr.	Guntersville
Marshall Christen School	Elementary/Secondary	1631 Brashiers Chapel Rd	Albertville
Marshall Technical School	Technical	12312 Us Highway 431	Guntersville
Sloman Primary School	Elementary/Secondary	200 Bethlehem Rd	Douglas
Snead State Community College	College	220 N Walnut St	Boaz
Snead State Community College	College	261 South Main St	Arab

Map 5-35. Marshall County Schools

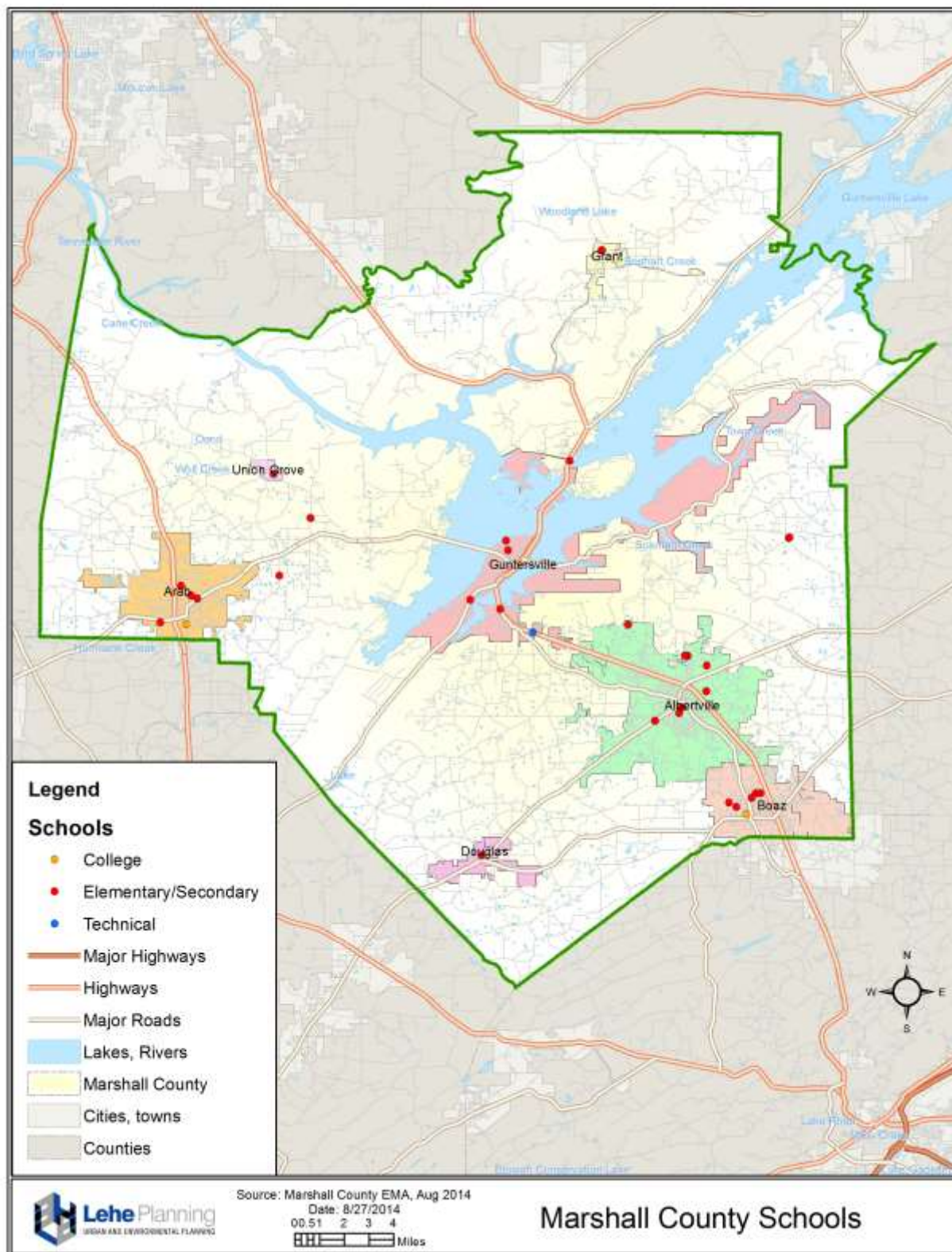


Table 5-36. Marshall County Hospital and Elderly Care Facilities

Name	Type	Address	City
Albertville Nursing Home	Nursing Home	750 AL Highway 75 N	Albertville
Assisted Living Of Arab	Assisted Living	8895 AL Highway 69	Arab
Barfield Health Care Inc.	Nursing Home	22444 Us Highway 431	Guntersville
Branchwater Village LLC	Nursing Home	763 Medical Center Pkwy	Boaz
Davita Boaz	Dialysis	16 Central Henderson Rd	Boaz
Golden Living Arab	Nursing Home	235 3rd St	Arab
Golden Living Boaz	Nursing Home	600 Corley Ave	Boaz
Lakeview Dialysis	Dialysis	45 Medical Park Dr.	Guntersville
Marshall Cancer Care Center	Cancer Care	11491 US Hwy 431	Albertville
Marshall Manor Nursing Home	Nursing Home	3120 North St	Guntersville
Marshall Medical Center North	Hospital	8000 AL Highway 69	Guntersville
Marshall Medical Center South	Hospital	2505 Highway 431	Boaz
Merrill Gardens At Albertville	Assisted Living	151 Woodham Dr.	Albertville
Terrace Lake Village	Assisted Living	100 Terrace Lake Dr.	Guntersville

Map 5-36. Marshall County Hospitals and Elderly Care Facilities

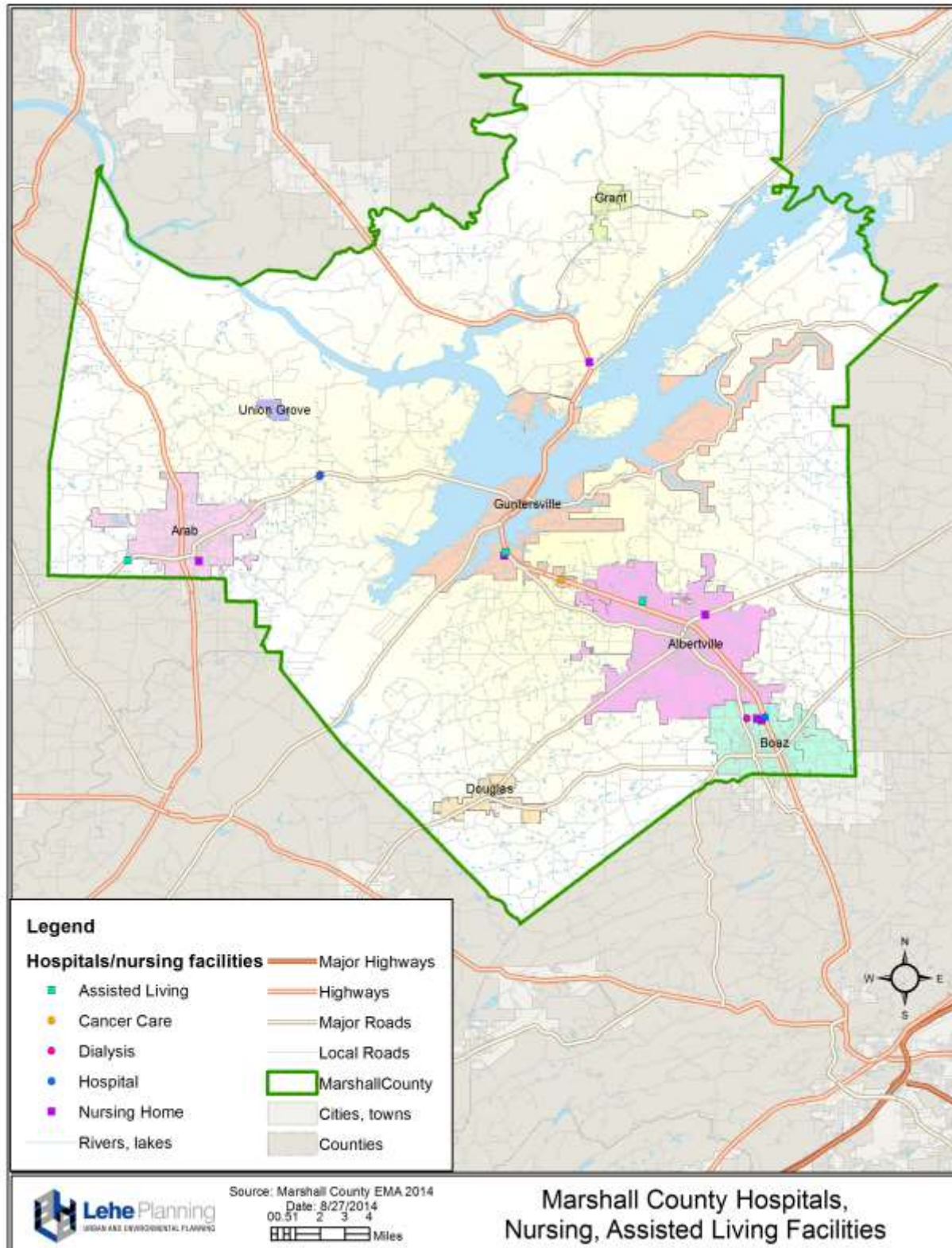


Table 5-37. Marshall County Community Shelters

Name / Location	Type	Address	City / Town
Albertville Board of Education	Place of Refuge	107 West Main Street	Albertville
Arab Senior Center	Place of Refuge	800 North Main Street	Arab
Asbury Martling / Community Center	Tornado Shelter	4059 Martling Rd	Albertville
Boaz First Baptist Church	Place of Refuge	225 South Main Street	Boaz
Claysville / Cedar Lodge Center	Tornado Shelter	22165 US Hwy 431	Guntersville
Douglas / Douglas Town Hall	Tornado Shelter	165 AL Hwy 168	Douglas
Douglas First Baptist Church	Place of Refuge	110 Moon Rd	Douglas
Georgia Mountain / Georgia Mtn. VFD	Tornado Shelter	2485 Georgia Mtn. Rd	Guntersville
Gilliam Springs Baptist Church	Place of Refuge	1351 North Brindlee Mtn. Pkwy	Arab
Grant / District 2 Shop	Tornado Shelter	21 1st Avenue West	Grant
Grant / Grant Senior Center	Tornado Shelter	307 2nd Ave	Grant
Hebron / Hebron VFD	Tornado Shelter	90 Hebron School Road	Grant
Mt. Pleasant / Community Center	Tornado Shelter	5743 Simpson Point Rd	Grant
Nixon Chapel / Nixon Chapel VFD	Tornado Shelter	7925 Nixon Chapel Rd	Horton
Oak Grove United Methodist Church	Place of Refuge	Oak Grove Rd	Horton
Oak Grove United Methodist Church	Place of Refuge	Oak Grove Rd	Horton
Pleasant Grove / Pleasant Grove VFD	Tornado Shelter	7275 Section Line Rd	Albertville
Riverview / Riverview Campground	Tornado Shelter	1345 Cha-La-Kee Rd	Guntersville
Scant City / District 1 Shop	Tornado Shelter	3850 Eddy Scant Rd	Arab
St Williams Catholic Church	Place of Refuge	929 Gunter Ave	Guntersville
Swearengin / Swearengin VFD	Tornado Shelter	5120 Swearengin Rd	Swearengin
Union Grove / Union Grove Town Hall	Tornado Shelter	3680 Union Grove Rd	Union Grove
Union Grove Senior Citizens Center	Place of Refuge	3935 Union Grove Rd	Union Grove
Wakefield / Wakefield VFD	Tornado Shelter	777 South Sauty Rd	Langston
Whitesville / Whitesville Church	Tornado Shelter	118 Whitesville Church Rd	Boaz

Map 3-37. Marshall County Community Shelters

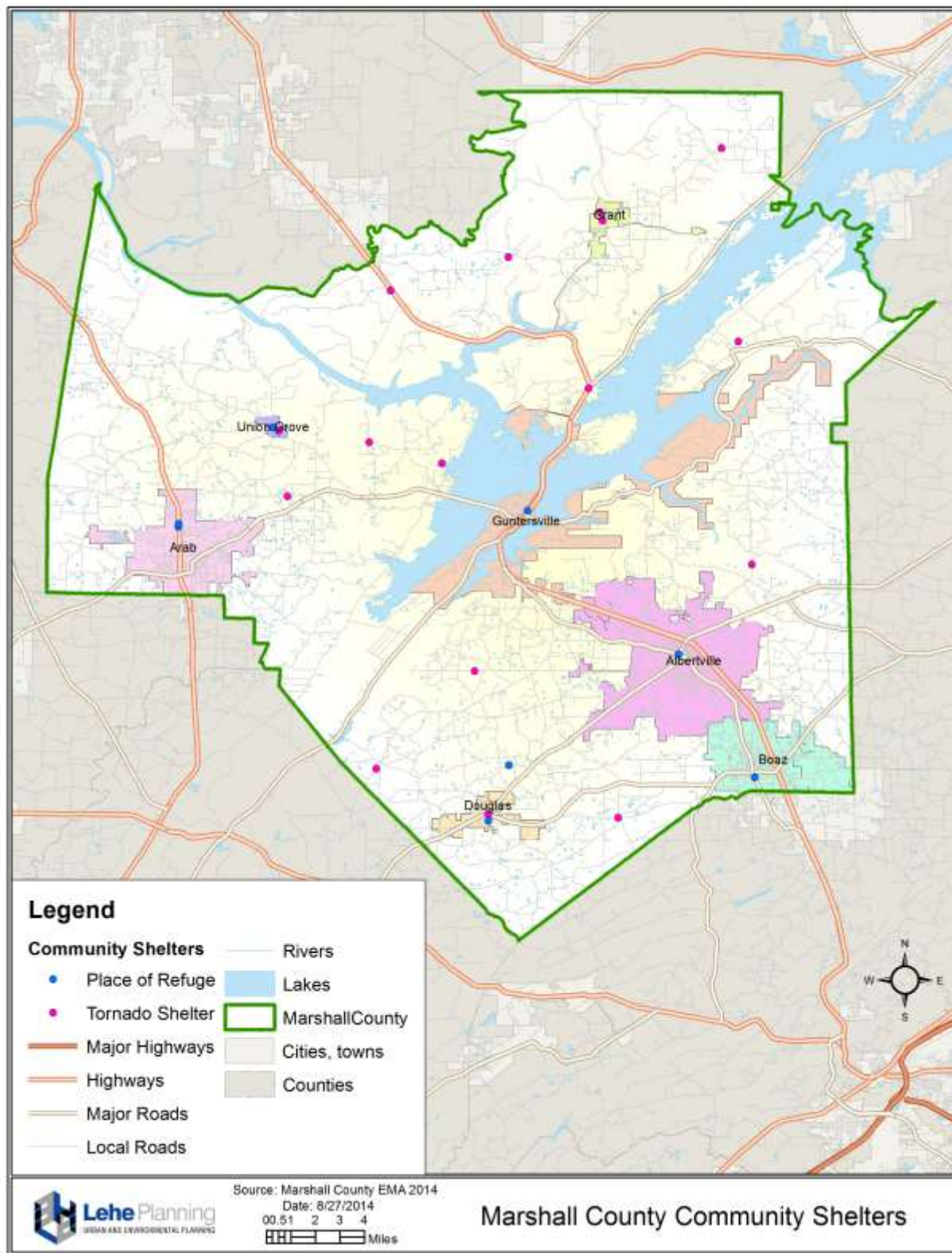


Table 5-38. Marshall County Communication Facilities

Company	Type	Address	City
AAA Communications	Wireless Communication	12985 Us Highway 431	Guntersville
American Hazmat Response	Wireless Communication	251 Evermore Ln	Arab
BellSouth	Wireless Communication	1121 Kilpatrick Rd	Albertville
Cingular Wireless	Wireless Communication	2081 US Highway 431	Boaz
Cingular Wireless	Wireless Communication	1004 Butler Ave	Boaz
Cingular Wireless	Wireless Communication	8337 Us Highway 431	Albertville
Cingular Wireless	Wireless Communication	1077 N Brindlee Mountain	Arab
Cingular Wireless	Wireless Communication	1450 N Brindlee Mountain Pkwy	Arab
Cool-Com	Wireless Communication	1532 N Brindlee Mountain Pkwy	Arab
Corr Wireless	Wireless Communication	8180 Us Highway 431 # B	Albertville
Corr Wireless	Wireless Communication	1416 N Brindlee Mountain Pkwy	Arab
Wireless Advantage	Wireless Communication	2276 Us Highway 431	Boaz
Wireless Advantage	Wireless Communication	8353 Us Highway 431	Albertville
East Alabama Electronic Inc.	Wireless Communication	565 US Highway 431 B	Boaz
Farmers Wireless	Wireless Communication	2073 Us Highway 431	Boaz
Suncom National Wireless	Wireless Communication	423 Us Highway 431	Boaz
Verizon Wireless	Wireless Communication	11476 Us Highway 431	Guntersville
Otelco	Telecommunications	113 South Main St	Arab
Charter Communications	Cable TV	904 Rose Rd	Albertville
Digital Satellite-Guntersville	Cable TV	46 Brown Acres	Guntersville
Southern Cable Services	Cable TV	10790 US Highway 431	Albertville
WAFN Radio FM 92.7	Radio Broadcasting	981 N Brindlee Mountain Pkwy	Arab
WAVU Radio FM 107.5, AM 630	Radio Broadcasting	3770 US Highway 431	Albertville
WBSA Radio AM 1300	Radio Broadcasting	1525 Wills Rd	Boaz
WGSV Radio AM 1270	Radio Broadcasting	2301 Thomas Ave	Guntersville
WJIA Radio FM 88.5	Radio Broadcasting	5025 Spring Creek Dr.	Guntersville
WQSB Radio FM 105.1	Radio Broadcasting	3770 US Hwy 431	Albertville
WRAB Radio AM 1380	Radio Broadcasting	619 S Brindlee Mountain Pkwy	Arab
WTWX Radio FM 95.9	Radio Broadcasting	2301 Thomas Ave	Guntersville
WWGC Radio AM 1090 Spanish	Radio Broadcasting	455 AL Hwy 75	Albertville
WZZN Radio FM 97.9	Radio Broadcasting	108 Woodson St (Tower in Union Grove AL)	Huntsville

Map 5-38. Marshall County Communication Facilities

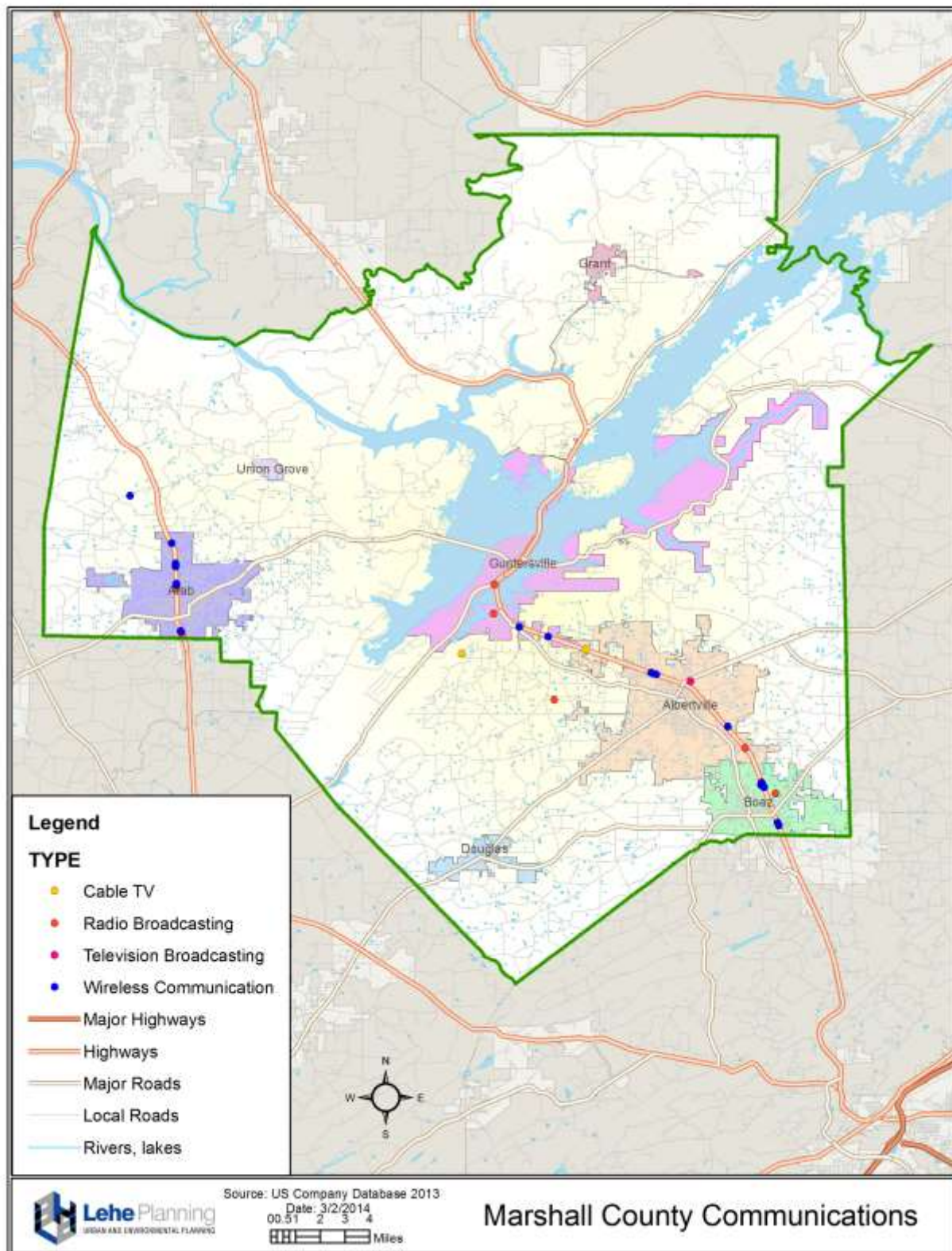


Table 5-39. Marshall County Warning Sirens

Current Siren #	FA#	Location
1001	7124	Grant High School
1002	7125	Douglas High School
1003	7123	Claysville Elementary School
1004	7126	Ball field across street Asbury High School
1005	7626	Alder Springs Volunteer Fire Dept.
1006	9014	Whitesville Dr./Sommerville Dr.
1007	9015	Mt Hebron Volunteer Fire Dept.
1008	7787	Pleasant Grove Rd/Byron Moman Rd
1009	9196	Swearengin Volunteer Fire Dept.
1010	10311	Poplar Springs Rd/Burgess Rd
1011	10314	U.S. Hwy 431/Bakers Chapel Rd
1012	10312	Waterfront Volunteer Fire Dept.
1013	7786	U.S. Hwy 431/Boat launch near Snug Harbor Rd
1014	10313	Hebron Volunteer Fire Dept.
1015	10315	Nixon Chapel Volunteer Fire Dept.
1016	10042	Beulah Volunteer Fire Dept.
1017	10037	Pea Ridge Rd/ Between Puney Grove Rd and Martling Rd
1041	-	Guntersville Rescue Squad
1018	10040	Simpson Point Rd/Anderson Ln
1019	10041	Nixon Chapel Rd/Douglas-Hyatt Rd
1020	7624	South Ridge Dr.
1021	7122	Scant City Rd/Union Grove Rd
1022	7625	Mt Carmel Rd/Rush Circle
1023	6794	Brashiers Chapel Rd/Thompson Falls
1024	6795	Al Hwy 69/Benton Rd
1025	10039	Ruth Rd/Matt Morrow Rd
1027	10407	Wakefield Volunteer Fire Dept.
1028	10427	South Sauty Volunteer Fire Dept.
1029	10428	Hulaco Rd/Norwood Dr.
1030	10430	Union Grove Rd/Brocks Chapel Rd
1031	10429	Warrenton Rd/Vaughn Circle
1032	10458	Cathedral Caverns Hwy/Word Mtn. Rd
1033	10842	Union Grove Rd/Royster Dr.
1034	10840	Warrenton Rd/Warrento Shores Dr.
1035	10841	Cathedral Caverns Hwy/Kenamer Cove Rd
1036	10983	Brashiers Chapel Rd/Fosset Rd
1037	10981	Fry Gap Rd/Askea Grove Ln
1038	10984	U.S. Hwy 68/McVile Rd
1039	10980	Grimes Ln/Bohannon Rd

Current Siren #	FA#	Location
1040	10982	Turnpike Rd/U.S. Hwy 205
1114	11408	Intersection of Friendship Rd/New Friendship Rd
1115	11407	Intersection of Mobb School Rd/Graceland Dr.
1116	11405	Feemster Gap Rd near the intersection of Largo Lane
1117	11406	Intersection of Georgia Mountain Rd/Foster Landing Rd
1211	11410	Intersection of Welcome Home Rd/Campbell Rd
1212	11413	Intersection of Simpson Point Rd/Kirkland Rd
1213	11412	Intersection of US. Hwy 79N/Comfort Lane
1214	11409	3550 Creek Path Road, Guntersville, AL
1215	11411	Bakers Chapel Rd near Lewis Mtn. Rd Intersection
1216	11414	Intersection of Swearengin Rd/Esslinger Rd
1309	11419	Intersection of Hwy High Point Rd/Old Oneonta Rd
1310	11416	Intersection of Kelly Rd/Pleasant Grove Rd
1311	11415	Niles Rd near the intersection of Miller Dr.
1312	11417	Intersection of Jackson Rd and Plum Dr.
1026	-	Union Grove Rd/Union Chapel
1313	11418	Intersection of Mobb School Rd/Graceland Dr.
1410	11423	Intersection of Hustleville Hwy/Rice Mill Chavers Rd
1411	11424	Intersection of Martling Rd/Holly Lane
1412	11421	Intersection of Claude Hill Rd/Ervin Patterson Rd
1413	11420	Intersection of Milky Way Rd/Mizar Rd
1414	11422	On Murphy Hill Rd at the entrance to Mountain Lake Resort

Map 5-39. Marshall County Warning Sirens

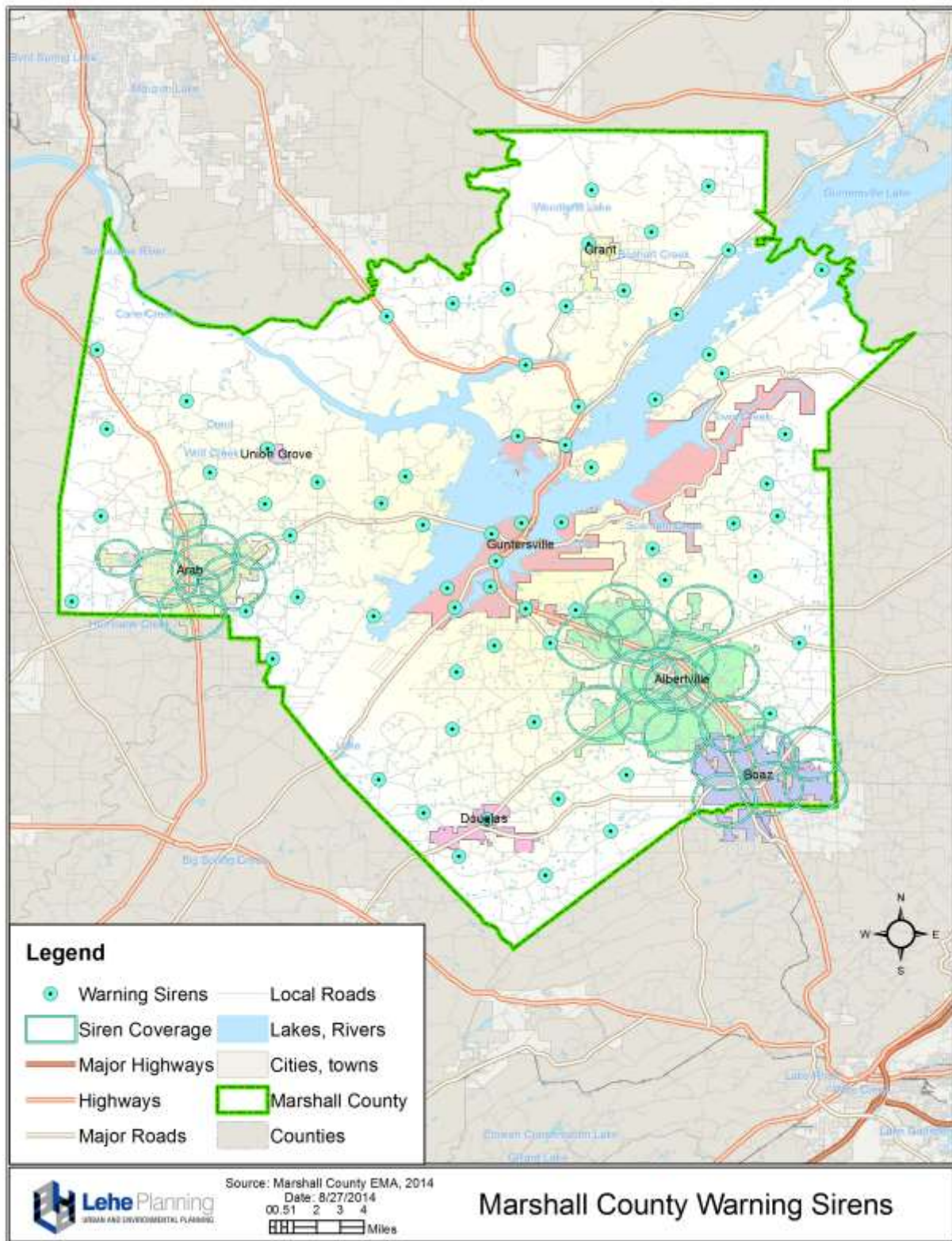


Table 5-40. Marshall County Utilities

Company	Type	Address	City
Arab Electric	Main Office	331 South Brindlee Mountain Parkway	Arab
Arab-Electric	Brindlee Substation	Substation Rd. (Morgan Co.-serves Marshall)	Arab
Arab-Electric	District Substation	North Main St.	Arab
Arab-Electric	Georgia Mountain Substation	Georgia Mountain Road	Arab
Arab-Electric	Union Chapel Substation	Union Chapel Rd.	Arab
Arab-Electric	Union Grove Substation	Union Grove Rd.	Arab
Arab Water	Main Office	526 Cullman Rd. Arab	Arab
Arab-Water	4th Ave. Tank	5th Ave. NW	Arab
Arab-Water	12th Ave. Tank	12th Ave. NE	Arab
Arab-Water	Arab Water Plant/Lift Station #1	66 Water Works Rd.	Arab
Arab-Water	Armory Tank	AL 69/Hulaco Rd.	Arab
Arab-Water	Deltacom Tank	Chambers Rd.	Arab
Arab-Water	Morgan City Tank	US Hwy 231 (Morgan County)	Arab
Arab-Water	Mountain Gap Pump/Tank/Lift Station #2	Al Hwy 69	Arab
Arab-Water	Mountain View Tank & Pump	Mountain View Rd.	Arab
Arab-Water	Raw Water Source	AL Hwy 69 Causeway (Guntersville)	Arab
Arab-Water	Terrell Hill Pump Station	US Hwy 231 N	Arab
Arab Sewer	Main Office	526 Cullman Rd. Arab	Arab
MUB Electric	Main Office	210 West Main, AL,	Albertville
MUB-Electric	District Substation	Teague St.	Albertville
MUB-Electric	Mathis Mill Substation	Mathis Mill Rd.	Albertville
MUB-Electric	Mueller Substation	Industrial Blvd.	Albertville
MUB-Electric	North Substation (NAIB)	George Wallace Dr.	Albertville
MUB-Electric	Primary Substation	Substation Rd.	Albertville
MUB Sewer	Main Office	210 W Main St.	Albertville
MUB-Sewage	Arbor Acres	Arbor Acres Rd./Hwy 431	Albertville

Company	Type	Address	City
MUB-Sewage	Broadway Estates	Bowery Ln.	Albertville
MUB-Sewage	Circle Dr. #18	Circle Dr.	Albertville
MUB-Sewage	Country Club #13	135 Wildhaven Dr.	Albertville
MUB-Sewage	Dairy Queen #34	US Hwy 431	Albertville
MUB-Sewage	Feed Mill #10	Railroad Ave.	Albertville
MUB-Sewage	Floyd Dr. #29	Floyd Dr.	Albertville
MUB-Sewage	Hickory St. #4	Hickory St.	Albertville
MUB-Sewage	Hwy 75 #24	AL Hwy 75/Brock St.	Albertville
MUB-Sewage	Hwy 75 #23	AL Hwy 75/O'Hara Dr.	Albertville
MUB-Sewage	Indian Trails #30	Cherokee Dr.	Albertville
MUB-Sewage	Industrial Park #3	Industrial Blvd.	Albertville
MUB-Sewage	Little Drum	130 Quality Dr.	Albertville
MUB-Sewage	Lowery St. #33	Little Tree Rd.	Albertville
MUB-Sewage	Mitchell #6	401 Mitchell Ave.	Albertville
MUB-Sewage	Pine St. #15	Pine St.	Albertville
MUB-Sewage	Rec. Center	Wendy Ln.	Albertville
MUB-Sewage	Shaw St. #36	Shaw St.	Albertville
MUB-Sewage	Solitude #8	401 Solitude Ave.	Albertville
MUB-Sewage	South Broad St. #26	South Broad St.	Albertville
MUB-Sewage	Terra Pine Pump #17	Terra Pine St.	Albertville
MUB-Sewage	Timber Lane #31	Timber Lane	Albertville
MUB-Sewage	Wastewater Plant	901 E. McKinney,	Albertville
MUB-Sewage	Waylon St. #19	Edmonson St./Waylon St.	Albertville
MUB Water	Main Office	210 W Main St.	Albertville
MUB-Water	Incoming Point	Hwy 227, , 35976	Guntersville
MUB-Water	Adams Tank	Adams Dr./US Hwy 431	Guntersville
MUB-Water	Alverson Tank	Alverson St./Bobo St.	County
MUB-Water	Beulah Tank	Beulah Cut-Off Rd./Darden St.	County
MUB-Water	Cahill Tank	Cahill Rd.	County

Company	Type	Address	City
MUB-Water	Drum Circle Pump #11	274 Drum Cir.	Albertville
MUB-Water	East McKinney Pump #35	901 E. McKinney	Albertville
MUB-Water	Edmonson Pump #5	810 Edmonson St.	Albertville
MUB-Water	George Wallace Pump #12	2700 George Wallace Dr.	Albertville
MUB-Water	Gray Pump #1	Gray Rd.	Albertville
MUB-Water	Huhtamaki Pump #27	608 Mathis Mill Rd.	Albertville
MUB-Water	Leisure Acres Pump #14	Leisure Acres/Glassco Dr.	Albertville
MUB-Water	Mary Tank	Mary St.	Albertville
MUB-Water	McKinney Tank	McKinney/Hambrick St.	Albertville
MUB-Water	Plantation Pump #16	216 O'Hara Dr.	Albertville
MUB-Water	Pine Tank	Pine St./First St.	Albertville
MUB-Water	Turkey Pump #22	393 Corbinville Rd.	Albertville
MUB-Water	US431/AL75 Pump #21	7155 US Hwy 431	Albertville
MUB-Water	US 431 North Pump	9610 US Hwy 431	Albertville
MUB-Water	Wagner Dr. Pump #25	Wagner Dr.	Albertville
MUB-Water	Water Plant	600 Water Plant Rd.	Albertville
MUB-Water	Whispering Pines Pump #7	1410 Ponderosa Ave.	Albertville
MUB-Water	Westside Pump #9	713 Half Section Line Rd	Albertville
Boaz Sewer	Main Office	107 Billy Dyar Blvd	Boaz
Boaz-Sewer	Bruce Rd.	Bruce Rd.	Boaz
Boaz-Sewer	King St.	King St.	Boaz
Boaz-Sewer	Martin Rd.	Martin Rd.	Boaz
Boaz-Sewer	Pleasant Hill Rd.	Pleasant Hill Rd.	Boaz
Boaz-Sewer	Treatment Plant	College Ave.	Boaz
Boaz Water	Main Office	107 Billy Dyar Blvd	Boaz
Boaz-Water	Aurora Rd. Tank	Aurora Rd. (Etowah County)	Boaz
Boaz-Water	Blanche Dr. Pump	Blanche Dr.	Boaz
Boaz-Water	Collier St. Tank	Collier St.	Boaz
Boaz-Water	Elder St. Tank	Elder St./Ursy St.	Boaz

Company	Type	Address	City
Boaz-Water	Henderson Rd. Pump	Henderson Rd. Pump	Boaz
Boaz-Water	Julietta St. Pump	Julietta St.	Boaz
Boaz-Water	King St. Tank	King St.	Boaz
Boaz-Water	McVile Rd. Tank	McVile Rd./Old Crossville Rd.	Boaz
Boaz-Water	Snead St. Tank	Snead St.	Boaz
Boaz-Water	US 431 Tank	US Hwy 431 N (Behind Guthrie's)	Boaz
Boaz-Water	Wagner Dr. Pump	Wagner Dr./Industrial Blvd.	Boaz
Boaz-Water	Wagner Dr. Tank	Wagner Dr./Industrial Blvd.	Boaz
Boaz Gas Board	Main Office	138 N Main St. Boaz,	Boaz
Boaz Gas Bd.	431 Gate Station	HWY 431 Near Faucett Motors	Boaz
Boaz Gas Bd.	Snellgrove Rd Gate Station	Snellgrove Rd and HWY 168	Boaz
Marshall-DeKalb Electric	Main Office	10025 Alabama 168	Boaz
MarDek EC	Boaz South Substation	Denson Rd.	Boaz
MarDek EC	Cochran's Corner Substation	AL Hwy 75 N, behind Powell's store	Boaz
MarDek EC	Horton Substation	Bethany Rd.	Boaz
MarDek EC	Mt. High Substation	Red Barn Rd.	Boaz
MarDek EC	Old Boaz Substation	Al Hwy 205/Emory Ave.	Boaz
MarDek EC	Raymond Teal Substation	Oneonta Cut-Off Rd./Irvin Ln.	Boaz
Douglas Water	Main Office	550 Bethlehem Rd	Douglas
DOUG-W	Filter Plant	Located in Blount County	Douglas
DOUG-W	Plant Pump House	Located in Blount County	Douglas
DOUG-W	Pump Station #1	Located in Blount County	Douglas
DOUG-W	Pump Station #2	Nixon Chapel Rd.	Douglas
DOUG-W	Pump Station #3	AL Hwy 168/New Hope Rd.	Douglas
DOUG-W	Pump Station #6	Horton-Nixon Chapel Rd.	Douglas
DOUG-W	Pump Station #8	Wind Mill Rd.	Douglas
DOUG-W	Tank #1	*Blount County*	Douglas
DOUG-W	Tank #2, Tank #7, Pump #7	Section Line Road	Douglas

Company	Type	Address	City
DOUG-W	Tank #3	Bethlehem Rd.	Douglas
DOUG-W	Tank #4	Forrest Home Rd.	Douglas
DOUG-W	Tank #6	Formby Rd./Bethlehem Rd.	Douglas
DOUG-W	Tank #8	Big Spring Brow Rd.	Douglas
DOUG-W	Wells 1-3	Located in Blount County	Douglas
DOUG-W	Pump Station #4	Highpoint Rd and McAllister Rd.	Albertville
DOUG-W	Pump Station #5	Al Hwy 179 and Glover Rd.	Boaz
North Marshall Utilities	Main Office	4141 Cathedral Caverns Hwy, Grant	Grant
NMARU-W	Grant Elevated Tank	Cathedral Caverns Highway/Near Downtown	Grant
NMARU-W	Grant Park Tank	Park Rd., Near Fire Tower Rd.	Grant
NMARU-W	Gunter's Landing Tank	End of Gunter's Landing Rd.	Grant
NMARU-W	Guntersville Airport Pump	US Hwy 431 N/Bakers Chapel Rd.	Grant
NMARU-W	Jim Tom Hodges Rd. Pump	Jim Tom Hodges Rd./Cathedral Caverns Highway	Grant
NMARU-W	Kenamer Cove Pump & Tank	Cathedral Caverns Highway	Grant
NMARU-W	Lewis Mountain Pump	Lewis Mountain Rd.	Grant
NMARU-W	Lewis Mountain Tank	Lewis Mountain Rd.	Grant
NMARU-W	Merrill Mountain Pump	Merrill Mountain Rd.	Grant
NMARU-W	Merrill Mountain Tank	Merrill Mountain Circle	Grant
NMARU-W	Mountain Side Pump	Word Mountain Rd., next to Mountain Side Tank	Grant
NMARU-W	Mountain Side Tank	Word Mountain Rd.	Grant
NMARU-W	Mountain Top Pump & Tank	Word Mountain Rd./Cathedral Caverns Hwy	Grant
NMARU-W	Raw Water Source	Word Mountain Rd., south of water plant	Grant
NMARU-W	Shin Point Pump	Shin Point Rd.	Grant
NMARU-W	Valley Water Tank	Bakers Chapel Rd., near AL Highway Department	Grant
NMARU-W	Water Plant	Word Mountain Rd.	Grant
Guntersville Electric	Main Office	333 Gunter Avenue, Guntersville, AL 35976	Grant
Guntersville-Electric	Gerald Bryant Rd. Substation	Gerald Bryant Rd.	Grant
Guntersville-Electric	Loveless St. Substation	Loveless St.	Grant

CHAPTER 5

2014 Marshall County Multi-Hazard Mitigation Plan

Company	Type	Address	City
Guntersville-Electric	Spring Creek Substation	Spring Creek Dr./GHS	Grant
Guntersville-Electric	Warrenton Rd. Substation	Warrenton Rd.	Grant
Guntersville-Electric	Willow Beach Rd. Substation	Willow Beach Rd.	Grant
Guntersville-Electric	Wyeth Dr. Substation	AL Hwy 227/Wyeth Dr.	Grant
Guntersville Water / Sewer	Main Office	329 Gunter Ave.,	Guntersville
GUNT-S	Eastlake Wastewater Plant	AL Hwy 227/behind Gold Kist	Guntersville
GUNT-S	Sewer Lift #1	Al Hwy 227/Railroad Ave.	Guntersville
GUNT-S	Sewer Lift #2	Sunset Dr./Near Carlisle School	Guntersville
GUNT-S	Sewer Lift #3	Lakeshore Dr.	Guntersville
GUNT-S	Sewer Lift #8	Wyeth Dr./Launch St.	Guntersville
GUNT-S	Sewer Lift #13	Wyeth Dr./Near AL Hwy 227	Guntersville
GUNT-S	Lift Station #16	Morrow Street	Guntersville
GUNT-W	Little Mountain Pump Station	Al Hwy 227, near Signal Point Rd.	Guntersville
GUNT-W	Indian Hills Pump Station	Sequoyah Ln., near AL Hwy 79	Guntersville
GUNT-W	Sunset Dr. Water Plant	Sunset Dr./Willow Beach Rd.	Guntersville
GUNT-W	Well #1	Blount Ave., next to Kirkpatrick Concrete	Guntersville
Marshall County Gas	Main Office	1245 Gunter Ave. , Guntersville, 35976	Guntersville
Mar Co Nat Gas	Albertville Gate Station	Neely Graham Ln.	Guntersville
Mar Co Nat Gas	Arab Gate Station	Main St./Shoal Creek Trail (Behind Doctors office)	Guntersville
Mar Co Nat Gas	Douglas Gate Station	Al Hwy 79/US Hwy 278 (In Blount County)	Guntersville
Mar Co Nat Gas	Guntersville/Baker Mountain Gate Station	Baker Mountain Road, near AL Hwy 79	Guntersville
Mar Co Nat Gas	Guntersville/Fire Station	Blount Ave., next to Guntersville Fire Station #1	Guntersville
Mar Co Nat Gas	Guntersville/Highway 79 Station	AL Hwy 79, near Convict Camp Rd.	Guntersville
Mar Co Nat Gas	Guntersville/Lurleen Wallace Gate Station	Lurleen Wallace Dr./US Hwy 431	Guntersville
Mar Co Nat Gas	Guntersville/River Gate Station	US Hwy 431 S, north end of Tennessee River Bridge	Guntersville
Mar Co Nat Gas	Guntersville/Sunset Dr. Gate Station	Sunset Dr./AL Hwy 69	Guntersville

CHAPTER 5

2014 Marshall County Multi-Hazard Mitigation Plan

Company	Type	Address	City
No. Alabama Electric Coop	Main Office (serving Marshall County)	41103 U.S. 72	County
NALCOOP-E	Columbus City Substation	Substation Rd., off AL Hwy 79	County
NALCOOP-E	Larkinsville/Woodville Substation	Co.Rd. 30 by Co.Rd. 80 (Jackson Co.)	County
North East AL Water	Main Office (serving Marshall County)	2416 Beck Industrial Blvd NW	County
NEAL-WW	Cochran's Corner Pump	AL Hwy 75, North Scarham Creek Bridge	County
NEAL-WW	Double Bridges Pump	Beulah Rd., near AL Hwy 168	County
Huntsville Electric	Main Office (serving Marshall County)	112 Spraggins St., 35801	County
Hunt-Nat Gas	Guntersville Gate Station	US Hwy 431/AL Hwy 79	County
Swearengin Water	Main Office (serving Marshall County)	5100 Swearengin Road	County
SWEAR-W	Grant Pump	Swearengin Rd./Esslinger Rd.	County
SWEAR-W	Scottsboro Tank & Pump	Swearengin Rd. (Jackson Co.)	County
SWEAR-W	Willmon Rd. Tank	Swearengin Rd./Willmon Rd.	County
Union Grove Water	Main Office	3680 Union Grove Rd	Union Grove
UGUB-W	Pritchett Dr. Tank	Pritchett Dr.	Union Grove
UGUB-W	Pump Station	Union Grove Rd., near Mountain View Rd.	Union Grove
UGUB-W	Union Grove Water Tank	Union Grove Rd.	Union Grove
Sand Mountain Electric	Main Office (serving Marshall County)	402 Main Street West	County
TVA Electric	Guntersville Hydro Plant / Dam	3464 Snow Point Rd.	County

Map 5-40. Marshall County Utilities

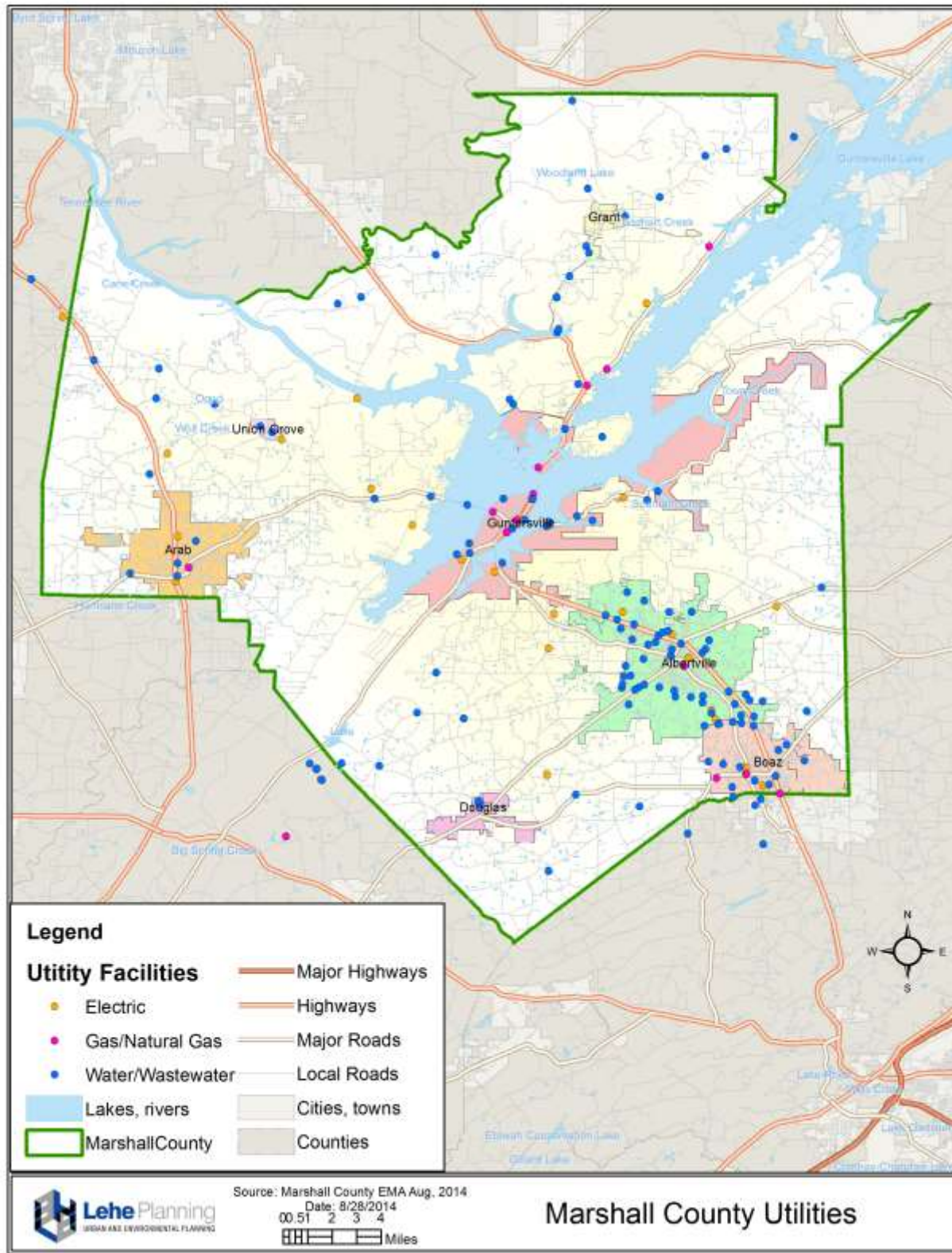
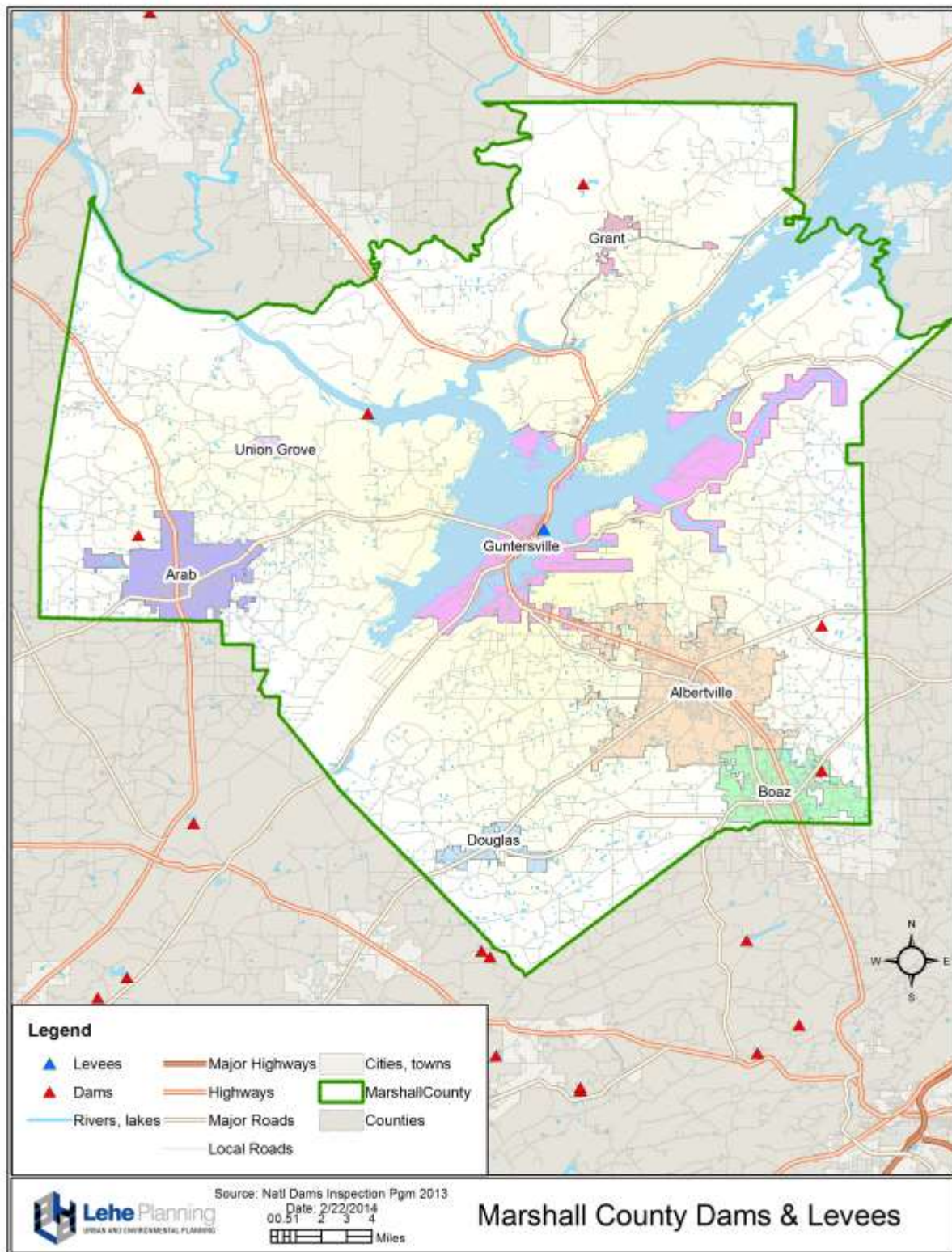


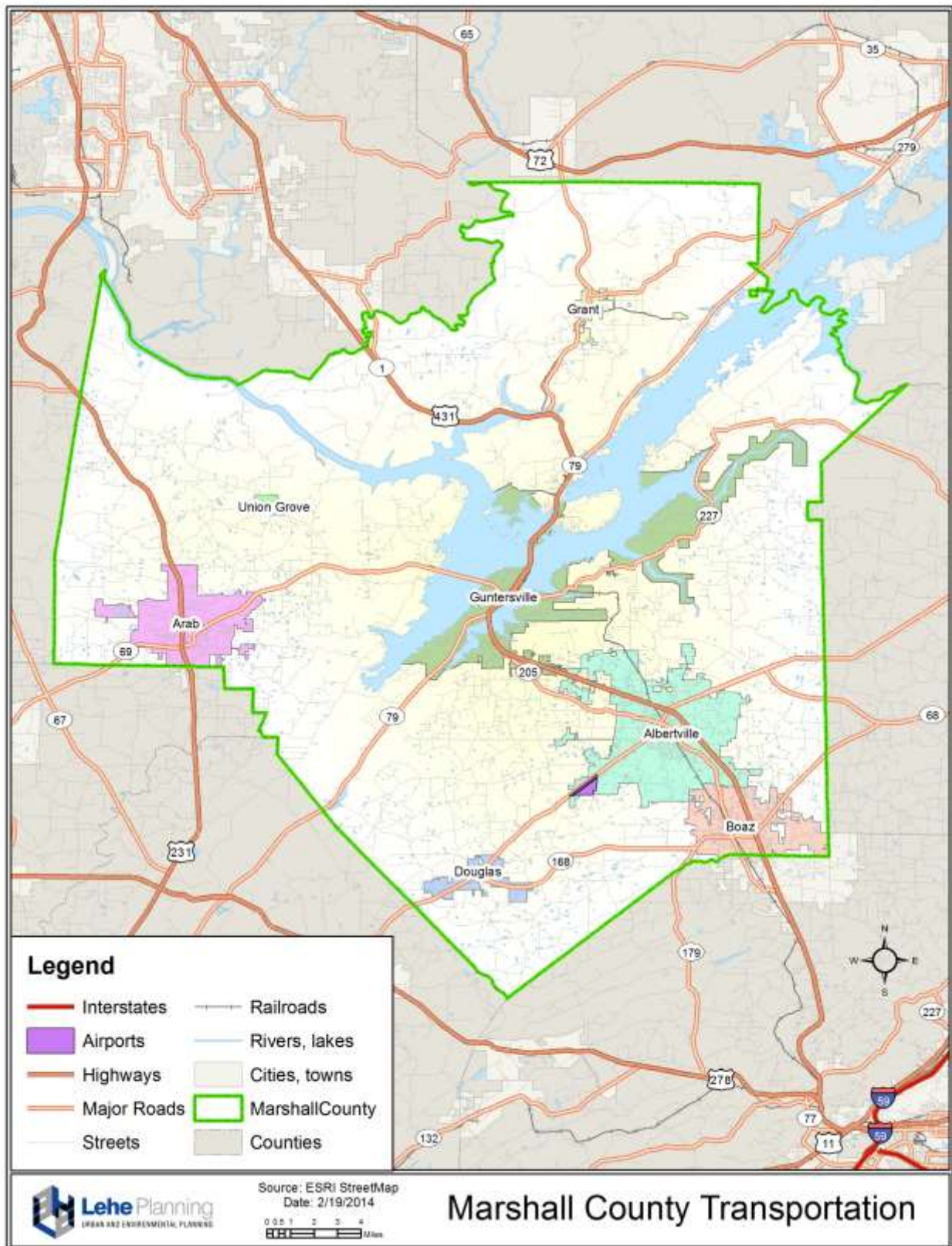
Table 5-41. Marshall County Dams/Levees

Name	Owner	River	Dam Length	Dam Height	Max Discharge	Max Storage
Pine Lake Dam	Sid McDonald	Gilliam Creek	680	0.00	2,675	473
Guntersville	TVA	Tennessee River	3,979	0.00	650,000	1,049,000
Little Paint Creek Lake Dam 9	Richard Woodall	Little Paint Creek	798	26.00	1,060	950
Rudy Beaver	Rudy Beaver	TR – Scarham Creek	260	30.00	700	104
Reedy Morris	Reedy Morris	TR - Short Creek	400	32.20	83	99
Guntersville Levee	TVA	Tennessee River	-	-	-	-

Map 5-41. Marshall County Dams and Levees



Map 5-42 Marshall County Transportation Infrastructure



5.6 Estimate of Dollar Losses to Vulnerable Structures

5.6.1 Scope and Purpose of Loss Estimates

This section provides estimates of damages to vulnerable structures identified above in Section 5.5. Loss estimates are calculated using the structure, contents, and function of each asset. The following definitions are used:

- ✓ *Structure loss* – (% damage) X (\$ replacement value of the structure)
- ✓ *Content loss* – (% damage) X (\$ replacement value of the contents)
- ✓ *Functional Loss* - indirect effects of the hazard, such as the days of interruptions in operations that an asset incurs during an event.

For hazards with damage records, loss estimates count damages from the most probable severity. For location-specific events, loss estimates evaluate the affected parts of each jurisdiction. Although these estimates are broad, they can be useful in roughly assessing the benefits and costs of a proposed mitigation project. Moreover, these estimates provide a basis for selecting and prioritizing actions recommended by the Mitigation Strategy in Chapter 6.

This section also describes methodology and highlights limitations of insufficient data and lack of reliable methods. Measures for compiling and analyzing data to improve risk assessment studies appear in Section 5.6.5 “Recommended Risk Assessment Measures.”

As explained above, most hazards are county-wide. In the case of county-wide hazards, exposure is distributed uniformly over all municipalities and unincorporated areas. County-wide hazards include tornadoes, severe storms, winter storms/freezes, droughts/heat waves, wildfires, and earthquakes. In contrast, exposure to location-specific hazards, including flooding, dam/levee failures, sinkholes and landslides, varies widely among jurisdictions.

5.6.2 Loss Estimate Methodology

Method 1: HAZUS-MH Loss Estimates

This plan estimates losses using HAZUS-MH, which was used as a basis for the vulnerable structures inventory of Section 5.5. HAZUS-MH uses approximations and algorithms to estimate losses, so results do not reflect actual losses with certainty. These loss estimates are most useful for judging a hazard’s risk *relative to* other hazards and the vulnerability of a structure *relative to* other structures, rather than as absolute measures of likelihood and economic appraisal. These 2011 HAZUS-MH loss estimates are updates of estimates included in the 2005 plan.

HAZUS-MH offers three levels of analysis. Level 1 requires the least amount of local data and is sufficient for mitigation policy planning purposes. A Level 1 analysis relies on the national data set provided with HAZUS-MH. The analysis provides general

loss estimates for earthquakes, floods, and hurricane winds. All loss estimates are at a county level, which is the smallest geographic area of meaningful analysis using HAZUS-MH.

Method 2: Estimates Based upon Historical Records

Data and records from Section 5.4 supplemented the HAZUS-MH data to prepare loss estimates. Damage data and records of previous occurrences were obtained from the following primary sources:

1. NFIP insurance claims data since 1978 (see Section 5.8);
2. NOAA, National Climatic Data Center damage estimates (see damage summaries in Section 5.4 “Hazard Profiles” and Appendix E “Hazard Profile Data.”
3. National Weather Service Alabama Tornado database.
4. Alabama State Hazard Mitigation Plan, 2013 update, Section 5.4 “Vulnerability Assessment and Loss Estimation.”

Jurisdictional Estimates

To derive jurisdictional estimates, the planning team used existing (2012) and future (2030) population estimates to distribute losses among Marshall County's eight jurisdictions. Population distribution appears in Table 5-42 below. (See Section 5.5.2 “Inventory Methodology”). The damage estimates in this section, however, only apply to existing conditions.

Table 5-42. Population Distribution by Jurisdiction, 2012 and 2030

Jurisdiction	Estimated 2012	% of 2012	Projected 2030	% of 2030 Projection
Albertville	21,516	22.7%	29,188	25.4%
Arab	8,237	8.7%	10,106	8.8%
Boaz	9,653	10.2%	12,475	10.9%
Douglas	758	0.8%	1,090	0.95%
Grant	912	0.9%	1,203	1.0%
Guntersville	8,343	8.8%	9,521	8.3%
Union Grove	78	0.1%	46	0.05%
Unincorporated	45,279	47.8%	51,211	44.6%
Marshall County	94,776	100%	114,839	100%

Source: U.S. Census Bureau & Center for Business & Economic Research

5.6.3 HAZUS-MH Loss Estimates

The planning team performed HAZUS-MH Hurricane studies to estimate losses. Global Summary and Quick Assessment Reports of the HAZUS-MH runs contain detailed results. These studies, maps, and reports were prepared by a qualified GIS

professional with advanced HAZUS training classes completed at the FEMA Emergency Management Institute in Emmitsburg, Maryland, and extensive experience in its local application to mitigation planning. The following HAZUS-MH reports are on file with the Marshall County EMA and available for public review:

- HAZUS-MH Hurricane Opal Event Global Report, dated April 30, 2014
- HAZUS-MH Hurricane Opal Quick Assessment Report, April 30, 2014
- HAZUS-MH 100 Year Flood Event Global Report, dated April 25, 2014
- HAZUS-MH 100 Year Flood Event Quick Assessment Report, dated April 25, 2014
- HAZUS-MH Irondale, Alabama 1916/5.00 Magnitude Earthquake Event Global Report, dated April 29, 2014
- HAZUS-MH Irondale, Alabama 1916/5.00 Magnitude Earthquake Event Quick Assessment Report, dated April 29, 2014

Flood Loss Estimates

The planning team used HAZUS-MH to assess the 100-year flood event scenario. The following table itemizes the overall “Quick Assessment” results for the 100-year flood event.

Table 5-43. HAZUS-MH Flood Module Quick Assessment Results

Marshall County 100 Year Flood Event	
Area (Square Miles)	567
Number of Residential Buildings	37,921
Number of All Buildings	41,068
Number of Persons in the Region	82,000
Residential Building Exposure (\$ millions)	\$3,702
Total Building Exposure (\$ millions)	\$5,264
Displaced Population (# of households)	322
Short Term Shelter Requirements (# of people)	309
Residential Property (Capital Stock) Losses (\$ millions)	\$16
Total Property (Capital Stock) Losses (\$ millions)	\$37
Business Interruptions (Income) Losses (\$ millions)	\$0
Total Economic Losses (\$ millions)	\$53

Economic Losses by Jurisdiction. The following table shows jurisdictional loss estimates, which were obtained by dividing the county’s total losses by each jurisdiction’s share of the 2012 county population.

Table 5-44. Total Economic Losses by Jurisdiction

Jurisdiction	Share of Losses	Total Economic Losses (\$ millions)
Albertville	22.7%	\$12.03
Arab	8.7%	\$4.61
Boaz	10.2%	\$5.41
Douglas	0.8%	\$0.43
Grant	0.9%	\$0.48
Guntersville	8.8%	\$4.66
Union Grove	0.1%	\$0.05
Unincorporated	47.8%	\$25.33
Marshall County	100%	\$53.00

Building-Related Damages. HAZUS estimates that a 100-year flood event would moderately damage 58 buildings — over 19 percent of the total number of buildings at risk of flooding in Marshall County. The event would destroy nine buildings. The following tables show the detailed results, and GIS maps illustrate the HAZUS-generated damages due to flooding.

Table 5-45. Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	2	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	1	1.79	22	39.29	7	12.50	17	30.36	9	16.07
Total	0		3		22		7		17		9	

Table 5-46. Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Manuf/Housing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	7	100.00
Masonry	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Steel	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	1	2.04	22	44.90	7	14.29	17	34.69	2	4.08

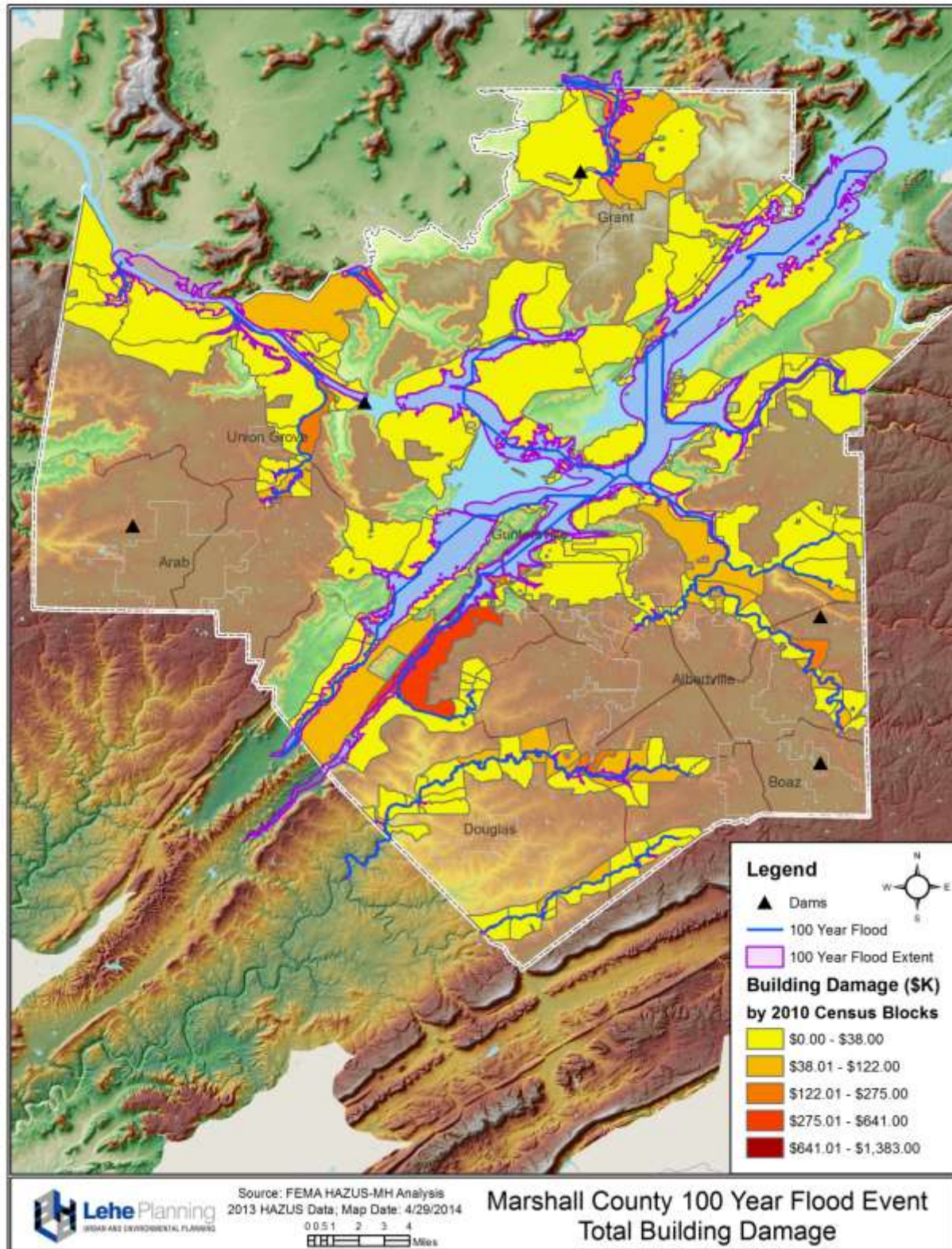
Essential Facilities Damages. HAZUS predicts that a 100-year flood event would cause no damage to the estimated 66 essential facilities (police stations, fire stations, hospitals, and schools) in Marshall County.

Building Related Losses. Building losses are broken into two categories by HAZUS: direct building losses and business interruption losses. Direct building losses include estimated costs to repair or replace damaged buildings and contents. Business interruption losses are losses associated with the inability to operate a business as a result of the flood and also include temporary living expenses for displaced households. The total losses are estimated at \$38.88 million, with 0.5% related to business interruption. Building loss accounts for 99.5% of the total loss, with residential occupancies comprising 41.7% of that loss.

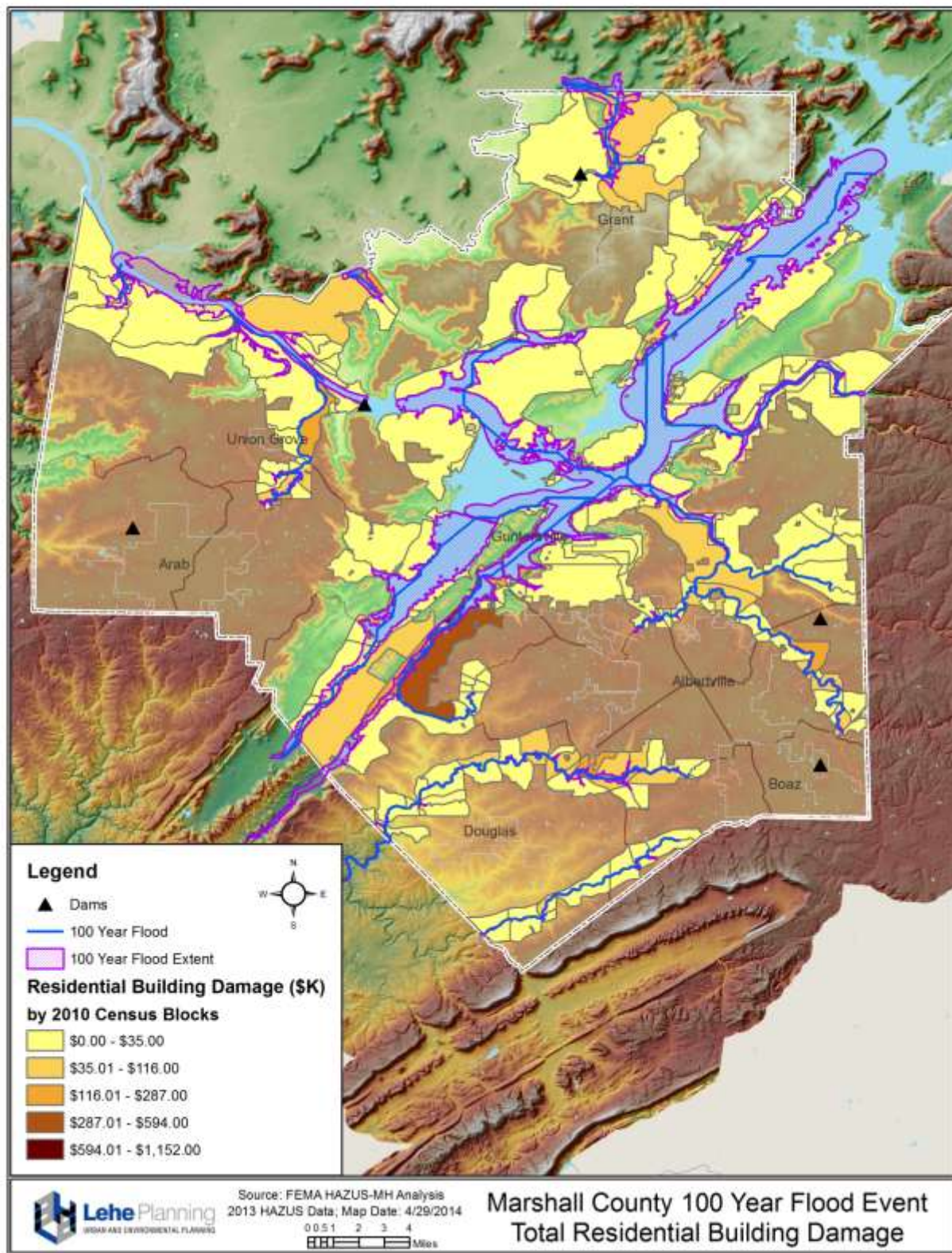
Table 5-47. Building Related Economic Loss Estimates (\$ millions)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	10.24	2.62	1.43	0.38	14.66
	Content	5.90	9.09	3.95	2.11	21.05
	Inventory	0.00	0.18	0.78	0.02	0.98
	Subtotal	16.14	11.89	6.16	2.61	36.70
<u>Business Interruption</u>						
	Income	0.00	0.05	0.00	0.00	0.05
	Relocation	0.01	0.01	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.01
	Wage	0.00	0.07	0.00	0.05	0.12
	Subtotal	0.01	0.12	0.00	0.06	0.18
ALL	Total	16.16	12.01	6.16	2.68	36.88

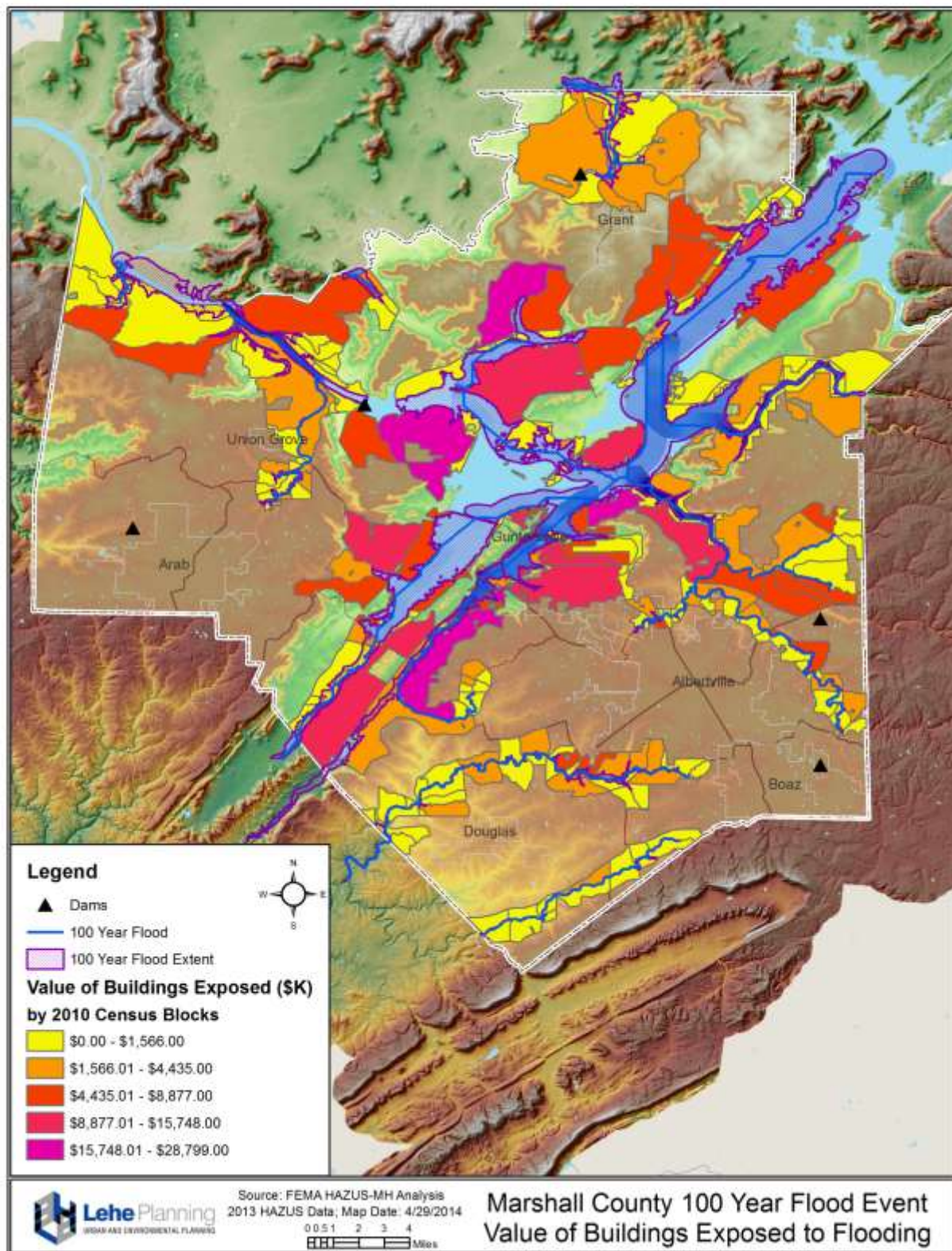
Map 5-43. Total Building Damages from 100 Year Flood



Map 5-44. Total Residential Building Damage (100 year flood)



Map 5-45. Value of Buildings Exposed to 100 Year Flood



Hurricane Loss Estimates

The planning team used HAZUS-MH to assess a historic Hurricane Opal event scenario. HAZUS only assesses the hurricane wind effects of each event. The following tables show the direct economic losses generated by HAZUS-MH, followed by Map 5-46, which show the geographic distribution of economic losses as a result of Hurricane Opal (2006 dollars).

Table 5-48. HAZUS-MH Hurricane Scenarios

General Building Stock

<i>Occupancy</i>	<i>Building Count</i>	<i>Dollar Exposure (\$M)</i>
Residential	37,921	3,702
Commercial	2,075	934
Other	1,072	628
Total	41,068	5,264

Number of Buildings Damaged

<i>Damage State</i>	<i>Residential</i>	<i>Commercial</i>	<i>Other</i>	<i>Total</i>
Minor	<10	<10	<10	20
Moderate	0	0	0	0
Severe	0	0	0	0
Destruction	0	0	0	0
Total	<10	<10	<10	20

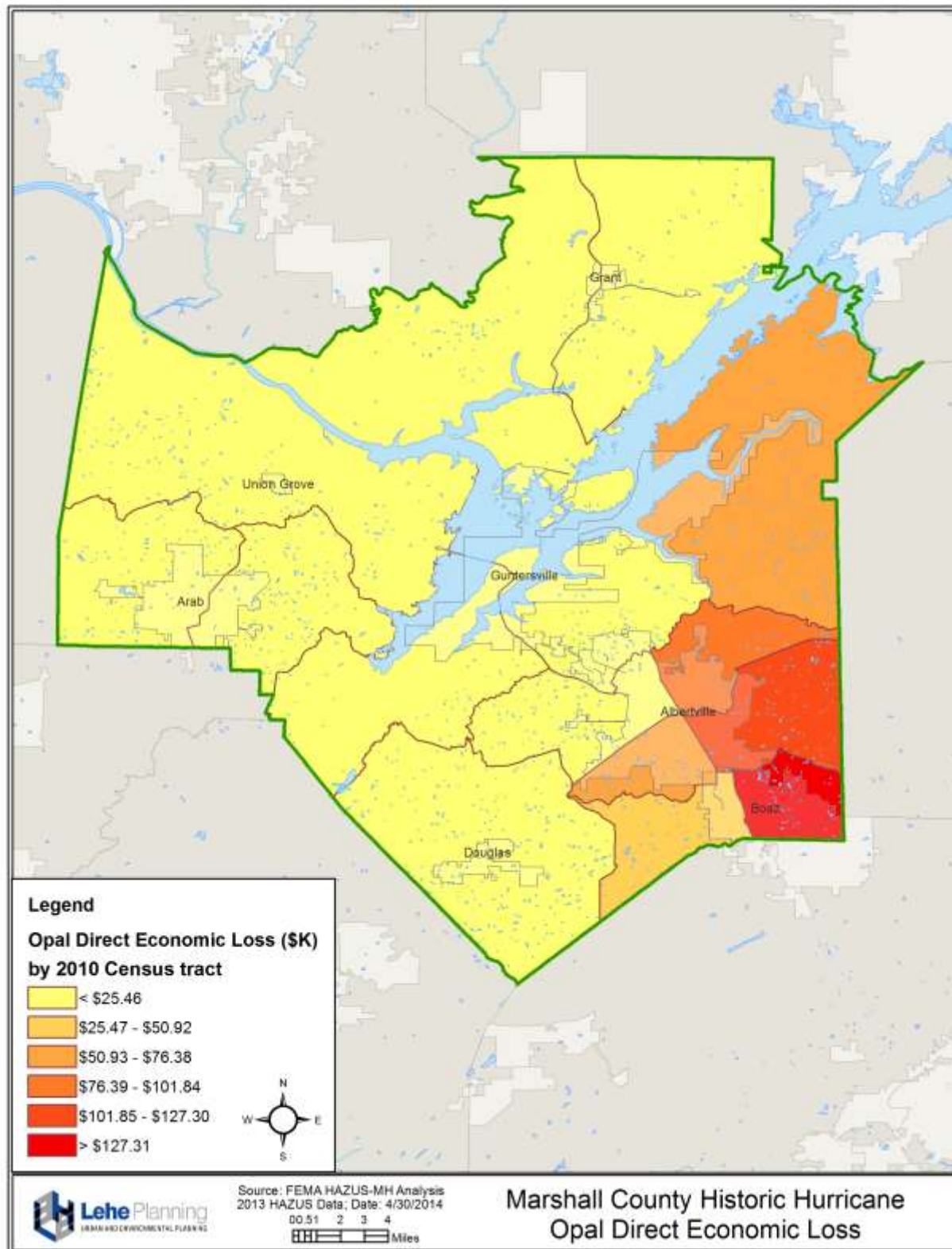
Shelter Requirements

Displaced Households (# Households)	0
Short Term Shelter (# People)	0

Economic Loss (\$ Millions)

Capital Stock	<1
Residential Property	<1
Commercial Property	0
Other Property	0
Business Interruption (Income)	<1
Total Direct Economic Loss	<1

Map 5-46. HAZUS-MH Hurricane Opal Direct Economic Loss



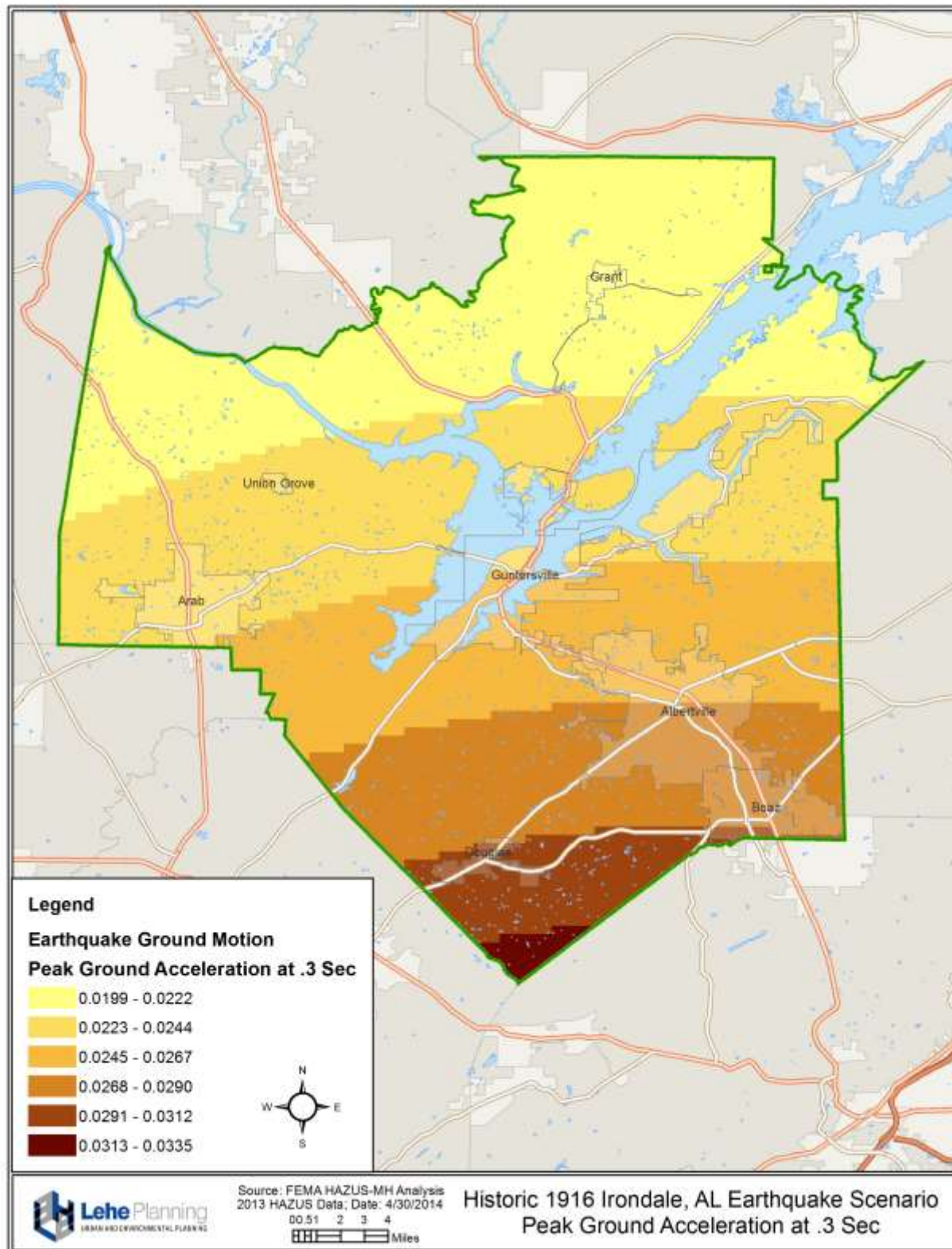
Earthquake Loss Estimates

The planning team used HAZUS-MH to estimate the losses as a result of an earthquake similar to that of the 1916 Irondale, Alabama earthquake event. Results indicate only that approximately 109 buildings will sustain at least moderate damage: only 0.3% of all buildings. HAZUS-MH predicts no damage to essential facilities, such as hospitals, schools, EOCs, Police and Fire Stations; although 5 percent of hospital beds would be unavailable immediately after the event, with all but 2 percent in service one week later and 100 percent of beds operational after 30 days.

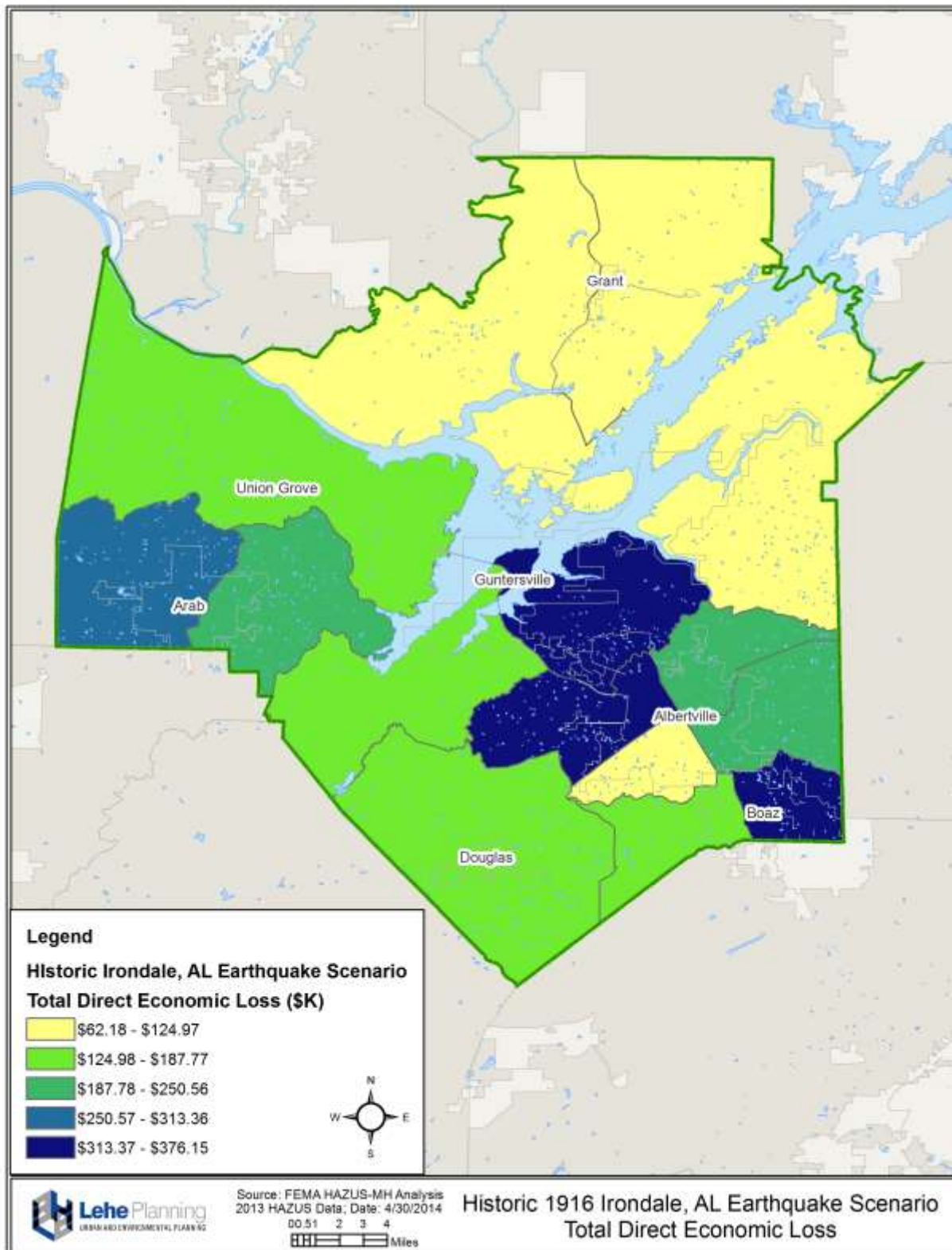
Additionally, the event report predicts that all components of the transportation system will maintain at least 50 percent functionality, because no component is expected to suffer damage. Likewise, HAZUS predicts no disabling damage to the utility infrastructure but rather only a handful of leaks and breaks in water and gas lines. Therefore, the model projects no interruption of water, gas, or electrical service.

No casualties are expected, and total building-related economic losses (structural, contents, inventory, income and wages, etc.) are estimated at \$2.84 million countywide, 36% of which can be attributed to business interruption losses. Likewise, estimated damage to transportation, utilities and communications systems is minimal.

Map 5-47. 1916 Irondale Earthquake Ground Shaking Impacts



Map 5-48. 1916 Irondale Earthquake Economic Loss Impacts



5.6.4 Loss Estimates Based on Historical Records

Tornado Loss Estimates

According to the NOAA National Climatic Data Center and National Weather Service (NWS) records (see Section 5.4.1 “Tornadoes Profile”), Marshall County has been the site of 60 tornadoes since 1957, averaging over 2.0 annually. These tornadoes caused 7 deaths, 163 injuries, and property damages of nearly \$39 million.

Severe Storms Loss Estimates

As reported in the severe storms hazard profile in Section 5.4.2, National Climatic Data Center (NCDC) records show frequent annual severe storm occurrences since 1960. The database shows 302 severe storm events for Marshall County, roughly ten per year. The database also shows over \$5 million in damages since 1960.

Flood Loss Estimates

The National Climatic Data Center (NCDC) Storm Events Database shows frequent flooding since 1997 (Section 5.4.3). There have been 54 floods reported for Marshall County (4.2 per year) for the 1997-2013 period. Average annual damages are estimated at \$85,154; however, most of this comes from the 2009 floods.

Winter Storms/Freeze Estimates

The National Climatic Data Center (NCDC) estimated that 22 winter storm/freeze events occurred in the ten-year period between 1993 and 2013. Damages amounted to \$5,015,774,000, with most of the damages occurring during the Blizzard of 1993, which led to 4 deaths in Marshall County.

Loss Estimates for Remaining Hazards

Historical data is not available to estimate losses for the remaining hazards identified in this Plan. In some cases, there have been no recorded events, such as dam/levee failures, and in other cases, no damages resulted from an event, as is the case for instances of wildfires, landslides, and sinkholes.

5.6.5 Recommended Risk Assessment Measures

The Mitigation Strategy of this Plan (Chapter 6) should include both short term and long term measures to improve the completeness and reliability of loss estimates. These measures should carry out the following general objectives:

- ✓ Critical Facilities Assessments. Assess critical facilities (hospitals, schools, fire and police stations, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.

- ✓ Geographic Information Systems (GIS). Maintain a comprehensive database of hazard locations, socio-economic data, infrastructure, and critical facilities inventories.
- ✓ Planning Studies. Conduct special plans and studies, as needed, to identify hazard risks and develop mitigation projects.

5.7 General Description of Land Uses and Development Trends

5.7.1 Impacts of Development Trends on Vulnerability

Development trends demand consideration in any plan for hazard mitigation. This section examines development trends affecting vulnerability to natural hazards. Development can raise vulnerability in several ways, including:

- Competing uses for land can push new development into areas prone to flooding, landslides and other location-specific hazards.
- New roads, parking lots, and other impervious surfaces can increase urban runoff and thereby exacerbate flooding.
- New residential, commercial and industrial development in previously rural areas can boost the community's vulnerability to wildfires.
- Increased population can stretch scarce water resources in times of drought.
- Development on slopes and geologically unstable terrain can increase exposure to and even cause sinkholes and landslides.

5.7.2 Past Trends

Growth in Marshall County has increased over the past twenty years at a rate greater than that of the State of Alabama. Both the State and the County grew at a slightly slower rate from 2000 to 2010, as compared to the growth from 1990 to 2000. Table 5-49 depicts population growth trends from 1990 to 2010.

Table 5-49. Marshall County Historic Growth Trends

Jurisdiction	1990	2000	Number Change	Percent Change	2010	Number Change	Percent Change
Alabama	4,040,389	4,447,100	406,711	10.1%	4,779,736	332,636	7.5%
Marshall County	70,832	82,231	11,399	16%	93,019	10,788	13.1%
Albertville	14,507	17,247	2740	19%	21,160	3,913	22.7%
Arab	6,321	7,174	826	13%	8,050	876	12.2%
Boaz	6,928	7,411	483	7%	9,551	2,140	28.9%
Douglas	474	530	56	12%	744	214	40.3%
Grant	638	665	27	4%	896	231	34.7%
Guntersville	7,038	7,395	357	5%	8,197	802	10.8%
Union Grove	119	94	-25	-21%	77	-17	-18.1%

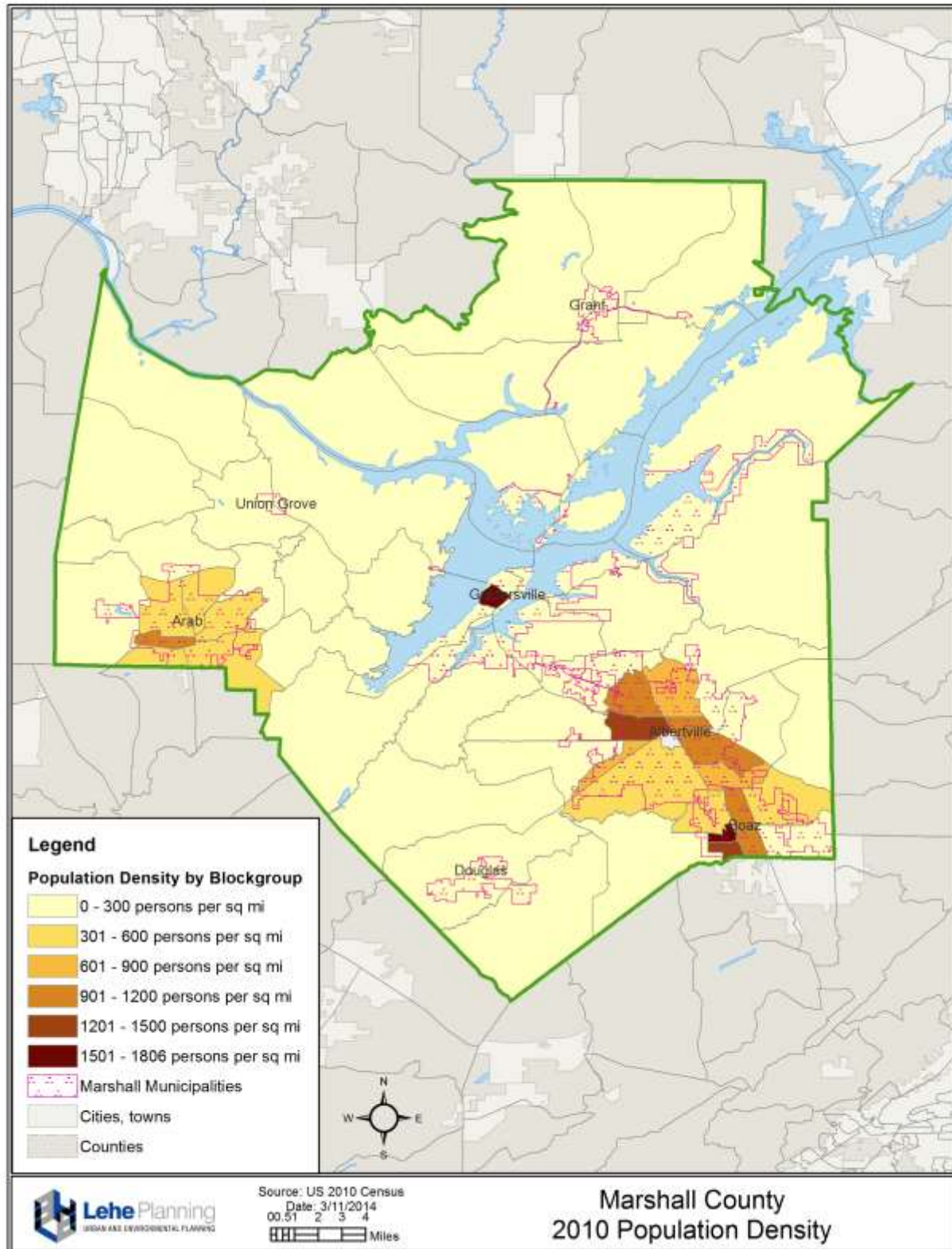
Source: U.S. Census Bureau, 2010

Distribution of Growth within Marshall County

With a 2010 population of 21,160, the City of Albertville is the largest city in Marshall County, followed by approximately 9,500 people residing in Boaz, 8,200 people in Guntersville, and 8,000 residing in Arab. The jurisdictions in Marshall County that have grown the most between 2000 and 2010 include Douglas at 40.3%, Grant at 34.7% and Boaz at 28.9%. Only Union Grove declined in population over the past twenty years.

Map 5-49 shows population density (persons per square mile) for Marshall County in 2010. The densest areas are located in the heart of Guntersville and Boaz.

Map 5-49. Population Density in Marshall County



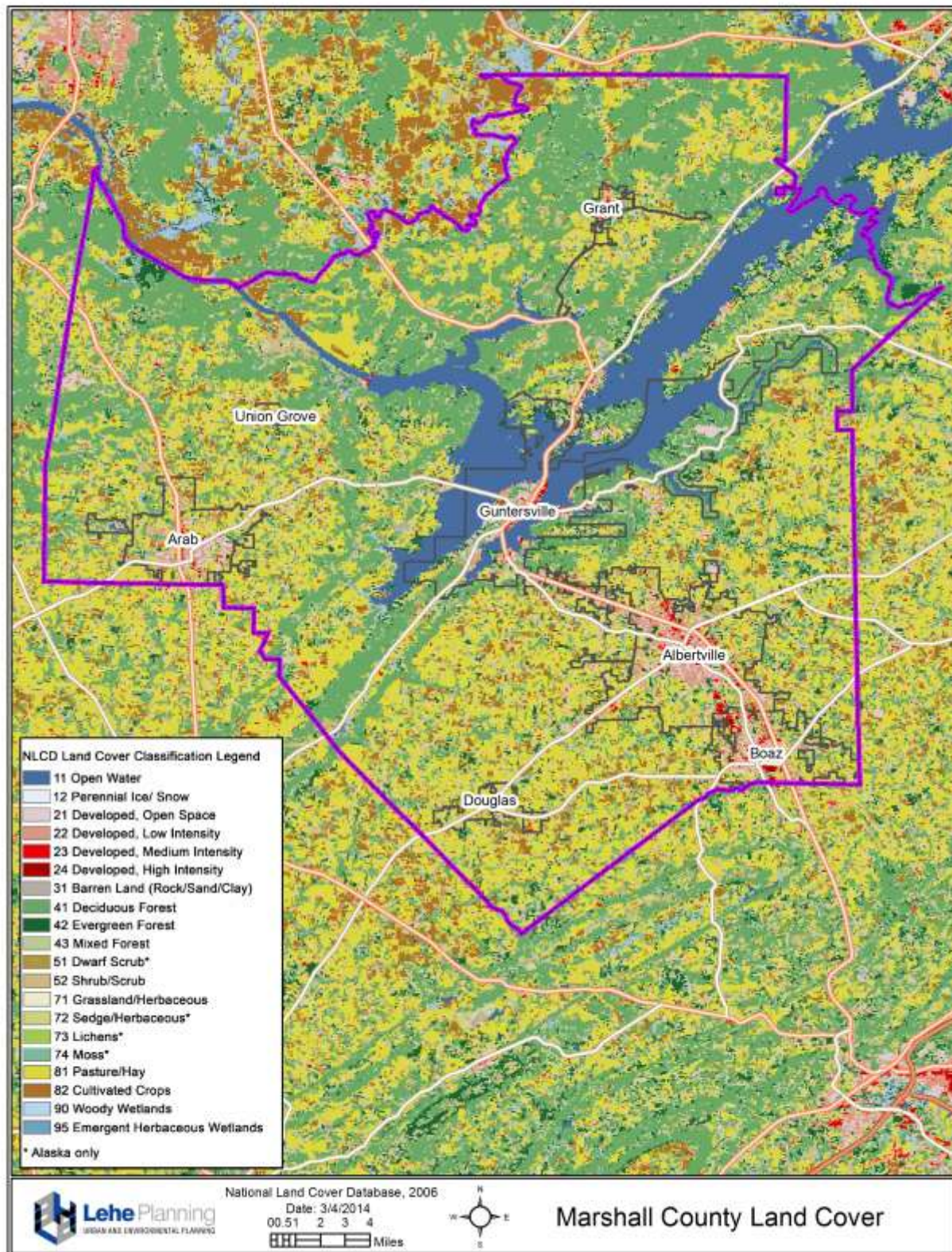
Land Cover and Land Use

Marshall County has an area of approximately 627 square miles with 56 square miles covered by Guntersville Reservoir. The County is divided into three physiographic divisions - sandstone plateaus, rough mountain slopes, and limestone valleys. From the southwest to the northeast across the center of the County is an anticlinal valley. It is approximately 3 miles wide.

Approximately 150,446 acres of Marshall County's 362,918 acres are forestland (Alabama Forestry Commission, 2011). Map 5-50 "Marshall County Land Cover" shows that the majority of Marshall County is deciduous forest and pasture, with more developed areas around each jurisdiction. From the northeast through the valley to Guntersville is the Tennessee River.

Most of Marshall County is agricultural but features a development pattern that is unusually dense among Alabama's agricultural counties. Over half of Marshall County's residents live in incorporated jurisdictions. The major population center is in lower Marshall County around Albertville and Boaz, on top of Sand Mountain. The other population concentration is around Guntersville Lake and the Tennessee River.

Map 5-50. Marshall County Land Cover



5.7.3 Future Trends

Table 5-50 presents projected growth in Marshall County and the State of Alabama, between 2000 and 2030 according to projections compiled by the Center for Business and Economic Research at the University of Alabama. Marshall County's population growth between 2000 and 2030 nears 40%, which is almost twice that of the State's growth. These projections are based on historical data and do not reflect current economic development efforts in Marshall County or throughout the State. Table 5-51 and Chart 5-4 show the estimated 2012 population and the projected 2030 population by jurisdiction. Aside from the unincorporated portion of Marshall County (accounting for 45%), Albertville comprises the most of the 2030 population growth at 25%.

Table 5-50. Population 2000-2010 and Projections 2015-2035

Population Estimate/Projection						Change 2000-2030	
	2000 ^a	2010 ^a	2015 ^b	2025 ^b	2030 ^b	Number	Percent
Alabama	4,447,100	4,779,736	4,943,866	5,242,423	5,365,245	918,145	20.6%
Marshall	82,231	93,019	98,775	109,712	114,839	32,608	39.7%

^a U.S. Census Bureau. 2010 Census

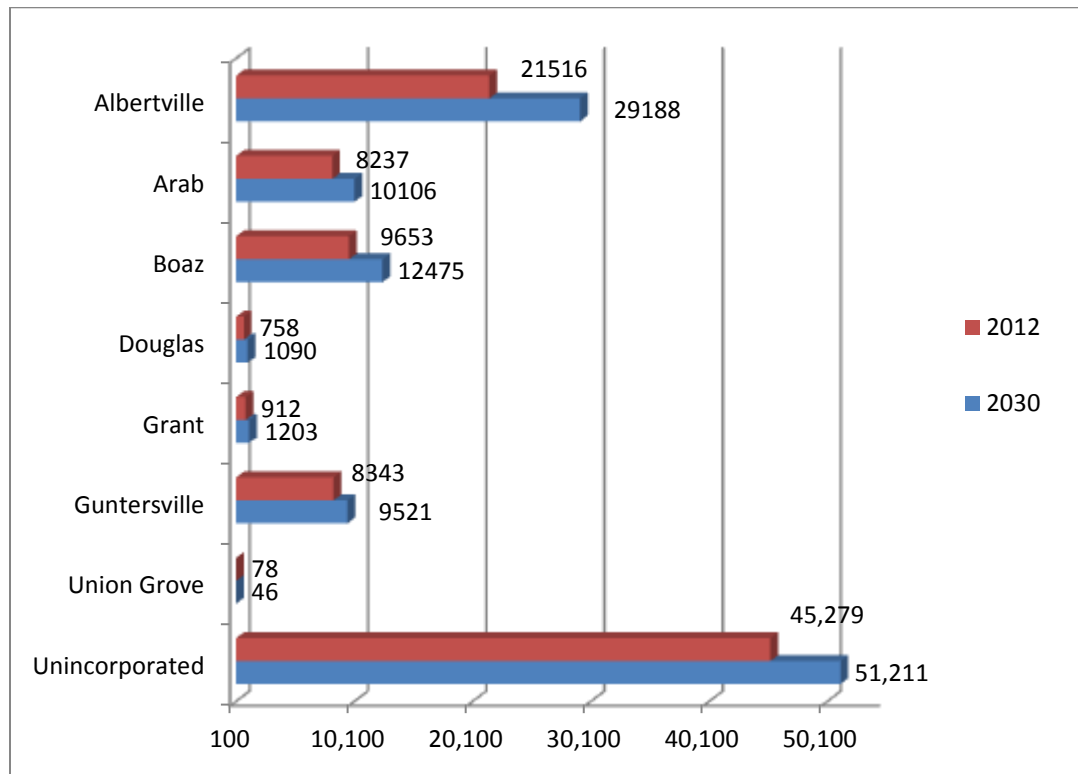
^b Center for Business and Economic Research, U. of Alabama

Table 5-51. Population Projections by Jurisdiction

Jurisdiction	Estimated 2012	Projected 2030	Projected Change 2012-2030	Percent Increase 2012-2030	% of Total 2030
Albertville	21,516	29,188	7,672	35.7%	25.4%
Arab	8,237	10,106	1,869	22.7%	8.8%
Boaz	9,653	12,475	2,822	29.2%	10.9%
Douglas	758	1,090	332	43.8%	0.95%
Grant	912	1,203	291	31.9%	1.0%
Guntersville	8,343	9,521	1,178	14.1%	8.3%
Union Grove	78	46	-32	-41.5%	0.05%
Unincorporated	45,279	51,211	5,932	13.1%	44.6%
Marshall County	94,776	114,839	20,063	21.2%	100%

Source: Derived from the Alabama State Data Center & U.S. Census

Chart 5-4 Projected Population Changes



Economic development prospects

Marshall County's major employers deal primarily in poultry processing. The following companies are listed as the county's top manufacturing employers:

- Pilgrim's Pride – poultry processing
- AlaTrade Foods – poultry processing
- Tyson Foods Inc. – poultry processing
- Wayne Farms – poultry processing
- TS Tech Alabama – automotive supplier
- Mueller – fire hydrants
- Mitchell Grocery – wholesale grocery
- Kappler Safety Group – chemical/protective clothing

Marshall County provides a low-cost of living with competitive market prices for business location. The four major cities of Albertville, Boaz, Arab, and Guntersville create a region without all of the regional costs. Additionally, the county is less than three hours away from larger markets, such as Huntsville, Birmingham, and Atlanta. Marshall County also provides workforce training and recruitment.

5.8 Repetitively-Damaged NFIP-Insured Structures

FEMA defines *repetitive loss* property as properties that have two or more losses of at least \$1,000 and have been paid under the National Flood Insurance Program (NFIP) within any 10-year period. According to the State NFIP Coordinator, the unincorporated portion of Marshall County has one repetitively damaged single family dwelling with three total repetitive loss claims totaling \$131,678. This property is not in a flood hazard zone. Table 5-52 also describes the number of policies in force.

Table 5-52. NFIP Policies and Repetitive Loss Claims

Community Name	Total NFIP Policies	Repetitive Loss Structures	Total RL Claims	Total RL Losses	Total Insurance in Force
Albertville	51	0	0	\$0	\$9,043,100
Arab	24	0	0	\$0	\$6,041,900
Boaz	0	0	0	\$0	\$0
Douglas	0	0	0	\$0	\$0
Grant	0	0	0	\$0	\$0
Guntersville	17	0	0	\$0	\$4,198,100
Union Grove	0	0	0	\$0	\$0
Unincorporated	51	1	3	\$131,678	\$11,437,800
Totals	143	1	3	\$131,678	\$30,720,900

Source: NFIP State Coordinator, 2014 & FEMA Policy Statistics, 2014

5.9 Summary of Hazards and Community Impacts

Table 5-53 summarizes each jurisdiction's vulnerability. Community impacts include the following descriptions and measurements:

Location. Location measures the geographic extent of the identified hazard in one of three ways, as follows:

- 1) *Community-wide* - the entire geographic area is affected;
- 2) *Partial* - a significant portion of the community is affected; or
- 3) *Minimal* - a negligible area is affected.

Probability. Probability measures the likelihood of the hazard occurring within the community, based on historical incidence. The scale for frequency runs as follows:

- 1) *Very high* - annually;
- 2) *High* - every two to three years;
- 3) *Moderate* - every three to ten years;
- 4) *Low* - every ten years; or
- 5) *Very low* - rare.

Extent. Extent measures the severity of the hazard and its potential to cause casualties, business losses, and damage to structures. The scale utilized runs as follows:

- 1) *Devastating* - the potential for devastating casualties, business losses, and structure damage;
- 2) *Significant* - the potential for some casualties and significant, but less than devastating, business losses and structure damage;
- 3) *Moderate* – moderate potential for economic losses and structure damage; or
- 4) *Slight* – slight or minimal potential for economic losses and structure damage.

Exposure. Exposure measures the percentage of structures within the community, including buildings, critical facilities, and infrastructure lifelines, that are exposed to the hazard. The classifications are defined as follows:

- 1) *High* - includes more than approximately 25 percent of the structures;
- 2) *Medium* - includes 10 percent to 25 percent of the structures; or
- 3) *Low* - includes less than 10 percent of the structures.

Damage Potential. Damage potential measures the damage that can be expected should an event take place. The classifications are defined as follows:

- 1) *High* - a hazard could damage more than 5 percent of the structures in a community;
- 2) *Medium* - a hazard could damage between 1 and 5 percent of the structures in a community; or
- 3) *Low* - a hazard could damage less than 1 percent of the structures in a community.

Table 5-53. Summary of Hazards and Community Impacts

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Tornadoes	Marshall County	Community-wide	High	Devastating	High	High
	Albertville	Community-wide	High	Devastating	High	High
	Arab	Community-wide	High	Devastating	High	High
	Boaz	Community-wide	High	Devastating	High	High
	Douglas	Community-wide	High	Devastating	High	High
	Grant	Community-wide	High	Devastating	High	High
	Guntersville	Community-wide	High	Devastating	High	High
	Union Grove	Community-wide	High	Devastating	High	High
	Unincorporated Communities	Community-wide	High	Devastating	High	High
Severe Storms	Marshall County	Community-wide	Very High	Significant	High	Low
	Albertville	Community-wide	Very High	Significant	High	Low
	Arab	Community-wide	Very High	Significant	High	Low
	Boaz	Community-wide	Very High	Significant	High	Low
	Douglas	Community-wide	Very High	Significant	High	Low
	Grant	Community-wide	Very High	Significant	High	Low
	Guntersville	Community-wide	Very High	Significant	High	Low
	Union Grove	Community-wide	Very High	Significant	High	Low
	Unincorporated Communities	Community-wide	Very High	Significant	High	Low

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Floods	Marshall County	Partial	Low	Moderate	Low	Medium
	Albertville	Partial	Moderate	Significant	Low	Medium
	Arab	Partial	Low	Moderate	Low	Medium
	Boaz	Partial	Low	Moderate	Low	Medium
	Douglas	Partial	Low	Moderate	Low	Medium
	Grant	Partial	Low	Moderate	Low	Medium
	Guntersville	Partial	Low	Moderate	Low	Medium
	Union Grove	Minimal	Very Low	Not Severe	Low	Medium
	Unincorporated Communities	Partial	Moderate	Significant	Low	Medium
Hurricanes	Marshall County	Community-wide	Low	Moderate	High	Low
	Albertville	Community-wide	Low	Moderate	High	Low
	Arab	Community-wide	Low	Moderate	High	Low
	Boaz	Community-wide	Low	Moderate	High	Low
	Douglas	Community-wide	Low	Moderate	High	Low
	Grant	Community-wide	Low	Moderate	High	Low
	Guntersville	Community-wide	Low	Moderate	High	Low
	Union Grove	Community-wide	Low	Moderate	High	Low
	Unincorporated Communities	Community-wide	Low	Moderate	High	Low

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Winter Storms/ Freezes	Marshall County	Community-wide	Moderate	Significant	High	Low
	Albertville	Community-wide	Moderate	Significant	High	Low
	Arab	Community-wide	Moderate	Significant	High	Low
	Boaz	Community-wide	Moderate	Significant	High	Low
	Douglas	Community-wide	Moderate	Significant	High	Low
	Grant	Community-wide	Moderate	Significant	High	Low
	Guntersville	Community-wide	Moderate	Significant	High	Low
	Union Grove	Community-wide	Moderate	Significant	High	Low
	Unincorporated Communities	Community-wide	Moderate	Significant	High	Low
Droughts/Heat Waves	Marshall County	Community-wide	Moderate	Moderate	High	Low
	Albertville	Community-wide	Moderate	Moderate	High	Low
	Arab	Community-wide	Moderate	Moderate	High	Low
	Boaz	Community-wide	Moderate	Moderate	High	Low
	Douglas	Community-wide	Moderate	Moderate	High	Low
	Grant	Community-wide	Moderate	Moderate	High	Low
	Guntersville	Community-wide	Moderate	Moderate	High	Low
	Union Grove	Community-wide	Moderate	Moderate	High	Low
	Unincorporated Communities	Community-wide	Moderate	Moderate	High	Low

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Wildfires	Marshall County	Partial	Very High	Moderate	Medium	High
	Albertville	Partial	Very High	Moderate	Medium	High
	Arab	Partial	Very High	Moderate	Medium	High
	Boaz	Partial	Very High	Moderate	Medium	High
	Douglas	Partial	Very High	Moderate	Medium	High
	Grant	Partial	Very High	Moderate	Medium	High
	Guntersville	Partial	Very High	Moderate	Medium	High
	Union Grove	Partial	Very High	Moderate	Medium	High
	Unincorporated Communities	Partial	Very High	Significant	High	High
Dam/Levee Failures	Marshall County	Minimal	Very Low	Moderate	Low	High
	Albertville	Minimal	Very Low	Slight	Low	High
	Arab	Minimal	Very Low	Slight	Low	High
	Boaz	Minimal	Very Low	Slight	Low	High
	Douglas	Minimal	Very Low	Slight	Low	High
	Grant	Minimal	Very Low	Slight	Low	High
	Guntersville	Partial	Very Low	Moderate	Low	High
	Union Grove	Minimal	Very Low	Slight	Low	High
	Unincorporated Communities	Partial	Very Low	Significant	Medium	High

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Landslides	Marshall County	Partial	Very Low	Slight	Low	High
	Albertville	Partial	Very Low	Slight	Low	High
	Arab	Partial	Very Low	Slight	Low	High
	Boaz	Partial	Very Low	Slight	Low	High
	Douglas	Partial	Very Low	Slight	Low	High
	Grant	Partial	Very Low	Slight	Low	High
	Guntersville	Partial	Very Low	Slight	Low	High
	Union Grove	Partial	Very Low	Slight	Low	High
	Unincorporated Communities	Partial	Low	Slight	Low	High
Earthquakes	Marshall County	Community-wide	Low	Slight	High	Low
	Albertville	Community-wide	Low	Slight	High	Low
	Arab	Community-wide	Low	Slight	High	Low
	Boaz	Community-wide	Low	Slight	High	Low
	Douglas	Community-wide	Low	Slight	High	Low
	Grant	Community-wide	Low	Slight	High	Low
	Guntersville	Community-wide	Low	Slight	High	Low
	Union Grove	Community-wide	Low	Slight	High	Low
	Unincorporated Communities	Community-wide	Low	Slight	High	Low

Hazard	Jurisdiction	Community Impacts			Impacts on Vulnerable Community Buildings, Critical Facilities, and Infrastructure	
		Location (Geographic Extent of Hazard in the Community)	Probability (Frequency of Hazard Occurrence in the Community)	Extent (Magnitude or Severity of Hazard in the Event of Occurrence)	Level of Exposure (Degree of Structures Exposed to the Hazard)	Level of Damage Potential (Percentage of Likely Damage to Exposed Structures)
Sinkholes (Land Subsidence)	Marshall County	Partial	Low	Not Severe	Medium	High
	Albertville	Minimal	Low	Not Severe	Low	High
	Arab	Minimal	Low	Not Severe	Low	High
	Boaz	Minimal	Low	Not Severe	Low	High
	Douglas	Minimal	Low	Not Severe	Low	High
	Grant	Minimal	Low	Not Severe	Low	High
	Guntersville	Community-wide	Low	Not Severe	High	High
	Union Grove	Minimal	Low	Not Severe	Low	High
	Unincorporated Communities	Partial	Low	Not Severe	Medium	High
Human-Caused & Technological Hazards	Marshall County	Community-wide	Very High	Varies	High	Varies
	Albertville	Community-wide	Very High	Varies	High	Varies
	Arab	Community-wide	Very High	Varies	High	Varies
	Boaz	Community-wide	Very High	Varies	High	Varies
	Douglas	Community-wide	Very High	Varies	High	Varies
	Grant	Community-wide	Very High	Varies	High	Varies
	Guntersville	Community-wide	Very High	Varies	High	Varies
	Union Grove	Community-wide	Very High	Varies	High	Varies
	Unincorporated Communities	Community-wide	Very High	Varies	High	Varies

5.10 Risks that Vary Among the Jurisdictions

This Plan has strongly emphasized the variations in risks among jurisdictions. In particular, the following sections contain specific references to jurisdictional variations:

- Hazard identification. Each jurisdiction was independently assessed to identify pertinent hazards, based on the sources noted in Section 5.3 “Identification of Hazards Affecting Each Jurisdiction.” Descriptions of hazards can be found in Appendix D, “Hazard Identification, Ratings and Descriptions”.
- Hazard profiles. Each of the hazard profiles in Section 5.4 notes how the location, extent, past occurrences, and probability of future events may vary among all jurisdictions. Maps are included, where possible, to emphasize the locations of hazards in relation to jurisdictional limits.
- Summary of Community Impacts. Table 5-53 “Summary of Hazards and Community Impacts” summarizes how hazards impact each jurisdiction.

Risk may vary among jurisdictions, as described in Table 5-54 “Jurisdictional Risk Variations.” This table presents an overview of the common and unique risks within each jurisdiction and the unique characteristics of those risks.

The risk variations table uses the following terms, as defined here:

Variation of Risks. Measures whether a risk is common or unique, as follows:

- 1) *Common risk* - affects all areas equally; or
- 2) *Unique risk* - affects certain jurisdictions with varying probability and extent.

Location. Indicates whether a hazard’s impact varies within the community, as follows:

- 1) *Specific locations* - the hazard only threatens particular parts of the jurisdiction; or
- 2) *Not unique* - the hazard affects all parts of the jurisdiction.

Probability. Probability measures the likelihood of the hazard occurring within the community, based on historical incidence. The scale for frequency runs as follows:

- 1) *Very high* - annually;
- 2) *High* - every two to three years;
- 3) *Moderate* - every three to ten years;
- 4) *Low* - every ten years; or
- 5) *Very low* - rare.

Extent. Extent measures the severity of the hazard and its potential to cause casualties, business losses, and damage to structures. The scale utilized runs as follows:

- 1) *Devastating* - the potential for devastating casualties, business losses, and structure damage;
- 2) *Significant* - the potential for some casualties and significant, but less than devastating, business losses and structure damage;
- 3) *Moderate* – moderate potential for economic losses and structure damage; or
- 4) *Slight* – slight or minimal potential for economic losses and structure damage.

Table 5-54. Jurisdictional Risk Variations

Hazard	Jurisdiction	Variation of Risks	Hazard's Unique Risk Characteristics		
			Location	Probability	Extent
Tornadoes	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique
Severe Storms	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique
Floods	Marshall County	Unique Risks	Specific Locations	Low	Somewhat Severe
	Albertville	Unique Risks	Specific Locations	Moderate	Moderately Severe
	Arab	Unique Risks	Specific Locations	Low	Somewhat Severe
	Boaz	Unique Risks	Specific Locations	Low	Somewhat Severe
	Douglas	Unique Risks	Specific Locations	Low	Somewhat Severe
	Grant	Unique Risks	Specific Locations	Low	Somewhat Severe
	Guntersville	Unique Risks	Specific Locations	Low	Somewhat Severe
	Union Grove	Unique Risks	Specific Locations	Very Low	Not Severe
	Unincorporated Communities	Unique Risks	Specific Locations	Moderate	Moderately Severe

Hazard	Jurisdiction	Variation of Risks	Hazard's Unique Risk Characteristics		
			Location	Probability	Extent
Hurricanes	Marshall County.	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique
Winter Storms/Freezes	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique
Droughts/Heat Waves	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique

Hazard	Jurisdiction	Variation of Risks	Hazard's Unique Risk Characteristics		
			Location	Probability	Extent
Wildfires	Marshall County	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Albertville	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Arab	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Boaz	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Douglas	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Grant	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Guntersville	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Union Grove	Unique Risks	Specific Locations	Very High	Somewhat Severe
	Unincorporated Communities	Unique Risks	Specific Locations	Very High	Severe
Dam/Levee Failures	Marshall County	Unique Risks	Specific Locations	Low	Somewhat Severe
	Albertville	Unique Risks	Specific Locations	Low	Not Severe
	Arab	Unique Risks	Specific Locations	Low	Not Severe
	Boaz	Unique Risks	Specific Locations	Low	Not Severe
	Douglas	Unique Risks	Specific Locations	Low	Not Severe
	Grant	Unique Risks	Specific Locations	Low	Not Severe
	Guntersville	Unique Risks	Specific Locations	Low	Somewhat Severe
	Union Grove	Unique Risks	Specific Locations	Low	Not Severe
	Unincorporated Communities	Unique Risks	Specific Locations	Low	Severe
Landslides	Marshall County	Unique Risks	Specific Locations	Very Low	Not Unique
	Albertville	Unique Risks	Specific Locations	Very Low	Not Unique
	Arab	Unique Risks	Specific Locations	Very Low	Not Unique
	Boaz	Unique Risks	Specific Locations	Very Low	Not Unique
	Douglas	Unique Risks	Specific Locations	Very Low	Not Unique
	Grant	Unique Risks	Specific Locations	Very Low	Not Unique
	Guntersville	Unique Risks	Specific Locations	Very Low	Not Unique
	Union Grove	Unique Risks	Specific Locations	Very Low	Not Unique
	Unincorporated Communities	Unique Risks	Specific Locations	Low	Not Unique

Hazard	Jurisdiction	Variation of Risks	Hazard's Unique Risk Characteristics		
			Location	Probability	Extent
Earthquakes	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique
Sinkholes (Land Subsidence)	Marshall County	Unique Risks	Specific Locations	Very Low	Not Severe
	Albertville	Unique Risks	Specific Locations	Very Low	Not Severe
	Arab	Unique Risks	Specific Location	Very Low	Not Severe
	Boaz	Unique Risks	Specific Locations	Very Low	Not Severe
	Douglas	Unique Risks	Specific Locations	Very Low	Not Severe
	Grant	Unique Risks	Specific Locations	Very Low	Not Severe
	Guntersville	Unique Risks	Specific Locations	Very Low	Not Severe
	Union Grove	Unique Risks	Specific Locations	Very Low	Not Severe
	Unincorporated Communities	Unique Risks	Specific Locations	Very Low	Not Severe
Human-Caused & Technological	Marshall County	Common Risks	Not Unique	Not Unique	Not Unique
	Albertville	Common Risks	Not Unique	Not Unique	Not Unique
	Arab	Common Risks	Not Unique	Not Unique	Not Unique
	Boaz	Common Risks	Not Unique	Not Unique	Not Unique
	Douglas	Common Risks	Not Unique	Not Unique	Not Unique
	Grant	Common Risks	Not Unique	Not Unique	Not Unique
	Guntersville	Common Risks	Not Unique	Not Unique	Not Unique
	Union Grove	Common Risks	Not Unique	Not Unique	Not Unique
	Unincorporated Communities	Common Risks	Not Unique	Not Unique	Not Unique

Chapter 6 – Mitigation Strategy

- 6.1 Federal Requirements for the Mitigation Strategy
- 6.2 Summary of Plan Updates
- 6.3 Goals for Hazard Mitigation
- 6.4 Participation and Compliance with the National Flood Insurance Program (NFIP)
- 6.5 Implementation of Mitigation Actions

6.1 Federal Requirements for the Mitigation Strategy

This chapter of the Plan addresses the Mitigation Strategy requirements of 44 CFR Section 201.6 (c) (3), as follows:

“201.6 (c)(3) *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 shall include:

- (i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
- (ii) 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. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction’s participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
- (iii) An action plan describing how the actions identified in paragraph (c) (3) (ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
- (iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.”

6.2 Summary of Plan Updates

Table 6-1 summarizes changes made to the 2009 plan as a result of the 2014 update, as follows:

Table 6-1 Summary of Plan Updates

Section		Change
6.3	Goals for Hazard Mitigation	2014 goals and objectives reviewed and modified based on current conditions, reviewed compatibility with State goals.
6.4	Identification and Analysis of Mitigation Actions and Projects	Updates the listing of alternative measures considered; administers a new HMPC exercise to garner recommended actions and projects.
6.5	Participation and Compliance with the National Flood Insurance Program (NFIP)	Describe participation by mapped communities and ongoing commitment of existing NFIP participants to enhance flood plain management program activities.
6.6	Implementation of Mitigation Actions	Describes new selection criteria for mitigation actions and projects.
6.7	Multi-Jurisdictional Community Mitigation Action Programs	This section has been relocated to Appendix B.

6.3 Goals for Hazard Mitigation

6.3.1 Description of How the Goals were Developed

The goals in the previous plans have been updated based on current conditions, including the following factors, among others:

- The completion of mitigation measures over the five-year plan implementation cycle (see Appendix C “2009 Plan Implementation Status”);
- The 2014 update to the risk assessment in Chapter 5;
- The update to the risk assessment in the 2013 Alabama State Hazard Mitigation Plan; and
- The update of State goals and mitigation priorities reflected in the State Plan.

The Hazard Mitigation Planning Committee (HMPC) evaluated the validity and effectiveness of the goals from the previous 2009 plan and determined that most of the goals statements should be retained in the 2014 plan update. The previously approved plan also included objectives, and this amendment carries forward many of the same objectives. Some objectives have been modified and new objectives have been added to better identify and select among available mitigation measures that best respond to the considerations listed in the next paragraph (see Appendix F “Alternative Mitigation Measures”). The 2009 implementation status report in Appendix C “2009 Plan Implementation Status” documents which objectives have been met.

Among the considerations reviewed by the planning team during the process of updating this goals section of the mitigation strategy were the following concerns:

- Whether the 2009 goals and objectives reflected the updates to the local risk assessment and the 2013 update to the State risk assessment;
- Whether the 2009 goals and objectives effectively directed mitigation actions and projects that helped reduce vulnerability to property and infrastructure;
- Whether the 2009 goals and objectives support the changed 2013 mitigation priorities established by the HMPC; and
- Whether the 2009 goals reflect the adopted goals in the 2013 Alabama State Hazard Mitigation Plan.

The updated goals are presented in Section 6.3.3 “Community Goals” and have also been incorporated into the “Community Action Programs” in Volume II.

As further explained in Appendix F, a strategic planning approach has been used for identification and analysis of mitigation actions and projects. FEMA’s program categories for managing a successful mitigation program were used as guidelines for identifying and sorting the alternative mitigation measures:

- **Prevention.** Adopting and administering ordinances, regulations, and programs that manage the development of land and buildings to minimize risks of loss due to natural hazards.
- **Property Protection.** Protecting structures and their occupants and contents from the damaging effects of natural hazard occurrences, including retrofitting existing structures to increase their resistance to damage and exposure of occupants to harm; relocating vulnerable structures and occupants from hazard locations; and conversion of developed land to permanent open space through acquisition and demolition of existing structures.
- **Public Education and Outreach.** Educating and informing the public about the risks of hazards and the techniques available to reduce threats to life and property.
- **Natural Resources Protection.** Preserving and restoring the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.
- **Structural Projects.** Engineering structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of a hazard on a community.

The comprehensive listing of alternative mitigation measures within each of the above mitigation program areas was developed by the planning team (again, refer to Appendix F “Identification and Analysis of Mitigation Measures”). The process by which the Hazard Mitigation Planning Committee (HMPC) and local jurisdictions finally selected among the available mitigation measures applied the STAPLEE method. STAPLEE

examines social, technical, administrative, political, legal, environmental, and economic considerations.

HMPC representatives from each jurisdiction participated in the evaluation and selection of the mitigation measures. Not all of the mitigation measures initially considered were included in the final Community Action Programs (see Volume II “Community Action Programs”). The STAPLEE evaluation eliminated many of the measures. Also, some communities did not have the capabilities to carry out a particular measure under consideration or had other concerns revealed by the STAPLEE method.

A capability assessment was performed by the planning team to determine each participating community’s capability to implement their selected mitigation action program. A report of the assessment is documented in Appendix B - “Community Mitigation Capabilities.” The assessment includes, among other capability factors, a review of local plans, studies, regulatory tools and other local planning tools. Mitigation measures to improve these tools to better integrate mitigation objectives were considered and, where deemed appropriate, selected for the action programs.

In addition to STAPLEE and community capabilities, the communities examined other evaluation criteria, including consistency with the vision, goals, and objectives established for the 2014 plan update; cost effectiveness in terms of benefit to cost; FEMA and State funding priorities for Hazard Mitigation Assistance grants; and the fiscal and staffing capabilities of the jurisdictions for carrying out the measures.

The “2014-2019 Marshall County Multi-Jurisdictional Mitigation Action Program,” as presented in Table 6-3 in Section 6.5, presents all the goals, objectives and measures chosen by each of the participating jurisdictions. The Community Action Programs in Volume II, which supplements Table 6-3, breaks out the same mitigation goals, objectives, and mitigation measures by community and adds the priority, timeframe for completion, and responsibility for implementation.

6.3.2 The Vision for Disaster-Resistant Marshall County Communities

The communities of Marshall County envision active resistance to the threats of nature to human life and property through publicly supported mitigation measures with proven results. Each community within the County embraces a long-term commitment to reduce the exposure and risks of natural and man-made hazards within its jurisdiction by activating all available resources through cooperative intergovernmental and private sector initiatives, augmenting public knowledge and awareness, and enhancing local mitigation capabilities.

This shared vision among all Marshall County local governments can be achieved through a long-term hazard mitigation strategy that fully responds to the following hazards identified by this plan:

- Tornadoes,
- Severe Storms,
- Floods,
- Hurricanes
- Winter storms/Freezes,
- Droughts/Heat Waves,
- Wildfires,
- Dam/Levee Failures
- Landslides,
- Earthquakes
- Sinkholes, and
- Human-caused and Technological Hazards

The attainment of this vision requires successful implementation of a comprehensive range of mitigation measures that promote the following underlying principles and purposes:

- To reduce or eliminate risks from natural and man-made hazards.
- To reduce the vulnerability of existing, new, and future development of buildings and infrastructure.
- To minimize exposure and vulnerability of people, buildings, critical facilities, and infrastructure to identified hazards.
- To increase public awareness and support of hazard mitigation.
- To establish interagency cooperation for conducting hazard mitigation activities.
- To strengthen communications and coordination among individuals and organizations.
- To integrate local hazard mitigation planning with State hazard mitigation planning, local comprehensive planning activities, and emergency operations planning.
- To protect people and property and reduce losses and damages to buildings and infrastructure.

6.3.3 Community Goals

The goals to guide the Mitigation Strategy and achieve the long-range vision shared among Marshall County communities are presented here:

1. **Prevention Goal.** Manage the development of land and buildings to minimize risks of loss due to hazards.
2. **Property Protection Goal.** Protect structures and their occupants and contents from the damaging effects of hazards.
3. **Public Education and Awareness Goal.** Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.
4. **Natural Resources Protection Goal.** Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.
5. **Structural Projects Goal.** Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where found to be feasible, cost effective, and environmentally suitable.

6.3.4 Compatibility with 2013 Alabama State Plan Goals

The 2014 Marshall County vision, goals, and objectives are reflective of the goals adopted in the 2013 Alabama State Hazard Mitigation Plan. The State plan includes the following five goals for statewide hazard mitigation:

1. Establish a comprehensive statewide hazard mitigation system.
2. Reduce the State of Alabama's vulnerability to natural hazards.
3. Reduce vulnerability of new and future development.
4. Foster public support and acceptance of hazard mitigation.
5. Expand and promote interagency hazard mitigation cooperation.

Alabama local governments, including Marshall County communities, are the fundamental building blocks of the "comprehensive statewide hazard mitigation system." The underlying principles and purposes of the 2014 Marshall County goals, listed in Subsection 6.3.2 complement the remaining five State goals, as follows: (a) to reduce or eliminate risks from natural and man-made hazards; (b) to reduce the vulnerability of existing, new, and future development of buildings and infrastructure; (c) to minimize exposure and vulnerability of people, buildings, critical facilities, and infrastructure to identified hazards; (d) to increase public awareness and support of hazard mitigation; and (e) to establish interagency cooperation for conducting hazard mitigation activities.

6.4 Participation and Compliance with the National Flood Insurance Program (NFIP)

Marshall County and its municipal jurisdictions, with the exception of the Town of Union Grove, have been mapped and the floodplain identified. The 2004 plan (Mitigation Measure 1.6.7) recommended that the towns of Douglas, Grant and Union Grove perform flood studies to determine if they needed to join the NFIP. The towns of Douglas and Grant were mapped in March of 2008 and at the time of the 2009 plan update, had not yet adopted a local floodplain ordinance. Both communities were working with the State NFIP Coordinator to adopt the State's model flood plain management ordinance and enter the NFIP. As of the 2014 update of the plan, the Town of Douglas had not adopted a local floodplain ordinance and is under sanction.

The jurisdictions of Marshall County, Albertville, Arab, Boaz, Douglas and Guntersville all are members in good standing with the NFIP. All of these jurisdictions had their maps digitized in 2008. All communities with the exception of Marshall County also had map updates in September 2011. The County Engineer, who is a member of the HMPC, provided oversight of the Map Modernization process on behalf of all jurisdictions. All NFIP communities in Marshall County have continued to effectively enforce and keep their floodplain ordinances current since their original entry into the program. Local flood plain ordinance administrators provide technical assistance to applicants and keep abreast of changes in floodplain management requirements through the State NFIP Coordinator. All communities, except for the Town of Union Grove (which has no areas of special flood hazards mapped by FEMA), have developed five-year action programs to improve local flood plain management programs (see specific action items for each community in Section 6.7, Goal 1 Prevention, Objective 1.5 "Flood Plain Management Program.") Demonstrations of community commitment to effective implementation of the NFIP include the following actions:

- Longstanding records of continuous and effective enforcement of flood plain management ordinance requirements;
- Continuing education of local flood plain administrators;
- Community outreach to inform builders and property owners of flood plain management ordinance permitting requirements;
- Continuing updates of local flood plain ordinances for compliance with the most current NFIP standards;
- Maintaining the latest FIRM data in the County's GIS database for all communities;
- Ongoing relations by each community with the State NFIP Coordinator;
- Monitoring flooding events and damages in conjunction with the Marshall County EMA;

- Encouragement to participate in the Community Rating System (CRS) program, through this hazard mitigation planning process and the HMPC; and
- Maintaining NFIP publications on hand by the Marshall County EMA as technical support resources to local flood plain administrators and as public education information for the general public.

The following Table 6-2 provides information on the NFIP participation status of Marshall County jurisdictions:

Table 6-2. NFIP Community Status, Marshall County Jurisdictions

Community ID	Jurisdiction	Current Effective Map Date	Status
010275	Marshall County	03/18/08	Participating
010366	Albertville	09/16/2011(M)	Participating
010345	Arab	09/16/2011(M)	Participating
010276	Boaz	09/16/2011(M)	Participating
010311	Guntersville	09/16/2011	Participating
010459	Douglas	09/16/2011	Sanctioned
010282	Grant	09/16/2011(M)	Participating
-----	Union Grove	Not Mapped	Not Mapped

(M)=No Elevations Determined - All Zone A, C and X

Source: NFIP Community Status Book, 4/30/2014

Since the 2009 plan, the Town of Grant has become a participating member of the NFIP. The town of Douglas has not adopted the necessary floodplain ordinance to enter into the NFIP and was sanctioned in 2009. The Town of Union Grove is not a member of the NFIP and does not have any special flood hazard areas identified.

6.5 Implementation of Mitigation Actions

The range of measures described in Section 6.3 “Goals for Hazard Mitigation” was the source for all actions and projects selected by the Hazard Mitigation Planning Committee (HMPC) and the planning team for inclusion in the five-year Community Mitigation Action Programs for each jurisdiction (see Volume II). Each jurisdiction assigned a priority to selected measures, established a general completion schedule, assigned administrative responsibility for carrying out the measures, estimated costs, where possible, and identified potential funding sources, including potential eligibility for FEMA Hazard Mitigation Assistance Programs.

Social, technical, administrative, political, legal, environmental, and economic considerations – often referred to as the STAPLEE method – guided the evaluation of the range of measures considered by the Hazard Mitigation Planning Committee (HMPC) and its final recommended action programs for each participating jurisdictions.

The STAPLEE method addressed the following areas of concern and responded to many of the questions presented here:

1. Social Considerations.

- *Environmental justice.* Will the proposed measure be socially equitable to minority, disadvantaged, and special needs populations, such as the elderly and handicapped?
- *Neighborhood impact.* Will the measure disrupt established neighborhoods or improve quality of life for affected neighborhoods?
- *Community support.* Is the measure consistent with community values? Will the affected community support the measure?
- *Impact on social and cultural resources.* Does the measure adversely affect valued local resources or enhance those resources?

2. Technical Considerations.

- *Technical feasibility.* Is the proposal technically possible? Are there technical issues that remain? Does the measure effectively solve the problem or create new problems? Are there secondary impacts that might be considered? Have professional experts been consulted?

3. Administrative Considerations.

- *Staffing.* Does the jurisdiction have adequate staff resources and expertise to implement the measure? Will additional staff, training, or consultants be necessary? Can local funds support staffing demands? Will the measure overburden existing staff loads?
- *Maintenance.* Does the jurisdiction have the capabilities to maintain the proposed project once it is completed? Are staff, funds, and facilities available for long-term project maintenance?
- *Timing.* Can the measure be implemented in a timely manner? Are the timeframes for implementation reasonable?

4. Political Considerations.

- *Political support.* Does the local governing body support the proposed measure? Does the public support the measure? Do stakeholders support the measure? What advocates might facilitate implementation of the proposal?

5. Legal Considerations.

- *Legal authority.* Does the jurisdiction have the legal authority to implement the measure? What are the legal consequences of taking action to implement the measure as opposed to an alternative action or taking no action? Will new legislation be required?

6. Environmental Considerations.

- *National Environmental Policy Act (NEPA).* Will the measure be consistent with Federal NEPA criteria? How will the measure affect environmental resources, such as land, water, air, wildlife, vegetation, historic properties, archaeological sites, etc.? Can potentially adverse impacts be sufficiently mitigated through reasonable methods?
- *State and local environmental regulations.* Will the measure be in compliance with State and local environmental laws, such as flood plain management regulations, water quality standards, and wetlands protection criteria?
- *Environmental conservation goals.* Will the proposal advance the overall environmental goals and objectives of the community?

7. Economic Considerations.

- *Availability of funds.* Will the measure require Federal or other outside funding sources? Are local funds available? Can in-kind services reduce local obligations? What is the projected availability of required funds during the timeframe for implementation? Where funding is not apparently available, should the project still be considered but at a lower priority?
- *Benefits to be derived from the proposed measure.* Will the measure likely reduce dollar losses from property damages in the event of a hazard? To what degree?
- *Costs.* Are the costs reasonable in relation to the likely benefits? Do economic benefits to the community outweigh estimated project costs? What cost reduction alternatives might be available?
- *Economic feasibility.* Have the costs and benefits of the preferred measure been compared against other alternatives? What is the economic impact of the no-action alternative? Is this the most economically effective solution?
- *Impact on local economy.* Will the proposed measure improve local economic activities? What impact might the measure have on the tax base?

- *Economic development goals.* Will the proposal advance the overall economic goals and objectives of the community?

The STAPLEE evaluation also facilitated the prioritization of measures. If a measure under consideration was found to be financially feasible and had high ratings, it was given a higher priority for implementation than measures that fell lower in the rating. Moreover, a general economic evaluation was performed as part of the STAPLEE method, as described above. Weighing potential economic benefits to reducing damages against costs made it possible to select among competing projects. Especially important to the selection process is the estimated cost and availability of funds through local sources and potential FEMA Hazard Mitigation Assistance (HMA) grant programs. Prior to implementation of projects proposed for HMA funding, a detailed benefit-cost analysis (BCA) will be required.

All of the above considerations and prioritization methods resulted in the final goals, objectives, and mitigation measures presented in Table 6.3 “2014-2019 Marshall County Multi-Jurisdictional Mitigation Action Program” and Volume II “Community Action Programs,” which supplements Table 6.3.

Table 6-3. 2014-2019 Marshall County Multi-Jurisdictional Mitigation Action Program

Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.				
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.				
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long-term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	Albertville, Arab, Boaz, Douglas, Grant, Guntersville	All	Both	Action
1.1.2	Integrate the findings and recommendations of this plan into comprehensive plan amendments for jurisdictions with active comprehensive planning programs.	Albertville, Arab, Boaz, Guntersville	All	Both	Action
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	Marshall County, Albertville, Arab, Boaz, Guntersville	All	Both	Action
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories.				

Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1.2.1	Maintain a centralized, countywide natural hazards and risk assessment database in GIS that is accessible to local planners and emergency management personnel, including such data as, flood zones, geohazards, major drainages structures, dams/levees, tornado tracks, disaster events and their extents, and a comprehensive inventory of critical facilities within all jurisdictions.	Marshall County	All	Both	Action
1.2.2	Integrate FEMA HAZUS-MH applications for hazard loss estimations within local GIS programs. Maintain up-to-date data within GIS to apply the full loss estimation capabilities of HAZUS.	Marshall County	All	Both	Action
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.3	<u>Planning Studies.</u> Conduct special studies, as needed, to identify hazard risks and mitigation measures.				
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	Marshall County, Albertville, Arab, Boaz, Guntersville	All	Existing	Action
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Existing	Action
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Marshall County, Albertville, Arab, Boaz, Guntersville	Wildfires	Existing	Action

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.3.6	Develop an inventory of public and commercial building vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Marshall County, Albertville, Arab, Boaz, Guntersville	Earthquake	Existing	Project
1.4	<u>Zoning.</u> Establish effective zoning controls, where applicable, to vulnerable land areas to discourage environmentally incompatible land use and development.				
1.4.2	Evaluate additional land use restrictions within designated flood zones, such as prohibition of storage of buoyant materials, storage of hazardous materials, and restrictive development of flood ways, among others.	Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.4.3	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.4.4	Enact local ordinance that require community storm shelters within sizeable mobile home parks and subdivisions.	Albertville, Arab, Boaz, Guntersville	Tornadoes, Hurricanes, Severe Storms	New	Action
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.				
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Flooding	New	Action
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.				
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action

Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Action
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Action
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Project
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.				
1.7.1	Promote good construction practices and proper code enforcement to mitigate structural failures during natural hazard events.	Albertville, Arab, Boaz, Guntersville	All	New	Action
1.7.2	Evaluate and revise as appropriate, building codes for roof construction to maximize protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of "hurricane clips."	Albertville, Arab, Boaz, Guntersville	Tornadoes, Hurricanes, Severe Storms	New	Action

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Marshall County, Albertville, Arab, Boaz, Guntersville	Tornadoes, severe storms, winter storms/freezes, hurricanes	Both	Action
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Marshall County, Albertville, Arab, Boaz, Guntersville	Wildfires	Both	Action
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	Marshall County, Albertville, Arab, Boaz, Guntersville	All	Existing	Action
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Marshall County, Albertville, Arab, Boaz, Guntersville	Tornadoes, Hurricanes, Severe Storms	New	Project
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics.				
1.8.1	Review and revise as necessary, landscaping standards for parking lots that reduce the size of impervious surfaces and encourage natural infiltration of rainwater.	Albertville, Arab, Boaz, Guntersville	Flooding	New	Action
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Marshall County, Albertville, Arab, Boaz, Guntersville	Wildfires	Both	Action
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Marshall County, Albertville, Arab, Boaz, Guntersville	Wildfires	Both	Action
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.				

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Albertville, Arab, Boaz, Grant, Guntersville	Flooding	Existing	Action
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Albertville, Arab, Boaz, Grant, Guntersville	Flooding	Existing	Action
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Action
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.				
1.10.1	Support legislation to establish a State dam safety program.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Dam/Levee Failure	Both	Action
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.				
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Action
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.				
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Existing	Action
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Wildfire	Both	Project

Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.				
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.				
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.				
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Landslide	Existing	Project
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.				
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Flooding	Existing	Project
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.				

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Project
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.				
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Existing	Action
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Existing	Action
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies.				
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Existing	Action
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Drought	Existing	Action
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.				

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2.7.1	Install lightning and/or surge protection on existing critical facilities.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Severe storms	Existing	Project
2.7.2	Conduct ongoing tree trimming programs along power lines.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Severe storms	Existing	Action
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events.				
2.8.1	Install backup power generators for critical facilities.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Hurricanes, Tornadoes, Severe Storms	Existing	Project
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.				
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.				
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.				
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.2.2	Conduct materials distribution, via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	Marshall County, Albertville, Arab, Boaz, Guntersville	All	Existing	Action

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	Marshall County, Albertville, Arab, Boaz, Guntersville	All	Both	Action
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
3.2.5	Educate citizens on water saving techniques.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Drought	Both	Action
3.2.6	Educate farmers on soil and water conservation practices.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville	Drought	Both	Action
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.				
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Action
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Existing	Action
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.				
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.				

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
3.5.1	Distribute hazard mitigation brochures to students through area schools.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Earthquake	Both	Action
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.				
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.7	<u>Technical Assistance.</u> Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.				
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.				
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.				
3.9.1	Promote the use of weather radios in households and businesses.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.9.3	Distribute weather radios and emergency response instructions to municipal residents.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	All	Both	Action
3.10	<u>Disaster Warning.</u> Improve public warning systems.				
3.10.1	Upgrade siren-warning systems to provide complete coverage to all jurisdictions.	Marshall County	Flooding	Both	Project
3.10.2	Upgrade critical communications infrastructure.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Project
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.				
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.				
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Project
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.				
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Marshall County, Albertville, Arab, Boaz, Guntersville	Flooding	Both	Action

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Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Action
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.				
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Existing	Action
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Wildfire	Both	Action
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.				
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Droughts/heat waves, wildfires	Both	Action
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.				
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.				
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Action
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.				

Goals, Objectives, and Mitigation Measures		Communities	Hazards Addressed	Affects New or Existing Buildings or Infrastructure	Action or Project
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Marshall County, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Flooding	Both	Project
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Marshall County, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Drought	Both	Project
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.				
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Hurricanes, Tornadoes, Severe Storms	New	Project
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Marshall County, Albertville, Arab, Boaz, Guntersville	Hurricanes, Tornadoes, Severe Storms	Both	Project
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Marshall County, Albertville, Arab, Boaz, Douglas, Grant, Guntersville, Union Grove	Hurricanes, Tornadoes, Severe Storms	Both	Project

Chapter 7–Plan Maintenance Process

- 7.1 Federal Requirements for the Plan Maintenance Process
- 7.2 Summary of Plan Updates
- 7.3 Monitoring, Evaluating and Updating the Mitigation Plan
- 7.4 Incorporation of the Mitigation Plan into Other Planning Mechanisms
- 7.5 Continuing Public Participation in the Plan Maintenance Process

7.1 Federal Requirements for the Plan Maintenance Process

This chapter of the Plan addresses the Plan Maintenance Process requirements of 44 CFR Sec. 201.6 (c) (4), as follows:

“Sec. 201.6 (c) *Plan content*. The plan shall include the following:

(4) *A plan maintenance process* that includes:

- (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- (ii) 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.
- (iii) Discussion on how the community will continue public participation in the plan maintenance process.”

7.2 Summary of Plan Updates

Table 7-1 summarizes changes made to the 2004 plan as a result of the 2009 plan update, as follows:

Table 7-1. Summary of Plan Updates

Section		Change
7.1	Ongoing Monitoring of the Plan	No changes.
7.2	Evaluating the Plan	No changes.
7.3	Plan Update Process	No changes.
7.4	Incorporation of the Mitigation Plan into Other Planning Mechanisms	Changed reference to 2014 Plan.
7.5	Continuing Public Participation in the Plan Maintenance Process	Changed reference to 2014 Plan; updated website link.

7.3 Monitoring, Evaluating, and Updating the Mitigation Plan

7.3.1 Ongoing Monitoring of the Plan

The Hazard Mitigation Planning Committee's (HMPC) ongoing review process throughout the year should continually monitor the current status of the mitigation measures scheduled for implementation. Ongoing status reports of each jurisdiction's progress will be reviewed by the EMA Director and representatives from the HMPC and should include the following information:

- Actions that have been undertaken to implement the scheduled mitigation measure, such as, obtaining funding, permits, approvals or other resources to begin implementation.
- Mitigation measures that have been completed, including public involvement activities.
- Revisions to the priority, timeline, responsibility, or funding source of a measure and cause for such revisions or additional information or analysis that has been developed that would modify the mitigation measure assignment as initially adopted in the plan.
- Measures that a jurisdiction no longer intends to implement and justification for cancellation.

The ongoing review process may require adjustments to the selection of mitigation measures, priorities, timelines, lead responsibilities, and funding sources presented in the Community Mitigation Action Programs found in Volume II. In the event modifications to the plan are warranted as a result of the annual review or other conditions, the HMPC will oversee and approve all amendments to the plan by majority vote of a quorum of HMPC members. Conditions that might warrant amendments to this plan would include, but not be limited to, special opportunities for funding and response to a natural or human-made disaster. A copy of the plan amendments will be submitted by the Marshall County EMA to all jurisdictions in a timely manner and filed with the Alabama EMA.

7.3.2 Evaluating the Plan

Within sixty days following a significant disaster or an emergency event having a substantial impact on a portion of, or the entire Marshall County area, or any of its jurisdictions, the HMPC will conduct or oversee an analysis of the event to evaluate the responsiveness of the Mitigation Strategy to the event and the effects on the contents of the Risk Assessment. The Risk Assessment should evaluate the direct and indirect damages, response and recovery costs (economic impacts) and the location, type, and extents of the damages. The findings of the assessment should determine any new mitigation initiatives that should be incorporated into this plan to avoid similar losses from future hazard events. The results of the assessment will be provided to those

affected jurisdictions for review. These results also provide useful information when considering new mitigation initiatives as an amendment to the existing plan or during the next five-year plan update period.

The HMPC will oversee an annual evaluation of progress towards implementation of the Mitigation Strategy. Any discussions and reports by the HMPC should be documented. When the plan is next revised, the evaluation findings should clearly justify and explain any revisions. In its annual review, the HMPC should discuss the following topics to determine the effectiveness of the implementation actions and the need for revisions to the Mitigation Strategy:

- Are there any new potential hazards that have developed and were not addressed in the plan?
- Have any disasters occurred and are not included in the plan?
- Are there additional mitigation ideas that need to be incorporated into the plan?
- What projects or other measures have been initiated, completed, deferred or deleted?
- Are there any changes in local capabilities to carry out mitigation measures?
- Have funding levels to support mitigation actions either increased or decreased?

The HMPC may create subcommittees to oversee and evaluate plan implementation. This will be done at the Committee's discretion.

7.3.3 Plan Update Process

Any of the following situations may require a review and update of the plan:

- Requirement for a five-year update.
- Change in federal requirements for review and update of the plan.
- Significant natural or human-made hazard event(s) before the expiration of the five-year plan update.

As stated above in Section 7.3.2, the HMPC will convene within 60 days of a significant disaster to discuss the potential need for any amendments to the plan. If there are no significant disasters that trigger an update, the current Federal guidelines require a five-year update.

The Marshall County EMA will release or publish a notice to the public that an update is being initiated and provide information on meeting schedules, how and where to get information on the plan, how to provide comments on the plan, and opportunities for other public involvement activities. The EMA will then convene the HMPC and with

the assistance of EMA staff or a consultant, as deemed necessary, carry out the steps necessary to update the plan.

The initial steps for the five-year update to this plan should begin nine to twelve months before the current FEMA approval expiration, which takes into consideration the 90 day review process by the Alabama EMA and FEMA. Additional time for planning grants may require up to an additional year added to the start date. Once the Hazard Mitigation Planning Committee has been organized to oversee the update, the following steps will take place in order to facilitate the process:

- Step 1. Review of the most recent FEMA local mitigation planning requirements and guidance.
- Step 2. Evaluation of the existing planning process and recommendations for improvements.
- Step 3. Examination and revision of the risk assessment, including hazard identification, profiles, vulnerabilities, and impacts on development trends, to ensure accuracy and up to date information.
- Step 4. Update of mitigation strategies, goals and action items, in large part based on the annual plan implementation evaluation input.
- Step 5. Evaluation of existing plan maintenance procedures and recommendations for improvements.
- Step 6. Comply with all applicable Federal regulations and directives.

Ninety days prior to the anniversary date, a final draft of the revised plan will be submitted to the Alabama EMA for review and comments and then to FEMA for conditional approval. Once FEMA Region IV has issued a conditional approval, the updated plan will be adopted by all participating jurisdictions.

7.4 Incorporation of the Mitigation Plan into Other Planning Mechanisms

This plan supplements the most recent edition of the Marshall County Emergency Operations Plan, which is administered through the Marshall County Emergency Management Agency. Further, each governmental entity will be responsible for implementation of their individual Community Mitigation Action Programs based on priorities, funding availability, capabilities, and other considerations described in Chapter 6 “Mitigation Strategy.” Because the 2014 Marshall County Multi-Hazard Mitigation Plan is a multi-jurisdictional plan, the mechanism for implementation of the various mitigation measures through existing programs may vary by jurisdiction. Each jurisdiction’s unique needs and capacities for implementation are reflected in its respective mitigation action program.

The Hazard Mitigation Planning Committee recognizes the importance of fully integrating hazard mitigation planning and implementation into existing local plans,

regulatory tools, and related programs. This plan is intended to influence each jurisdiction's planning decisions concerning land use, development, public facilities, and infrastructure. Any updates, revisions, or amendments to the Marshall County Emergency Operations Plan, local comprehensive plans, capital improvement budgets or plans, zoning ordinances and maps, subdivision regulations, building and technical codes, and related development controls should be consistent with the goals, objectives, and mitigation measures adopted in this plan. Each jurisdiction's commitment to this consistency is reflected in its respective mitigation action program. As part of the subsequent five-year update process, all local planning mechanisms should again be reviewed for effectiveness, and recommendations for new integration opportunities should be carefully considered.

Multi-hazard mitigation planning should not only be integrated with local planning tools but into existing public information activities, as well as household emergency preparedness. Ongoing public education programs should stress the importance of managing and mitigating hazard risks. Public information handouts and brochures for emergency preparedness should emphasize hazard mitigation options, where appropriate.

Of particular importance to incorporating hazard mitigation planning into other planning programs, is the Marshall County EMA's commitment to full integration of natural and human-made hazards mitigation planning into its comprehensive emergency operations planning program and associated public emergency management activities, to the furthest possible extent.

7.5 Continuing Public Participation in the Plan Maintenance Process

A critical part of maintaining an effective and relevant multi-hazard mitigation plan is ongoing public review and comment. Consequently, the Hazard Mitigation Planning Committee is dedicated to direct involvement of its citizens in providing feedback and comments on the plan throughout the five-year implementation cycle and interim reviews.

To this end, copies of this 2014 Marshall County Multi-Hazard Mitigation Plan will be maintained in the offices of the Marshall County EMA and the principal offices of all of the jurisdictions that participated in the planning process. After adoption, a public information notice will inform the public that the plan may be viewed at these offices or on the web. The Marshall County EMA website at <http://www.marshallcoema.org> contains a link to download an on-line copy of the plan. Public comments can be mailed, e-mailed, or phoned in to the Marshall County EMA.

Public meetings will be held when significant modifications to the plan are required or when otherwise deemed necessary by the Hazard Mitigation Planning Committee. The public will be able to express their concerns, ideas, and opinions at the

meetings. At a minimum, public hearings will be held during the annual and five-year plan updates and to present the final plan and amendments to the plan to the public before adoption. Public opinion surveys and public involvement activities required for the five-year update will be conducted during the community meeting and may be periodically administered by the Marshall County EMA.

Public involvement activities initiated by the 2014 planning process are documented in Appendix H “Community Involvement Documentation.” Many of these activities will continue throughout the five-year implementation cycle and be evaluated for effectiveness at least annually by the Hazard Mitigation Planning Committee. Moreover, the public outreach goal of this plan and the associated objectives and mitigation measures commit each locality to implement a range of public education and awareness opportunities. The constant monitoring of these programmed mitigation actions assures ongoing public participation throughout the plan maintenance process.

MARSHALL COUNTY

MULTI-HAZARD MITIGATION PLAN

II. COMMUNITY ACTION PROGRAMS

A MULTI-JURISDICTIONAL PLAN



Prepared under the direction of the
Marshall County Hazard Mitigation Planning Committee



With the support of the Marshall County EMA by:



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January 30, 2015

2014 Marshall County Multi-Hazard Mitigation Plan

Community Action Programs

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Community Action Programs

- 1.0 Development of Community Action Programs
- 2.0 Community Action Programs for Each Jurisdiction

1.0 Development of Community Action Programs

The Community Action Programs supplement Table 6-2 “2014-2019 Marshall County Multi-Jurisdictional Mitigation Action Program” is found in Chapter 6, Section 6.5. These Community Action Programs break out the same mitigation goals, objectives, and mitigation measures by community and add the priority, timeframe for completion, and lead responsibility for implementation.

In developing a list of mitigation measures for potential loss reduction, the planning team utilized three main sources: the 2009 Marshall County, Alabama, Multi Hazard Mitigation Plan, the 2013 Alabama State Hazard Mitigation Plan, and the Hazard Mitigation Planning Committee. First, the planning team took the mitigation measures presented to the HMPC in 2009 and used them as base measures for the HMPC to consider for the plan update (see Appendix C “2009 Plan Implementation Status”). Second, the team added the action items that are listed in the 2013 Alabama State Hazard Mitigation Plan mitigation strategy, in which the State assigned implementation responsibility to local jurisdictions. Third, mitigation actions the HMPC developed through various exercises that were not covered by either the 2009 plan or the 2013 state plan were added to the list (see Appendix F “Alternative Mitigation Measures”).

In addition to those main sources listed above, various mitigation guides and publications published by FEMA in its “How-to” series were consulted for inclusion in the list. Mitigation measures that resulted in loss reduction to existing and new buildings and infrastructure were chosen for the final list of considered measures.

Each identified measure was entered into a table, which listed the hazard(s) addressed, the effects on new or existing buildings or infrastructure, whether the measure is an action or a project, if any project had the potential for FEMA HMA funding, and the origin or source of the measure. Each item was categorized with other measures that fulfilled common goals and objectives. The final comprehensive strategy is presented in Table 6-2 “2014-2019 Marshall County Multi-Jurisdictional Mitigation Action Program.”

2.0 Community Action Programs for Each Jurisdiction

This section presents the Community Action Programs adopted by each of the participating jurisdictions. The following key explains the components of the Community Action Programs:

Key

- Action programs are in alphabetical order by jurisdiction.
- The action programs assign lead responsibility for implementation to a specific department or agency or position within the organization.
- The Local Floodplain Manager is an administrator designated through the NFIP as the person responsible for enforcing the local ordinance, and may be the Local Engineer or Local Building Official
- Priorities are *High*, *Medium*, and *Low*.
- Timelines are *Short-Range* (2 or less years, between 2015 and 2016), *Mid-Range* (3 to 4 years, between 2016 and 2018), *Long-Range* (more than 4 years, 2019 or later) or *Ongoing*. *Ongoing* measures are continuous measures to be carried out throughout the 5 year timeframe and may be carried over from previous editions of the plan or carried forward to the next plan update.
- General cost estimates and potential funding sources are identified. FEMA Hazard Mitigation Assistance funds, where noted as a possible funding source, are subject to final eligibility determination, including, among other eligibility criteria, a positive benefit/cost analysis, and the availability of funds.
- *TBD* is "To Be Determined."

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	All	Medium	Mid-Range	County Commission	Action	TBD	TBD
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories._							
1.2.1	Maintain a centralized, countywide natural hazards and risk assessment database in GIS that is accessible to local planners and emergency management personnel, including such data as, flood zones, geohazards, major drainages structures, dams/levees, hurricane surge areas, tornado tracks, disaster events and their extents, and a comprehensive inventory of critical facilities within all jurisdictions.	All	Medium	Mid-Range	County Commission and County GIS	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.2.2	Integrate FEMA HAZUS-MH applications for hazard loss estimations within local GIS programs. Maintain up-to-date data within GIS to apply the full loss estimation capabilities of HAZUS.	All	Medium	Mid-Range	County GIS	Action	TBD	TBD
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Flooding	High	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3	Planning Studies. Conduct special studies, as needed, to identify hazard risks and mitigation measures.							
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Flooding	Medium	Mid-Range	County Engineer	Action	TBD	TBD
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	All	Medium	Mid-Range	County Engineer	Action	No Additional Cost	Existing Funds
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Flooding	Medium	Mid-Range	County Engineer	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Flooding	Medium	Mid-Range	County Engineer	Action	TBD	TBD
1.3.6	Develop an inventory of public and commercial buildings vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Earthquake	Low	Long-Range	County GIS	Project	TBD	TBD
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	County Commission	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	County Commission	Project	No Additional Cost	Existing Funds
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Flooding	Medium	Ongoing	Floodplain Manager	Project	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.							
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Tornadoes, severe storms, winter storms/freezes, hurricanes	Low	Ongoing	County Engineer	Action	TBD	TBD
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Wildfires	High	Ongoing	Fire Department	Action	No Additional Cost	Existing Funds
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	All	High	Ongoing	County Commission	Action	No Additional Cost	Existing Funds
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	County Commission	Project	No Additional Cost	Existing Funds
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics._							

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Wildfires	Low	Long-Range	County Commission	Action	No Additional Cost	Existing Funds
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	County Engineer	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	County Engineer	Action	No Additional Cost	Existing Funds
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	County Commission	Action	TBD	TBD

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	County Commission	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	County Engineer	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2	Goal for Property Protection: Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	Building Relocation. Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2	Acquisition. Acquire flood prone buildings and properties and establish permanent open space.							
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3	Building Elevation. Elevate buildings in hazardous flood areas to safeguard against damages.							

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	County Engineer	Action	TBD	FEMA HMA Grant

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Ongoing	County Engineer	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	County Commission	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	County Commission	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	County Commission	Project	TBD	FEMA HMA Grant
3	Goal for Public Education and Outreach. Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							
3.1	Map Information. Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Flood Plain Manager	Action	No Additional Cost	Existing Funds
3.2	Outreach Projects. Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.2.2	Distribute information via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	All	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	All	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Flooding	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Flooding	Low	Long-Range	County Commission	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.7	Technical Assistance. Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.							
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Flooding	Low	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.8	Mass Media Relations. Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.9	Weather Radios. Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	EMA	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	County Commission	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	EMA	Action	TBD	FEMA HMA Grant

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.1	Upgrade siren-warning systems to provide complete coverage to all jurisdictions.	Flooding	Medium	Ongoing	EMA	Project	TBD	FEMA HMA Grant
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	County Commission	Project	TBD	FEMA HMA Grant
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							

Marshall County Mitigation Action Program								
	Goal, Objectives and Mitigation Measures	Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Flooding	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	County Commission	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	County Commission	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	County Commission	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	County Engineer	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	County Engineer	Project	TBD	FEMA HMA Grant
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	County Commission	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	County Commission	Project	TBD	FEMA HMA Grant
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	EMA	Project	TBD	FEMA HMA Grant

Marshall County Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	EMA	Project	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.2	Integrate the findings and recommendations of this plan into comprehensive plan amendments for jurisdictions with active comprehensive planning programs.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	All	Medium	Mid-Range	Mayor, Council and Planning Commission	Action	TBD	TBD

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories.							
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Flooding	High	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3	<u>Planning Studies.</u> Conduct special studies, as needed, to identify hazard risks and mitigation measures.							
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	All	Medium	Mid-Range	Building Official	Action	No Additional Cost	Existing Funds
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.6	Develop an inventory of public and commercial buildings vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Earthquake	Low	Long-Range	Building Official	Project	TBD	TBD
1.4	<u>Zoning.</u> Establish effective zoning controls, where applicable, to vulnerable land areas to discourage environmentally incompatible land use and development.							
1.4.2	Evaluate additional land use restrictions within designated flood zones, such as prohibition of storage of buoyant materials, storage of hazardous materials, and restrictive development of flood ways, among others.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.4.3	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.4.4	Enact local ordinance that require community storm shelters within sizeable mobile home parks and subdivisions.	Tornadoes, Hurricanes, Severe Storms	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Flooding	Medium	Ongoing	Floodplain Manager	Project	No Additional Cost	Existing Funds
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.							
1.7.1	Promote good construction practices and proper code enforcement to mitigate structural failures during natural hazard events.	All	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.2	Evaluate and revise as appropriate, building codes for roof construction to maximize protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of "hurricane clips."	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Tornadoes, severe storms, winter storms/freezes, hurricanes	Low	Ongoing	Mayor and Council	Action	TBD	TBD

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Wildfires	High	Ongoing	Fire Department	Action	No Additional Cost	Existing Funds
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	All	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics.							
1.8.1	Review and revise as necessary, landscaping standards for parking lots that reduce the size of impervious surfaces and encourage natural infiltration of rainwater.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	Building Official	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Flooding	Medium	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Building Official	Action	TBD	FEMA HMA Grant
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Ongoing	Building Official	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	Mayor and Council	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.2	Distribute information via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Flooding	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.7	<u>Technical Assistance.</u> Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.							
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Flooding	Low	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Flooding	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Albertville Mitigation Action Program								
	Goal, Objectives and Mitigation Measures	Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant

City of Albertville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Building Official	Project	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.2	Integrate the findings and recommendations of this plan into comprehensive plan amendments for jurisdictions with active comprehensive planning programs.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	All	Medium	Mid-Range	Mayor, Council and Planning Commission	Action	TBD	TBD

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories._							
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Flooding	High	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3	<u>Planning Studies.</u> Conduct special studies, as needed, to identify hazard risks and mitigation measures.							
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	All	Medium	Mid-Range	Building Official	Action	No Additional Cost	Existing Funds
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.6	Develop an inventory of public and commercial buildings vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Earthquake	Low	Long-Range	Building Official	Project	TBD	TBD
1.4	<u>Zoning.</u> Establish effective zoning controls, where applicable, to vulnerable land areas to discourage environmentally incompatible land use and development.							
1.4.2	Evaluate additional land use restrictions within designated flood zones, such as prohibition of storage of buoyant materials, storage of hazardous materials, and restrictive development of flood ways, among others.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.4.3	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.4.4	Enact local ordinance that require community storm shelters within sizeable mobile home parks and subdivisions.	Tornadoes, Hurricanes, Severe Storms	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Flooding	Medium	Ongoing	Floodplain Manager	Project	No Additional Cost	Existing Funds
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.							
1.7.1	Promote good construction practices and proper code enforcement to mitigate structural failures during natural hazard events.	All	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.2	Evaluate and revise as appropriate, building codes for roof construction to maximize protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of "hurricane clips."	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Tornadoes, severe storms, winter storms/freezes, hurricanes	Low	Ongoing	Mayor and Council	Action	TBD	TBD

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Wildfires	High	Ongoing	Fire Department	Action	No Additional Cost	Existing Funds
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	All	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics.							
1.8.1	Review and revise as necessary, landscaping standards for parking lots that reduce the size of impervious surfaces and encourage natural infiltration of rainwater.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	Building Official	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Flooding	Medium	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							

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Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Building Official	Action	TBD	FEMA HMA Grant
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Ongoing	Building Official	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							

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Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	Mayor and Council	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.2	Distribute information via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Flooding	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.7	<u>Technical Assistance.</u> Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.							
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Flooding	Low	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Flooding	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Arab Mitigation Action Program								
	Goal, Objectives and Mitigation Measures	Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant

City of Arab Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Building Official	Project	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.2	Integrate the findings and recommendations of this plan into comprehensive plan amendments for jurisdictions with active comprehensive planning programs.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	All	Medium	Mid-Range	Mayor, Council and Planning Commission	Action	TBD	TBD

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories.							
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Flooding	High	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3	<u>Planning Studies.</u> Conduct special studies, as needed, to identify hazard risks and mitigation measures.							
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	All	Medium	Mid-Range	Building Official	Action	No Additional Cost	Existing Funds
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.6	Develop an inventory of public and commercial buildings vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Earthquake	Low	Long-Range	Building Official	Project	TBD	TBD
1.4	<u>Zoning.</u> Establish effective zoning controls, where applicable, to vulnerable land areas to discourage environmentally incompatible land use and development.							
1.4.2	Evaluate additional land use restrictions within designated flood zones, such as prohibition of storage of buoyant materials, storage of hazardous materials, and restrictive development of flood ways, among others.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.4.3	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.4.4	Enact local ordinance that require community storm shelters within sizeable mobile home parks and subdivisions.	Tornadoes, Hurricanes, Severe Storms	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Flooding	Medium	Ongoing	Floodplain Manager	Project	No Additional Cost	Existing Funds
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.							
1.7.1	Promote good construction practices and proper code enforcement to mitigate structural failures during natural hazard events.	All	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.2	Evaluate and revise as appropriate, building codes for roof construction to maximize protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of "hurricane clips."	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Tornadoes, severe storms, winter storms/freezes, hurricanes	Low	Ongoing	Mayor and Council	Action	TBD	TBD

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Wildfires	High	Ongoing	Fire Department	Action	No Additional Cost	Existing Funds
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	All	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics.							
1.8.1	Review and revise as necessary, landscaping standards for parking lots that reduce the size of impervious surfaces and encourage natural infiltration of rainwater.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	Building Official	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Flooding	Medium	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Building Official	Action	TBD	FEMA HMA Grant
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Ongoing	Building Official	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	Mayor and Council	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.2	Distribute information via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Flooding	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.7	<u>Technical Assistance.</u> Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.							
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Flooding	Low	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Flooding	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Boaz Mitigation Action Program								
	Goal, Objectives and Mitigation Measures	Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant

City of Boaz Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Building Official	Project	No Additional Cost	Existing Funds

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	TBD
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	TBD	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.3.2	Repair, elevate and weatherize existing homes for low-to moderate-income families.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	TBD	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
4	Goal for Natural Resources Protection. Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	Open Space Easements and Acquisitions. Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
4.2	River/Stream Corridor Restoration and Protection. Restore and protect river and stream corridors within areas.							
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3	Urban Forestry Programs. Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							

Town of Douglas Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	Goal for Prevention. Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	Comprehensive Plans and Smart Growth. Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.5	Open Space Preservation. Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	Flood Plain Management Regulations. Effectively administer and enforce local floodplain management regulations.							

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	Planning Commission	Action	No Additional Cost	Existing Funds

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	TBD	Action	TBD	TBD

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low-to moderate-income families.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	TBD	Action	TBD	TBD
2.8	<u>Back Up Power.</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Grant Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.1	<u>Comprehensive Plans and Smart Growth.</u> Establish an active comprehensive planning program that is consistent with Smart Growth principles of sustainable community development.							
1.1.1	Maintain up-to-date comprehensive plans for all jurisdictions. Each plan should address natural hazards exposure and include long term disaster resistance measures. The vulnerability and environmental suitability of lands for future development should be clearly addressed. Local plans should assess the vulnerability of designated hazard areas and encourage open space planning to create amenities for recreation and conservation of fragile resources.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.2	Integrate the findings and recommendations of this plan into comprehensive plan amendments for jurisdictions with active comprehensive planning programs.	All	Medium	Mid-Range	Planning Commission	Action	TBD	TBD
1.1.3	Prepare a five-year capital improvements plan (CIP) to include capital projects that implements the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.	All	Medium	Mid-Range	Mayor, Council and Planning Commission	Action	TBD	TBD

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.2	<u>Geographic Information Systems (GIS).</u> Maintain a comprehensive database of hazards locations, socio economic data, infrastructure, and critical facilities inventories.							
1.2.3	Mark depths of flooding and storm surge immediately after each event. Enter and maintain these historical records in GIS.	Flooding	High	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3	<u>Planning Studies.</u> Conduct special studies, as needed, to identify hazard risks and mitigation measures.							
1.3.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.2	Identify existing culturally or socially significant structures and critical facilities within participating jurisdictions that have the most potential for losses from natural hazard events and identify needed structural upgrades.	All	Medium	Mid-Range	Building Official	Action	No Additional Cost	Existing Funds
1.3.3	Evaluate elevation and culvert sizing of existing roadways in flash flood-prone areas to ensure compliance with current standards for design year floods, and develop a program for construction upgrades as appropriate.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.3.4	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	Wildfires	Low	Long-Range	Fire Department	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.3.5	Identify problem drainage areas, conduct engineering studies, evaluate feasibility, and construct drainage improvements to reduce or eliminate localized flooding.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	TBD	TBD
1.3.6	Develop an inventory of public and commercial buildings vulnerable to earthquake damage, focusing on pre 1940 construction and buildings with cripple wall foundations.	Earthquake	Low	Long-Range	Building Official	Project	TBD	TBD
1.4	<u>Zoning.</u> Establish effective zoning controls, where applicable, to vulnerable land areas to discourage environmentally incompatible land use and development.							
1.4.2	Evaluate additional land use restrictions within designated flood zones, such as prohibition of storage of buoyant materials, storage of hazardous materials, and restrictive development of flood ways, among others.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.4.3	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.4.4	Enact local ordinance that require community storm shelters within sizeable mobile home parks and subdivisions.	Tornadoes, Hurricanes, Severe Storms	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.5	<u>Open Space Preservation.</u> Minimize disturbances of natural land features and increased storm water runoff through regulations that maintain critical natural features such as open space for parks, conservation areas, landscaping, and drainage.							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.5.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.1	Train local flood plain managers through programs offered by the State Flood Plain Coordinator and FEMA's training center in Emmitsburg, Maryland.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.4	Maintain membership for locally designated flood plain managers in the Association of State Flood Plain Managers and the Alabama Association Flood Plain Managers and encourage active participation.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.6.6	Improve flood risk assessment by documenting high water marks post event, verification of FEMA's repetitive loss inventory and revising and updating regulatory floodplain maps.	Flooding	Medium	Ongoing	Floodplain Manager	Project	No Additional Cost	Existing Funds
1.7	<u>Building and Technical Codes.</u> Review local codes for effectiveness of standards to protect buildings and infrastructure from natural hazard damages.							
1.7.1	Promote good construction practices and proper code enforcement to mitigate structural failures during natural hazard events.	All	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.2	Evaluate and revise as appropriate, building codes for roof construction to maximize protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of "hurricane clips."	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.3	Relocate existing utility lines underground, where feasible and cost effective, and require, through local subdivision and land development regulations, the placement of all new utility lines underground for large residential subdivisions and commercial developments.	Tornadoes, severe storms, winter storms/freezes, hurricanes	Low	Ongoing	Mayor and Council	Action	TBD	TBD

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.7.4	Ensure fire safety ordinances properly regulate open burning, the use of liquid fuel and electric space heaters.	Wildfires	High	Ongoing	Fire Department	Action	No Additional Cost	Existing Funds
1.7.5	Establish and enforce minimum property maintenance standards that reduce or eliminate unsafe structures.	All	High	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
1.7.6	Require the construction of safe rooms within new public buildings, such as new schools, libraries, community centers, and other public buildings where feasible.	Tornadoes, Hurricanes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds
1.8	<u>Landscape Ordinances.</u> Establish minimum standards for planting areas for trees and vegetation to reduce storm water runoff and improve urban aesthetics.							
1.8.1	Review and revise as necessary, landscaping standards for parking lots that reduce the size of impervious surfaces and encourage natural infiltration of rainwater.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.2	Establish ordinances to help mitigate fire hazards related to fuel buildup due to recent hurricanes, by raising tree canopies close to homes, thinning forests near urban areas, and removing trees that are too close to homes.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.8.3	Establish ordinance for the planting of new urban forests or replacement of hurricane damaged urban forests using hurricane resistant tree species to mitigate wind and erosion problems, help beautify and promote healthy urban environments and reduce heating, cooling and storm runoff costs.	Wildfires	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.1	Promote the adoption/enforcement of storm water management regulations that maintain pre-development runoff rates.	Flooding	Medium	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.2	Develop, adopt and implement subdivision regulations that require proper stormwater infrastructure design and construction.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	Building Official	Action	TBD	TBD
1.12.2	Conduct wildfire vulnerability assessments, including the vulnerability of critical facilities and number of residential properties in these risk areas, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas.	Wildfire	Low	Long-Range	Fire Department	Project	No Additional Cost	Existing Funds
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.2.3	Acquire and relocate or demolish structures located in Landslide Hazard Areas and enforce permanent restrictions after land acquisition and structure removal.	Landslide	Low	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.3.2	Repair, elevate and weatherize existing homes for low- to moderate-income families.	Flooding	Medium	Ongoing	Building Official	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Floodplain Manager	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Building Official	Action	TBD	FEMA HMA Grant
2.5.2	Provide technical advisory assistance to building owners on available building retrofits to protect against natural hazards damages.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Ongoing	Building Official	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
2.6.2	Promote the purchase of crop insurance to cover potential losses due to drought.	Drought	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.7.2	Conduct ongoing tree trimming programs along power lines.	Severe storms	High	Ongoing	Mayor and Council	Action	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.2	Distribute information via the internet and other media, and other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.3	Promote disaster resilience within the business community through workshops, educational materials and planning guides, intended to assist business owners in recovering from a disaster event in a timely manner.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.4	Distribute outreach materials to citizens, builders and business owners inquiring about a flood problem, a building permit or other natural hazard related questions.	Flooding	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.6	Educate farmers on soil and water conservation practices.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.3.2	Consider the enactment of a local ordinance or state law to require floodplain location disclosure when a property is listed for sale.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.7	<u>Technical Assistance.</u> Make qualified local government staff available to advise property owners on various hazard risks and mitigation alternatives.							
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	Flooding	Low	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.1	Keep builders and developers informed of Federal wetlands permitting requirements of the Corps of Engineers.	Flooding	Medium	Ongoing	Floodplain Manager	Action	No Additional Cost	Existing Funds
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Building Official	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds

City of Guntersville Mitigation Action Program								
	Goal, Objectives and Mitigation Measures	Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Floodplain Manager	Project	TBD	FEMA HMA Grant

City of Guntersville Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.2	Establish a program for subsidizing individual and community safe room construction in appropriate locations and facilities.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Building Official	Project	No Additional Cost	Existing Funds

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1	<u>Goal for Prevention.</u> Manage the development of land and buildings to minimize risks of loss due to natural hazards.							
1.6	<u>Flood Plain Management Regulations.</u> Effectively administer and enforce local floodplain management regulations.							
1.6.2	Maintain a library of technical assistance and guidance materials to support the local floodplain manager.	Flooding	Medium	Mid-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.6.3	Promote the adoption of uniform flood hazard prevention ordinance among all NFIP communities. The ordinance standards should encourage flood plain management that maintains the natural and beneficial functions of flood plains by maximizing the credits that could be obtained for "Higher Regulatory Standards" under the Community Rating System (CRS) Program.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.6.5	Participate in the "Turn Around Don't Drown" program by purchasing and installing signs in known flash flood bridge overpass locations.	Flooding	Medium	Mid-Range	Mayor and Council	Project	No Additional Cost	Existing Funds
1.9	<u>Storm Water Management.</u> Manage the impacts of land development on storm water runoff rates and to natural drainage systems.							
1.9.3	Establish urban forestry program to help mitigate storm water runoff common in areas with large impervious surfaces.	Flooding	Low	Long-Range	Mayor and Council	Action	TBD	TBD

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
1.10	<u>Dam Safety Management.</u> Establish a comprehensive dam safety program.							
1.10.1	Support legislation to establish a State dam safety program.	Dam/Levee Failure	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
1.11	<u>Community Rating System Program (CRS).</u> Increase participation of NFIP member communities in the CRS Program.							
1.11.1	Apply for/maintain membership in the CRS Program; continue to upgrade rating.	Flooding	Medium	Short-Range	Floodplain Manager	Action	No Additional Cost	Existing Funds
1.12	<u>Critical Facilities Assessments.</u> Perform assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) to address building and site vulnerabilities to hazards, identify damage control and retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.							
1.12.1	Perform vulnerability assessments of critical facilities to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	High	Mid-Range	TBD	Action	TBD	TBD
2	<u>Goal for Property Protection:</u> Protect structures and their occupants and contents from the damaging effects of natural hazards.							
2.1	<u>Building Relocation.</u> Relocate buildings out of hazardous flood areas to safeguard against damages and establish permanent open space.							

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.1.1	Relocate buildings out of hazardous flood areas, with emphasis on pre-FIRM residential buildings, where deemed more cost effective than property acquisition or building elevation.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2	<u>Acquisition.</u> Acquire flood prone buildings and properties and establish permanent open space.							
2.2.1	Acquire and demolish flood prone or substantially damaged structures and replace with permanent open space.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.2.2	Utilize the most recent NFIP repetitive loss property list, and other appropriate sources, to create and maintain a prioritized list of acquisition mitigation projects based on claims paid.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.3	<u>Building Elevation.</u> Elevate buildings in hazardous flood areas to safeguard against damages.							
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4	<u>Flood Proofing.</u> Encourage flood proofing of buildings in hazardous flood areas to safeguard against damages.							

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.4.1	Flood proof pre-FIRM non-residential buildings, where feasible.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.4.2	Examine use of minor structural projects (small berm or floodwalls) in areas that cannot be mitigated through non-structural mitigation techniques.	Flooding	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
2.5	<u>Building Retrofits.</u> Retrofit vulnerable buildings to protect against natural hazards damages, including flooding, high winds, tornadoes, hurricanes, severe storms, and earthquakes.							
2.5.1	Retrofit existing buildings, critical facilities, and infrastructure against potential damages from natural and manmade hazards.	Flooding, Tornadoes, Hurricanes, Severe Storms and Earthquakes	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
2.6	<u>Hazard Insurance Awareness.</u> Increase public awareness of flood insurance and special riders that may be required for earthquake, landslide, sinkhole, and other damages typically not covered by standard property protection policies							
2.6.1	Promote the purchase of insurance coverage by property owners and renters for flood damages in high-risk areas.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
2.7	<u>Critical Facilities Protection.</u> Protect critical facilities from potential damages and occupants from harm in the event of hazards through retrofits or relocations of existing facilities located in high-risk zones or construction of new facilities for maximum protection from all hazards.							
2.7.1	Install lightning and/or surge protection on existing critical facilities.	Severe storms	High	Ongoing	Mayor and Council	Project	TBD	TBD
2.8	<u>Back Up Power:</u> Assure uninterrupted power supplies during emergency events._							
2.8.1	Install backup power generators for critical facilities.	Hurricanes, Tornadoes, Severe Storms	Medium	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant
3	<u>Goal for Public Education and Outreach.</u> Educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.							
3.1	<u>Map Information.</u> Increase public access to Flood Insurance Rate Map (FIRM) information.							
3.1.1	Publicize the availability of FIRM information to real estate agents, builders, developers, and homeowners through local trade publications and newspaper announcements.	All	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2	<u>Outreach Projects.</u> Conduct regular public events to inform the public of hazards and mitigation measures.							

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.2.1	Continue to participate in environmental awareness events to provide the public information on hazard exposure and mitigation measures, such as City/County Day, Hurricane Awareness Week, and Severe Weather Week.	All	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.2.5	Educate citizens on water saving techniques.	Drought	High	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.3	<u>Real Estate Disclosure.</u> Encourage real estate agents to disclose flood plain location for property listings.							
3.3.1	Arrange with the Multiple Listing Service (MLS) to require floodplain location disclosure as a condition for each real estate listing.	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.4	<u>Library.</u> Use local library resources to educate the public on hazard risks and mitigation alternatives.							
3.4.1	Through local libraries, maintain and distribute free and current publications from FEMA, NWS, USGS, and other federal and state agencies.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5	<u>Education Programs.</u> Use schools and other community education resources to conduct programs on topics related to hazard risks and mitigation measures.							

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.5.1	Distribute hazard mitigation brochures to students through area schools.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.5.2	Educate homeowners about structural and non-structural retrofitting of vulnerable homes.	Earthquake	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.6	<u>Community Hazard Mitigation Plan Distribution.</u> Distribute the hazard mitigation plan to elected officials, interested agencies and organizations, businesses, and residents, using all available means of publication and distribution.							
3.6.1	Distribute the 2014 plan to local officials, stakeholders, and interested individuals through internet download.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.8	<u>Mass Media Relations.</u> Utilize all available mass media, such as, newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking to increase public awareness and distribute public information on hazard mitigation topics.							
3.8.1	Maintain appropriate media relationships to ensure the public is informed of hazard threats and means to mitigate property damages and loss of life.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9	<u>Weather Radios.</u> Improve public access to weather alerts.							
3.9.1	Promote the use of weather radios in households and businesses.	All	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
3.9.2	Require the installation of weather radios in all public buildings and places of public assembly.	All	High	Short-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
3.9.3	Distribute weather radios and emergency response instructions to residents and businesses.	All	Medium	Mid-Range	Mayor and Council	Action	TBD	FEMA HMA Grant
3.10	<u>Disaster Warning.</u> Improve public warning systems.							
3.10.2	Upgrade critical communications infrastructure.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
4	<u>Goal for Natural Resources Protection.</u> Preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.							
4.1	<u>Open Space Easements and Acquisitions.</u> Acquire easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands to assure permanent protection of these natural resources.							
4.1.1	Increase open space acquisitions through the FEMA HMA Grant Programs and other flood plain acquisition efforts.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
4.2	<u>River/Stream Corridor Restoration and Protection.</u> Restore and protect river and stream corridors within areas.							
4.2.2	Adopt and/or enforce regulations prohibiting dumping and littering within river and stream corridors.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3	<u>Urban Forestry Programs.</u> Maintain a healthy forest that can help mitigate the damaging impacts of flooding, erosion, landslides, and wild fires within urban areas.							
4.3.1	Utilize technical assistance available from the Alabama Cooperative Extension System with Best Management Practices (BMP).	Flooding	Low	Long-Range	Mayor and Council	Action	No Additional Cost	Existing Funds
4.3.2	Increase overall green spaces in cities by planting hurricane resistant trees with site and location taken into consideration.	Wildfire	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
4.5	<u>Water Resources Conservation Programs.</u> Protect water quantity and quality through water conservation programs to mitigate the effects of droughts and assure uninterrupted potable water supplies.							
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	Droughts/heat waves, wildfires	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5	<u>Goal for Structural Projects.</u> Apply engineered structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of hazards, where feasible, cost effective, and environmentally suitable.							

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.1	<u>Drainage System Maintenance.</u> Improve maintenance programs for streams and drainage ways.							
5.1.1	Prepare and implement standard operating procedures and guidelines for drainage system maintenance.	Flooding	Medium	Ongoing	Mayor and Council	Action	No Additional Cost	Existing Funds
5.2	<u>Reservoirs and Drainage System Improvements.</u> Control flooding through reservoirs and other structural improvements, where deemed cost effective and feasible, such as levees/floodwalls, diversions, channel modifications, dredging, drainage modifications, and storm sewers.							
5.2.1	Construct drainage improvements to reduce or eliminate localized flooding in identified problem drainage areas.	Flooding	Medium	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.2.2	Improve and retrofit water supply systems to save water during drought events and to eliminate breaks and leaks.	Drought	Low	Mid-Range	Mayor and Council	Project	TBD	FEMA HMA Grant
5.3	<u>Community Shelters and Safe Rooms:</u> Provide shelters from natural hazards for the safety of community residents.							
5.3.1	Construct new community safe rooms in accessible locations and add safe rooms within new and existing public and institutional buildings, such as schools, colleges and universities, senior centers, community centers, hospitals, and government buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	TBD	FEMA HMA Grant

Town of Union Grove Mitigation Action Program								
Goal, Objectives and Mitigation Measures		Hazards Addressed	Priority	Timeline	Lead Responsibility for Carrying Out Measure	Action or Project	Estimated Cost	Funding Source
5.3.3	Encourage the construction of safe rooms in new and existing homes and buildings.	Hurricanes, Tornadoes, Severe Storms	High	Ongoing	Mayor and Council	Project	No Additional Cost	Existing Funds

MARSHALL COUNTY

MULTI-HAZARD MITIGATION PLAN

APPENDICES

A MULTI-JURISDICTIONAL PLAN



Prepared under the direction of the
Marshall County Hazard Mitigation Planning Committee



With the support of the Marshall County EMA by:



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FEMA Hazard Mitigation Grant Program

January 30, 2015

2014 Marshall County Multi-Hazard Mitigation Plan**Appendices**

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Appendix A
Federal Requirements for Local Mitigation
Plans

App. A – Federal Requirements for Local Mitigation Plans

- 1.0 Compliance
- 2.0 44 CFR Sec. 201.6 (2013)

1.0 Compliance

The 2014 Marshall County Multi-Hazard Mitigation Plan addresses the Local Mitigation Plans requirements of 44 CFR Sec. 201.6.

2.0 44 CFR Sec. 201.6 (2013)

Section 201.6 Local Mitigation Plans. The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

(a) *Plan requirements.*

- (1) A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. The Administrator may, at his discretion, require a local mitigation plan for the Repetitive Flood Claims Program. A local government must have a mitigation plan approved pursuant to this section in order to apply for and receive mitigation project grants under all other mitigation grant programs.
- (2) Plans prepared for the FMA program, described at part 79 of this chapter, need only address these requirements as they relate to flood hazards in order to be eligible for FMA project grants. However, these plans must be clearly identified as being flood mitigation plans, and they will not meet the eligibility criteria for other mitigation grant programs, unless flooding is the only natural hazard the jurisdiction faces.
- (3) Regional Directors may grant an exception to the plan requirement in extraordinary circumstances, such as in a small and impoverished community, when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of the grant's termination will not be reimbursed by FEMA.

- (4) Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan. State-wide plans will not be accepted as multi-jurisdictional plans.
- (b) *Planning process.* An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
 - (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
 - (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and
 - (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
- (c) *Plan content.* The plan shall include the following:
 - (1) Documentation of 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.
 - (2) 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 risk assessment shall include:
 - (i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.
 - (ii) 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. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

- A. The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;
 - B. 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;
 - C. Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.
- (iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.
- (3) 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 shall include:
- (i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
 - (ii) 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. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.
 - (iii) An action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.
 - (iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

(4) *A plan maintenance process that includes:*

- (i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
- (ii) 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.
- (iii) Discussion on how the community will continue public participation in the plan maintenance process.

(5) *Documentation* that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

(d) *Plan review.*

- (1) Plans must be submitted to the State Hazard Mitigation Officer (SHMO) for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval. Where the State point of contact for the FMA program is different from the SHMO, the SHMO will be responsible for coordinating the local plan reviews between the FMA point of contact and FEMA.
- (2) The Regional review will be completed within 45 days after receipt from the State, whenever possible.
- (3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.
- (4) Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c) will be delegated approval authority for local mitigation plans, and the review will be based on the criteria in this part. Managing States will review the plans within 45 days of receipt of the plans, whenever possible, and provide a copy of the approved plans to the Regional Office. [67 FR 8848, Feb. 26, 2002, as amended at 67 FR 61515, Oct. 1, 2002; 68 FR 61370, Oct. 28, 2003; 69 FR 55096, Sept. 13, 2004; 72 FR 61748, Oct. 31, 2007; 74 FR 47482, Sept. 16, 2009]

Appendix B

Community Mitigation Capabilities

App. B - Community Mitigation Capabilities

- 1.0 Scope and Methodology
- 2.0 Summary of Results
- 3.0 Planning and Regulatory Tools
- 4.0 GIS Resources
- 5.0 Staffing and Administrative Resources
- 6.0 Fiscal Resources
- 7.0 Public Education and Awareness Programs
- 8.0 ISO Ratings

1.0 Scope and Methodology

This report is an in-depth assessment of community mechanisms that can affect hazard mitigation activities in a jurisdiction. The purpose of this examination is to determine the capabilities of Marshall County and its participating jurisdictions to implement mitigation strategies. Moreover, this assessment identifies any existing gaps or weaknesses that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. The results of this assessment help determine the types of mitigation activities a local government can realistically undertake over its five-year action program framework. This report also helps evaluate whether a proposed mitigation action is deemed practical when considering the local participating jurisdiction's ability to implement the action. It is important to review these mechanisms and assess whether they might either facilitate or hinder alternative hazard mitigation actions under consideration for each community mitigation action program included in Chapter 6 Mitigation Strategy.

This capabilities assessment examines six components, as follows: (1) planning and regulatory tools, (2) GIS resources, (3) staffing and administrative resources, (4) fiscal resources, (5) public education and awareness programs, and (6) ISO ratings. Local governments can use these components to enhance their capacity to carry out hazard mitigation actions and projects.

The information found in this report was derived from surveys and interviews of local government representatives regarding each of the community's current capabilities. A comprehensive questionnaire was distributed by the planning team to all participating jurisdictions. The questionnaire requested information on a variety of community initiatives, such as existing local plans, policies, programs, and ordinances that contribute to or hinder the local capabilities to implement hazard mitigation actions. Other surveyed information relates to participating jurisdictions' fiscal, administrative and technical capabilities, including access to budgetary and personnel resources for mitigation purposes.

The tables that follow show the participating jurisdictions' responses to the community capabilities questionnaire and interviewing processes. Explanations of findings accompany the tables.

2.0 Summary of Results

Planning and Regulatory Capabilities

- ✓ All jurisdictions adopted the 2009 Marshall County hazard mitigation plan and have actively implemented action items from that plan over the last five years.
- ✓ Albertville, Arab, Douglas, Grant, and Guntersville have comprehensive plans that were adopted over ten years ago. Marshall County, Boaz, and Union Grove have no comprehensive plans.
- ✓ Five of the municipal governments have zoning ordinances: Albertville, Arab, Boaz, Grant and Guntersville.
- ✓ Marshall County, Douglas, Grant, and Union Grove do not enforce building codes within their jurisdictions.
- ✓ Douglas does not currently participate in the National Flood Insurance Policy (NFIP) program but has recently mapped flood plains.
- ✓ Union Grove has not been mapped by the NFIP and therefore does not have to participate.
- ✓ None of the NFIP communities participate in the Community Rating System (CRS) program.
- ✓ Arab, Boaz, and Guntersville are "Tree City USA" communities.

GIS Technical Capabilities

- ✓ All the jurisdictions in Marshall County have access to Geographic Information System (GIS) services, provided by the Marshall County Information Technology Department and the Top of Alabama Regional Council of Governments.
- ✓ Marshall County maintains its own GIS system
- ✓ Marshall County develops and maintains critical geographic data that supports hazard mitigation planning and analysis for all jurisdictions.

Staffing and Administrative Capabilities

- ✓ Albertville, Arab, Boaz and Guntersville have building code inspectors on staff.

- ✓ No community that participates in the NFIP has a full time flood plain administrator, but personnel have been designated to administer the flood plain management ordinance.
- ✓ No local flood plain administrator is a Certified Floodplain Manager (CFM) designated by the Association of State Floodplain Managers (ASFM).
- ✓ None of the jurisdictions have a professional urban planner on staff.
- ✓ Marshall County has a professional engineer (P.E.) serving as County Engineer and a Floodplain Manager serving in unincorporated areas only. Guntersville also has a P. E. on staff but serving in the capacity of the building inspector.

Fiscal Capabilities

- ✓ Marshall County, Arab, Boaz, Douglas, and Grant have been awarded FEMA mitigation grants while Guntersville received a mitigation grant under the State's Community Development Block Grant (CDBG) Program.
- ✓ All the jurisdictions, with the exception of Albertville, have staff with grant writing experience or have retained a grant writer.

Public Education and Awareness Capabilities

- ✓ Most public outreach activities are conducted jointly through the Marshall County Emergency Management Agency and the Marshall County communities.

ISO Capabilities

- ✓ The Insurance Services Office (ISO) would not disclose BCGES (Building Code Effectiveness Grading Schedule) and PPC (Public Protection Classification) ratings directly to the planning team which had to rely entirely on local knowledge for this survey.
- ✓ Among the communities in Marshall County that participate in the National Flood Insurance Program (NFIP), none of the jurisdictions participate in the CRS Program.
- ✓ The City of Albertville boasts a Property Protection Classification (PPC) of 2, and the City of Arab has a very high rating of 4.
- ✓ The Cities of Boaz and Guntersville have the highest Building Code Grade Effective Schedule (BCGES) rating of 5, according to available survey results.

3.0 Planning and Regulatory Tools

This section is an inventory of planning and regulatory tools in place by Marshall County jurisdictions to facilitate hazard mitigation through prevention measures.

Comprehensive planning can establish a vehicle for instituting and acknowledging local support for hazard mitigation goals. Comprehensive land use plans provide a growth management mechanism to prevent or discourage development in hazardous areas or restrict development in a manner that minimizes damage from hazards. Community facilities planning can ensure the protection of public infrastructure investments from future damages caused by natural and human-made hazards. Planning initiatives to promote community sustainability and smart growth should be fully integrated with related mitigation-related goals and objectives in local plans.

Regulatory tools used for planning and development can also be used to address hazard mitigation. Local governments can administer zoning ordinances, capital improvements plans, building and technical codes, floodplain management ordinances, erosion and sedimentation control ordinances, storm water management and detention standards, conservation subdivision provisions, hillside protection requirements, and a range of other regulatory tools to manage growth and land development. The planning and regulatory tools currently used by each jurisdiction are listed in Table B-1.

Table B-1. Planning and Regulatory Tools

Planning and Regulatory Tools	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
Adopted 2009 Hazard Mitigation Plan	Y	Y	Y	Y	Y	Y	Y	Y
Comprehensive Plan	N	Y	Y	Y	Y	Y	Y	N
Comprehensive Plan adopted \leq 5 yrs.	N	N	N	N	N	N	N	N
Zoning Ordinance	N	Y	Y	Y	Y	N	Y	N
Subdivision Regulations	Y	Y	Y	Y	Y	Y	Y	Y
Building Codes	N	Y	Y	Y	Y	N	N	N
Floodplain Management Ordinance	Y	Y	Y	Y	Y	N	Y	Y
Stormwater Management Regulations	N	Y	Y	N	Y	N	N	N
Urban Forestry/Tree Protection Program	Y	Y	Y	Y	Y	Y	Y	Y
Hillside Protection Regulations	N	N	N	N	Y	N	N	N
Open Burn Regulations	Y	Y	Y	Y	Y	Y	Y	Y

4.0 GIS Resources

Communities' access to geographic information systems (GIS) and database management resources were the focus of this survey component. GIS resources were evaluated to assess the communities' existing GIS tools, access to GIS services and data, and capabilities to effectively gather, maintain, and manage relevant GIS data critical to hazard mitigation planning.

Marshall County's municipalities have limited GIS staffing capabilities and limited computer hardware and software resources for GIS. In these jurisdictions, Marshall County is providing GIS technical assistance and maintains critical geographic data that supports hazard mitigation planning and analysis.

Table B-2 summarizes the GIS resources available to Marshall County jurisdictions.

Table B-2. GIS Resources

GIS Resources	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
Access to a GIS Program	Y	Y	Y	Y	Y	Y	Y	Y
Maintains its own GIS	Y	N	N	N	N	N	N	N
GIS Inventory of Natural Hazard Areas ¹	Y	Y	Y	Y	Y	Y	Y	Y
GIS Inventory of Critical Facilities ¹	Y	Y	Y	Y	Y	Y	Y	Y

¹Maintained by Marshall County Information Technology Department

5.0 Staffing and Administrative Resources

The following section includes an inventory of existing staffing and administrative resources that can be used for mitigation planning and implementation of some mitigation actions. Specific resources reviewed include those involving technical personnel that apply planning and engineering, floodplain management, building codes, and related consulting services needed to facilitate hazard mitigation in Marshall County. The ability of a local government to develop and implement mitigation projects, policies and programs is directly tied to staff resources that can be directed for that purpose. Administrative capabilities were evaluated by assessing whether there are adequate personnel resources to complete these mitigation activities.

The staffing and administrative capabilities of Marshall County and its participating jurisdictions are shown on Table B-3.

Table B-3. Staffing and Administrative Resources

Staffing and Administrative Resources	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
Building Code Staff	N	Y	Y	Y	Y	N	N	N
Staff assigned to administer floodplain ordinance	Y	Y	Y	Y	Y	N	Y	N
Certified Floodplain Manager	N	N	N	N	N	N	N	N
Professional Engineer on Staff	Y	N	N	N	Y ⁺	N	N	N
Utilizes Engineering Consulting Services	Y	N	Y	Y	Y	N	Y	N
Professional Planning Staff	N	N	N	N	N	N	N	N
Participates in Regional Planning Program	N	Y	N	N	Y	Y	Y	Y
Utilizes Planning Consulting Service	N	N	N	N	Y	N	Y	N

⁺Building Inspector is a P.E.

6.0 Fiscal Resources

The ability of local governments to undertake costly hazard mitigation projects and actions is a major constraint to effective hazard mitigation. This survey gathered information on Marshall County's fiscal capabilities through the identification of locally available financial resources and the local government's ability to compete for available mitigation grant resources. Table B-4 summarizes these fiscal resources.

Table B-4. Fiscal Resources

Fiscal Resources	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
Submitted applications for FEMA mitigation grants	Y	N	Y	Y	Y	Y	Y	Y
Awarded FEMA mitigation grants	Y	N	Y	Y	Y	Y	Y	Y
Initiated mitigation projects funded by other sources	N	N	N	N	Y	N	N	N
Has staff capable of writing grants	Y	N	Y	Y	Y	Y	Y	Y

7.0 Public Education and Awareness Programs

Local governments are strongly encouraged to initiate and maintain on-going public education and awareness programs. Such programs are among the most cost efficient mechanisms for hazard mitigation. These actions inform and educate citizens, elected officials, and property owners about potential risks of hazards and the available ways to mitigate potential property damages. Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs. The table below summarizes the public education and outreach efforts of Marshall County jurisdictions. Most awareness activities are conducted jointly with the Marshall County EMA.

Table B-5. Public Education and Awareness Programs

Public Education and Awareness Programs	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
On-going Awareness Program	Y	Y	Y	Y	Y	Y	Y	Y
Special Program or Event for Education Awareness	Y	Y	Y	Y	Y	Y	Y	Y

8.0 ISO Ratings

Each local government was surveyed to determine ratings in the following Insurance Services Office (ISO) programs: Community Rating System (CRS) Program, Property Protection Classification (PPC), and Building Code Effectiveness Grading Schedule (BCEGS). These rating systems provide valuable indicators of how the communities are reducing their hazard vulnerabilities through effective flood plain management, building code enforcement, and fire protection.

The CRS is an incentive-based program that encourages NFIP communities to undertake enhanced program measures to reduce the impacts of flooding. The CRS achieves these goals by encouraging communities to implement comprehensive flood plain mitigation programs that exceed the minimal requirements of the National Flood Insurance Program (NFIP). Class Communities can be rewarded by reduced flood insurance premiums – a 5% reduction for each rating increase. The highest rating of 1 can reduce premiums by 45% and the CRS entry rating of 9 results in a 5% reduction. NFIP communities that do not participate are rated class 10 and receive no premium reduction benefit. Among the communities in Marshall County that participate in the National Flood Insurance Program (NFIP), none of the jurisdictions participate in the CRS Program.

For the Property Protection Classification (PPC), the ISO collects information on municipal fire-protection efforts in communities throughout the United States. In each community, ISO analyzes the relevant data using its Fire Suppression Rating Schedule (FSRS). A PPC rating from 1 to 10 is assigned to each community. Class 1 generally represents superior property fire protection, and Class 10 indicates that the area's fire-suppression program doesn't meet ISO's minimum criteria.

The Building Code Effectiveness Grading Schedule (BCEGS) assesses the building codes in effect in a particular community and how the community enforces them. A community's classification is based on administration of codes, review of building plans, and field inspections. The BCEGS program assigns each municipality a BCEGS grade of 1 (exemplary commitment to building-code enforcement) to 10 (no credit).

The ISO would not disclose BCEGS and PPC ratings directly to the planning team which had to rely on local knowledge for this survey. The incomplete results of the ISO ratings survey are found on Table B-6.

Table B-6. Insurance Service Office (ISO) Ratings

Insurance Service Office (ISO) Ratings	Marshall County	Albertville	Arab	Boaz	Guntersville	Douglas	Grant	Union Grove
CRS Classification	10	10	10	10	10	NP	NP	NP
Property Protection Classification (PPC)	NR	2	4	5	5	5/9	6/9	NR
Building Code Effectiveness Grading Schedule (BCEGS)	NR	NR	6	5	5	NR	NA	NR

NP=Not Participating in the NFIP

NR=No Response

Appendix C
2009 Plan Implementation Status

App. C -2009 Plan Implementation Status

- 1.0 Scope and Methodology
- 2.0 Summary of Results

1.0 Scope and Methodology

As part of the 2014 plan update, each jurisdiction revisited its original five-year mitigation action program from the 2009 Marshall County Multi-Hazard Mitigation Plan. FEMA guidance requires this review of previous mitigation actions. Each action or project must be identified as completed, deleted or deferred actions. If a mitigation action remained unchanged, the jurisdiction must explain why no changes occurred. The community must also describe any challenges that hindered implementation of mitigation measures and how these might be dealt with in future updates. Technical, political, financial, legal, administrative, and agency coordination issues need to be evaluated for any potential hindrances to effective implementation of mitigation measures.

This appendix includes the Community Mitigation Action Programs adopted by Marshall County and its participating jurisdictions in the 2009 plan. Actions identified in the 2009 plan were evaluated to obtain the current implementation status. Each jurisdiction or agency responsible for implementing a mitigation measure in 2009 was asked to provide a status update by classifying each action as completed, ongoing but completed, deferred, or deleted. Further, agencies were asked to provide comments on any milestones achieved or impediments to implementation of the mitigation measures.

To accomplish this status assessment, a questionnaire based on the mitigation action program from the 2009 plan was distributed to each jurisdiction. This questionnaire was sent to all members of the Hazard Mitigation Planning Committee and the lead agencies or persons responsible for implementing each action. The survey provided each jurisdiction with a mechanism to provide feedback on the implementation status of the mitigation measures along with any relevant comments.

Results from this survey are highlighted on the table found in this appendix. The table shows an identifying number for each jurisdiction (e.g., Marshall County is 1, City of Albertville is 2, City of Arab is 3, etc.) for cross reference to the reasons for not completing the measure. If a mitigation measure was deferred or recommended for deletion, the jurisdiction was required to give the reason. The reasons for deferring or deleting a measure were categorized as lack of funding, administrative, political, technical, or legal. These categories are defined below:

Lack of funding	Lack of funding or budget constraints impeded the implementation of the mitigation measure
Administrative	Inadequate staff resources to implement and maintain the mitigation measure
Political	Lacks local political support of the mitigation measure
Technical	Mitigation measure was not technically feasible
Legal	Lacks the legal authority to implement the mitigation measure

2.0 Summary of Results

- ✓ The 2009 Marshall County Multi-Hazard Mitigation Plan contained approximately 82 mitigation measures. Only 24 of these mitigation measures were applicable to all the participating jurisdictions while 82 measures were adopted by at least one of the eight jurisdictions.
- ✓ The majority of the mitigation measures were completed or completed, but on-going.
- ✓ Some mitigation measures were deferred. The most prevailing reason given for deferring a mitigation measure was lack of funding.
- ✓ Fourteen of these measures were recommended for deletion by one or more of the jurisdictions. The predominant reason given for deleting these measures was the lead agency determined that the adopted mitigation measure was not applicable to their community or was under the jurisdiction of another agency.

The Key for Table C-1 is as follows:

- C** = Completed this 2009 mitigation measure.
- O** = Completed this ongoing measure and will continue in the 2014 Plan.
- D** = This 2009 mitigation measure was not completed but defer to the 2014 Plan.
- X** = Delete: this 2009 mitigation measure was not completed or will no longer be ongoing for the 2014 Plan.

Numbers next to “Reason for not Completing Mitigation Measure” refers to jurisdiction (e.g., number ⁴ refers to Boaz).

Table C-1. 2009 Plan Implementation Status

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.1.1	Update the community's comprehensive plan for future growth and development that integrates the findings and recommendations of this multi-hazard mitigation plan and support Smart Growth principles. Consider the addition of a natural hazards element, which includes the risk assessment findings of this plan and carries over its goals, objectives, and mitigation measures into the comprehensive plan.	X	O	O	O			D		⁷ Administrative ¹ County does not have a comprehensive plan
1.1.2	Prepare a five-year capital improvements plan (CIP) to include capital projects to implement the natural hazards element of the community's comprehensive plan or projects identified in the Community Mitigation Action Program of this multi-hazard mitigation plan.		D	O	O			D		² Lack of funding ^{2, 7} Administrative
1.1.3	Create local plans that address the vulnerability of designated hazard areas and encourage open space uses as amenities for recreation and conservation of fragile resources.	O	D	O	O			O		² Lack of funding ² Technical
1.2.1	Consider large lot size zoning restrictions on flood-prone areas designated on Flood Insurance Rate Maps.	O			O					

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.2.2	Evaluate additional land use restrictions within designated flood zones, such as prohibitions against storage of buoyant or hazardous materials and restrictive development controls within flood ways, among others.	O		O	O			O		
1.2.3	Update zoning regulations to include maximum impervious surface standards for non-residential developments.	X			O					
1.2.4	Update zoning regulations to require various open space and landscaping standards for land development proposals.	X			O			O		
1.2.5	Require delineation of flood plain fringe, floodways, and wetlands on all plans submitted with a permit for development within a flood plain.	X	O	O	O			O		
1.3.1	Continue to enforce subdivision construction standards for drainage improvements.	O	O	O	O	D	NA	O	D	⁶ County Engineer
1.4.1	Promote good construction practices and proper code enforcement to eliminate most structural problems during natural hazard events.			O	O	D		O	D	

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.4.2	Evaluate building code standards for roof construction to assure protection against wind damage from hurricanes, tornadoes, and windstorms; encourage installation of “hurricane clips.”		O	O	O			O		
1.4.3	Encourage the relocation of existing utility lines underground, and consider local regulations to require the placement of all new utility lines underground.		O	X	O			O		³ Political
1.4.4	Review fire safety ordinances for open burning and the use of liquid fuel and electric space heaters.		O	D	O	D	O	O	D	³ Administrative
1.4.5	Establish and enforce minimum property maintenance standards to eliminate unsafe structures.			O	O		X	O		⁶ Lack of funding
1.5.1	Train local flood plain managers through programs offered through the State Flood Plain Coordinator and FEMA’s training center in Emmitsburg, Maryland.	O		O	O			X		
1.5.2	Obtain membership for local flood plain managers in the Association of State Flood Plain Managers.	O	X	D	O			X		^{2,3} Lack of funding
1.5.3	Promote the adoption of a uniform flood hazard prevention ordinance with higher regulatory standards that discourage flood plain development and seek to maintain the natural and beneficial functions of flood plains.	O								

APPENDICES

2014 Marshall County Multi-Hazard Mitigation Plan

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.5.4	Maintain active participation in the National Flood Insurance Program (NFIP).	O	O	O	O	D	O	O	D	
1.5.5	Participate in the “Turn Around Don’t Drown” program by purchasing and installing signs in known flash flood bridge overpass locations.	O	X	O	O	D	NA	O	D	² Lack of funding
1.6.1	Enact and enforce a storm water management ordinance that maintains pre-development runoff rates for major developments.	D		O	O			O		¹ Marshall Co. Comm. will need to address
1.7.1	Support legislation to establish a State dam safety inspection program.	O	X	O	O	D	NA	O	D	² Legal
1.8.1	Examine regulatory options and feasibility of requiring open space areas for recreation, landscaping, and drainage control.			O	O			O		
1.9.1	Enforce open burning laws.	O	O	O	O	D	O	O	D	
1.10.1	Promote the enactment of local ordinances to require community storm shelters within sizeable mobile home parks, subdivisions, and RV parks.				O					
1.11.1	Adopt and enforce an ordinance prohibiting filling in or obstructing drainage flows within ditches.	D	O	O	O	D	O	O	D	¹ Marshall Co. Comm. will need to address

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.12.1	Perform vulnerability assessments of all public schools and colleges to identify retrofit projects to improve the safety of occupants and mitigate damages from hazards.	O	O	X	O		X	O		¹ Will work with BOE ³ Political ⁶ Legal
1.12.2	Conduct wildfire vulnerability assessments, and prepare a comprehensive inventory to identify high and moderate wildfire risk areas. Assess the vulnerability of critical facilities and number of residential properties in these risk areas.	O								¹ Combined effort between Alabama Forestry, Volunteer and Full Time Fire Departments
1.12.3	Examine vulnerable bridges for potential retrofits/replacements to mitigate flood damages.	O								
1.12.4	Perform structural engineering assessments of all public school buildings to identify vulnerabilities and feasible retrofit measures.	O	O	X	O		X	O		³ Political ⁶ Legal
1.13.1	Maintain risk assessment data in GIS, including flood zones, tornado tracks, sinkhole threat areas, dam inundation areas, disaster events, and a comprehensive inventory of critical facilities within all jurisdictions.	O								
1.13.2	Integrate FEMA HAZUS-MH applications for hazard loss estimations within local GIS programs. Maintain up-to-date data within GIS to apply the full loss estimation capabilities of HAZUS.	D								¹ Need trained personnel on GIS to accomplish

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.13.3	Document the extents of each flooding event using GIS.	O								
1.13.4	Work with TVA, the NWS, and the County GIS to maintain inundation mapping downstream of Guntersville and Nickajack Dams.	O								¹ TVA has developed comprehensive maps
1.14.1	Prepare and adopt an Outdoor Warning Sirens Plan for Marshall County, including consideration of the unique geographical location, technical requirements, system types and operational procedures of each local jurisdiction. The plans should include a review of existing outdoor warning siren coverage and recommend new locations if and where there are coverage gaps. Install new warning sirens in accordance with the plan recommendations.	O								¹ Need to add 1.14.1.1 Evaluate conversion and upgrade of older sirens and include conversion to solar power. Conduct upgrades to older sirens and addition of solar power to existing sirens and include solar capability on new sirens.
1.14.2	Evaluate existing flood warning systems and needs for system upgrades and expanded coverage.	O								¹ Include and purchase/install when feasible.

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.14.3	Install and maintain a comprehensive network of lake, river, and stream gages for the purpose of monitoring water surface and precipitation levels for monitoring flooding events. Provide publicly accessible Web access to the network.	O								¹ Work with NWS-HUN and TVA.
1.14.4	Install automatic icing indicators on critical bridges and overpasses.	O								¹ Work with ALDOT.
1.14.5	Determine the feasibility of telephone-based flood warning systems for select geographic areas.	O								
1.14.6	Create a back-up site with communications equipment for 911 services, and develop the capability to re-route communications from one 911 communication tower to another in the event of tower failure.	C								
1.15.1	Carry out detailed planning and engineering studies for sub-basins in critical flood hazard areas to determine watershed-wide solutions to flooding. Develop comprehensive watershed-scale storm management plans. Areas that have unique flooding and storm related issues must be considered. Multi-jurisdictional hot spots or high priority projects should be identified where watershed level solution projects could be applied.	X								

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
1.15.2	Develop a program to identify those existing mobile homes and older buildings throughout the City of Guntersville that have the most potential need for anchoring against straight-line and tornado force winds.	O	X	O	O	D	D	D	D	² Legal ⁷ Administrative
1.15.3	Identify existing culturally or socially significant structures and critical facilities within the City of Guntersville that have the most potential for losses from natural hazard events and identify needed structural upgrades.	O	D	D	O	D	X	D	D	^{2,3} Lack of funding ^{2, 3, 6, 7} Administrative
1.15.4	Evaluate road elevation and culvert sizing standards for construction upgrade on all county and city roads. Investigate current roadways located in flash flood-prone areas to ensure compliance with current standards for design year floods.	O	O	O	O		X	O		⁶ County Engineer
1.15.5	Inventory and map existing fire hydrants throughout the county, and identify areas in need of new fire hydrants.	O	O	O	O		O	O		

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
2.1.1	Implement a voluntary program of flood protection and property acquisition and relocation for high-risk residences and repetitive loss properties. Survey property owners to determine interest and assess cost. Assist local units of government to identify funding sources to acquire and remove or otherwise protect existing homes in the flood plain.	C	O	D	O			O		³ Administrative
2.2.1	Examine building elevation alternatives to acquisition of flood prone properties.	C	X	O	O			O		² Lack of funding ² Administrative ³ Technical
2.3.1	Elevate certain buildings in flood prone areas where acquisition or relocation is not feasible, with emphasis on Pre-FIRM buildings; where feasible, elevation is preferable to flood proofing.	O	X	D	O	D	X	O	D	² Lack of funding ^{2, 3, 6} Administrative ³ Legal
2.4.1	Encourage the retrofitting of existing buildings for protection against natural hazards.	O	X	D	O	D	X	O	D	² Lack of funding ^{2, 3, 6} Administrative ³ Legal
2.5.1	Install lightning and/or surge protection on existing critical facilities.	O	O	O	O	D	O	O	D	
2.5.2	Perform retrofits to critical facilities for maximum protection from hazards.	O	O	O	O	D	O	O	D	

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
2.5.3	Conduct ongoing tree trimming programs along power lines.	C	O	O	O		NA	O		¹ Conducted by Local Electrical Cooperatives ⁶ Electric Co-op
2.6.1	Establish back-up emergency power to all critical facilities, with highest priority to emergency services for police and fire.	O	O	O	O	D	O	D	D	⁷ Lack of funding
3.1.1	Distribute the full 2009 plan document to local officials, stakeholders, and interested individuals through internet download.	C		O						
3.2.1	Make digital flood map information freely available to the public through the internet and other media resources.	C	D	D	O	D	X	C	D	^{2,3} Lack of funding ² Technical ⁶ County Engineer
3.3.1	Distribute materials and conduct other outreach activities and workshops to encourage families and individuals to implement hazard mitigation measures in their homes.	O		D	O			O		³ Lack of funding ³ Administrative
3.3.2	Distribute materials to inform developers of available methods for creating natural fire breaks and defensible spaces around property.	O	X	D	O			D		^{2,3} Lack of funding ² Political ⁷ Administrative

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
3.3.3	Distribute public information on the hazardous effects of winter storm events and how to mitigate damages from such events, including hazards of unheated houses, guidance on the use of portable and standby generators, fire hazards associated with space heaters, protecting plumbing during a winter storm, and coping with power failures.	O		O	O			O		
3.3.4	Distribute public information to encourage property owners to keep maintain trees to avoid threats to lives and property during storm events.	O		O	O			O		
3.3.5	Conduct outreach programs to inform the public of flood plain locations.	O	O	D	O	D	O	D	D	³ Technical ⁷ Administrative
3.3.6	Distribute outreach materials to inform the public of appropriate actions to take in the event of a hazardous material release.	O								
3.4.1	Promote the purchase of insurance coverage by property owners and renters for flooding, sinkhole, and earthquake damages in high-risk areas.	O	X	D	O	D	NA	D	D	² Legal ³ Technical ⁶ County Engineer ⁷ Administrative
3.5.1	Assist real estate agents with flood map determinations for MLS property listings.	O	O	D	O	D	NA	O	D	³ Technical ⁶ County Engineer

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
3.6.1	Maintain repositories of FEMA hazard information publications at local public and school libraries.	O	O	O	O			O		
3.7.1	Provide technical assistance to homeowners, builders, and developers on flood protection alternatives.	O	O	O	O			O		
3.8.1	Conduct public hazard mitigation education and awareness workshops.	O								
3.8.2	Increase public awareness of storm mitigation activities, including storm warnings and advisories.	O								
3.8.3	Encourage development and dissemination of maps relating to the fire hazard to help educate and assist builders and homeowners in being engaged in fire mitigation activities and to help guide emergency services during response.	O	O	O	O	D	O	O	D	
3.8.4	Provide public awareness information on the effects of extreme temperature events through an active educational outreach program with specific plans and procedures to protect senior citizens and disabled persons.	O					X			⁶ Administrative
3.9.1	Maintain ongoing media relations to keep the public informed on the threats of hazards and the means to mitigate the effects of property damages and loss of life.	O								

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
3.10.1	Distribute free weather radios to needy families through corporate sponsorships.	O				D			D	
3.10.2	Maintain weather radios in all critical facilities.	O	D	O	O	C	O	O	C	² Lack of funding
4.1.1	Keep builders and developers informed of Federal wetlands permitting requirements through the Corps of Engineers.	X	O	O	O			O		¹ This is a USACE function.
4.2.1	Consider the creation of a non-profit land trust organization to oversee public open space acquisitions and donations.	X								
4.3.1	Adopt and enforce regulations prohibiting dumping and littering within river and stream corridors.	O	O		O	D	X	O	D	¹ PALS ⁶ Technical
4.4.1	Promote the implementation of Best Management Practices for forest land among forest managers.	O								
4.4.2	Use controlled burns to decrease the amount of fuel load in the identified moderate and high wildfire hazard areas.	O								
4.4.3	Encourage local tree commissions to develop urban tree maintenance and planting plans within public spaces and ROWs.			O						

#	Mitigation Measure	Marshall County ¹	Albertville ²	Arab ³	Boaz ⁴	Douglas ⁵	Grant ⁶	Guntersville ⁷	Union Grove ⁸	Reason Why Measure was not completed
4.5.1	Enforce water use restrictions during periods of drought to conserve existing water supplies.	O	O	D	O		D	O		³ Administrative ³ Legal
5.1.1	Evaluate road elevation and culvert sizing standards for construction upgrade on all county and city roads; investigate current roadways located in flash flood-prone areas to ensure compliance with current standards for design year floods; and identify structural improvements.	O	O	O	O			O		
5.2.1	Prepare and implement standard operating procedures for drainage system maintenance. Ensure storm drains and ditches are not blocked and are able to receive water in flood prone areas.	O	O	O	O	D	NA	O	D	⁶ County Engineer
5.3.1	Construct safe rooms in all existing and new public schools.	O	D	O	O	D	NA	O	D	² Lack of funding ⁶ County School Board
5.3.2	Construct freestanding community storm shelters within accessible population centers.	O	D	D	O					^{2,3} Lack of funding

Appendix D

Hazard Ratings and Descriptions

App. D - Hazard Ratings and Descriptions

- 1.0 Scope and Methodology
- 2.0 Hazard Descriptions

1.0 Scope and Methodology

1.1 The HMPC Hazard Identification Exercises

The tables in this Appendix show the results of the Hazard Mitigation Planning Committee (HMPC) responses to hazard identification exercises presented at its March 18, 2014 committee meeting. These exercises serve as a resource to help identify the hazards affecting each jurisdiction and determine the probability and extents (severity or magnitude) and how these measures of community impacts vary among Marshall County jurisdictions. These responses are those perceived by the HMPC membership, based on local knowledge and experience of the members and are not necessarily supported by other resources evaluated in Section 5 – Risk Assessment. The averages of the ratings compare how the location and impacts of hazards could vary among the jurisdictions. The same exercise was administered during the drafting of the 2009 plan. Tables D-1 and D-2 show the results from this exercise, as it compares to the 2009 exercise results.

Key.

The following key to the tables describes the hazard ratings:

LOCATION - WHETHER THE JURISDICTION IS AFFECTED BY THE HAZARD
1 = YES
0 = NO
PROBABILITY - THE LIKELIHOOD THAT THE HAZARD WOULD OCCUR IN THIS JURISDICTION
5 - VERY HIGH
4 - HIGH
3 - MEDIUM
2 - LOW
1 - MINIMUM OR NONE
EXTENT - THE SEVERITY OR MAGNITUDE OF THE HAZARD SHOULD IT OCCUR IN THIS JURISDICTION
5 - VERY HIGH
4 - HIGH
3 - MEDIUM
2 - LOW
1 - MINIMUM OR NONE

1.2 Summary of Results

Location of natural hazards

- ✓ The HMPC has identified the following hazards that could occur in all jurisdictions of Marshall County: tornadoes, severe storms, floods, hurricanes, winter storms/freezes, droughts/heat waves, wildfires, dam/levee failures, landslides, earthquakes, sinkholes (land subsidence), and human-caused and technological hazards.

Probability of natural hazards

- ✓ According to the HMPC, the natural hazards most likely to occur are tornadoes (4.6), severe storms (4.5), and winter storms/freezes (3.6).
- ✓ The natural hazards that have some likelihood of occurring are droughts/heat waves (2.9) and floods (2.7).
- ✓ The natural hazards with the lowest probability of occurrence are wildfires (2.0), hurricanes (1.7), dam/levee failures (1.2), earthquakes (1.7), sinkholes (1.7), and landslides (1.0).

Extent of natural hazards

- ✓ The most potentially severe natural hazards are tornadoes and severe storms (4.6), followed by winter storms/freezes (3.9).
- ✓ Drought/heat waves (3.3) could be moderately high in severity.
- ✓ Floods (2.1), wildfires (2.1), dam/levee failures (2.2), are considered by the HMPC to have a potential severity of low to medium in extent.
- ✓ The least severe impacts could be caused by hurricanes (1.8), earthquakes (1.7), sinkholes (1.7), and landslides (1.2).

Location of human-caused and technological hazards

- ✓ Human-caused and technological hazards could occur in any location within all jurisdictions.

Probability of human-caused and technological hazards

- ✓ Human-caused and technological hazards with the greatest probability include cyber-terrorism (2.7), industrial (transportation) incidents (2.6), disease/pandemic (2.6), and industrial (fixed) (2.4).
- ✓ Armed attack (2.3), agriterrorism (2.2), and explosive blast (2.1) have some likelihood of occurring.
- ✓ The least likely human-caused and technological hazards are chemical attack (1.8), radiological attack (1.7), nuclear attack (1.5), biological attack (1.5), and controls failure (1.2).

Extent of human-caused and technological hazards

- ✓ Generally, all human-caused and technological hazards, should they occur, could be severe, especially acts of terrorism.

Table D-1. Marshall County HMPC Identification and Ratings of Natural Hazards

Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
Tornadoes	Marshall County	1	1	5	5	5	5
	Albertville	1	1	4	4	5	5
	Arab	1	1	5	5	5	5
	Boaz	1	1	3	5	4	5
	Douglas	1	1	5	5	5	5
	Grant	1	1	5	5	5	5
	Guntersville	1	1	3	3	2	2
	Union Grove	1	-	4	-	4	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>4.3</i>	<i>4.6</i>	<i>4.4</i>	<i>4.6</i>
Severe Storms	Marshall County	1	1	5	-	5	5
	Albertville	1	1	4	4	5	5
	Arab	1	1	5	5	5	5
	Boaz	1	1	3	5	3	5
	Douglas	1	1	5	5	5	5
	Grant	1	1	5	5	5	5
	Guntersville	1	1	3	3	2	2
	Union Grove	1	-	4	-	4	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>4.3</i>	<i>4.5</i>	<i>4.3</i>	<i>4.6</i>
Floods	Marshall County	1	1	3	3	4	3
	Albertville	0	0	-	1	-	1
	Arab	1	1	5	4	3	3
	Boaz	1	1	1	5	1	2
	Douglas	1	1	2	2	3	3
	Grant	1	1	3	3	3	2
	Guntersville	1	1	1	1	1	1
	Union Grove	1	-	1	-	1	-
	<i>AVERAGE</i>	<i>0.9</i>	<i>0.9</i>	<i>2.3</i>	<i>2.7</i>	<i>2.3</i>	<i>2.1</i>
Winter Storms/Freezes	Marshall County	1	1	3	3	4	4
	Albertville	1	1	1	3	2	3
	Arab	1	1	3	3	5	5
	Boaz	1	1	3	5	3	5
	Douglas	1	1	3	3	4	4
	Grant	1	1	1	5	3	3
	Guntersville	1	1	3	3	3	3

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Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
	Union Grove	1	-	2	-	3	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>2.4</i>	<i>3.6</i>	<i>3.4</i>	<i>3.9</i>
Hurricanes	Marshall County	1	1	3	2	3	2
	Albertville	-	0	2	1	2	1
	Arab	1	1	2	2	2	2
	Boaz	0	1	-	1	-	1
	Douglas	1	1	2	2	3	3
	Grant	-	-	-	-	-	-
	Guntersville	1	1	2	2	2	2
	Union Grove	1	-	1	-	1	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>0.8</i>	<i>2.0</i>	<i>1.7</i>	<i>2.2</i>	<i>1.8</i>
Droughts/Heat Waves	Marshall County	1	1	3	3	3	3
	Albertville	1	1	3	3	4	3
	Arab	1	1	4	4	4	4
	Boaz	1	1	3	1	3	1
	Douglas	1	1	3	3	3	3
	Grant	1	1	3	3	3	3
	Guntersville	1	1	3	3	3	3
	Union Grove	1	-	2	-	3	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>3.0</i>	<i>2.9</i>	<i>3.3</i>	<i>2.9</i>
Wildfires	Marshall County	1	1	2	2	3	3
	Albertville	1	1	1	1	2	1
	Arab	1	1	3	2	2	2
	Boaz	0	1	-	1	-	1
	Douglas	1	1	3	3	3	3
	Grant	1	1	3	3	3	3
	Guntersville	1	1	2	2	2	2
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.9</i>	<i>1.0</i>	<i>2.3</i>	<i>2.0</i>	<i>2.5</i>	<i>2.1</i>
Dam/Levee Failures	Marshall County	1	1	1	1	5	5
	Albertville	0	0	-	1	-	1
	Arab	-	1	2	2	2	4
	Boaz	0	1	-	0	-	0
	Douglas	1	1	2	2	3	2
	Grant	-	-	-	-	-	-
	Guntersville	1	1	1	1	1	1

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Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
	Union Grove	1	-	1	-	1	-
	<i>AVERAGE</i>	<i>0.7</i>	<i>0.8</i>	<i>1.4</i>	<i>1.2</i>	<i>2.4</i>	<i>2.2</i>
Landslides	Marshall County	1	1	2	2	3	-
	Albertville	0	0	-	1	-	1
	Arab	1	0	2	0	2	2
	Boaz	0	1	-	0	-	0
	Douglas	1	1	2	2	3	2
	Grant	-	-	-	-	-	-
	Guntersville	1	1	1	1	1	1
	Union Grove	1	-	1	-	1	-
	<i>AVERAGE</i>	<i>0.7</i>	<i>0.7</i>	<i>1.6</i>	<i>1.0</i>	<i>2.0</i>	<i>1.2</i>
Earthquakes	Marshall County	1	1	2	2	3	3
	Albertville	1	1	1	1	1	1
	Arab	1	1	1	1	1	1
	Boaz	0	1	1	1	1	1
	Douglas	1	1	3	2	3	2
	Grant	-	1	1	3	5	3
	Guntersville	1	1	2	2	1	1
	Union Grove	1	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.9</i>	<i>1.0</i>	<i>1.4</i>	<i>1.5</i>	<i>2.1</i>	<i>1.7</i>
Sinkholes	Marshall County	1	1	2	2	3	2
	Albertville	1	1	1	1	1	1
	Arab	1	1	2	2	3	2
	Boaz	0	1	-	1	-	1
	Douglas	1	1	2	2	2	2
	Grant	1	1	1	3	1	3
	Guntersville	0	1	1	1	1	1
	Union Grove	1	-	1	-	1	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>1.0</i>	<i>1.4</i>	<i>1.7</i>	<i>1.7</i>	<i>1.7</i>

*Any cells with a dash indicate data was not received

Table D-2. Marshall County HMPC Identification and Ratings of Human-Caused and Technological Hazards

Human-caused Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
Industrial (Fixed)	Marshall County	1	1	4	4	4	4
	Albertville	1	1	-	1	1	1
	Arab	1	1	3	3	5	4
	Boaz	1	1	3	1	3	1
	Douglas	1	1	3	2	3	2
	Grant	1	1	4	4	4	4
	Guntersville	1	1	2	2	2	2
	Union Grove	1	-	2	-	5	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>3.0</i>	<i>2.4</i>	<i>3.4</i>	<i>2.6</i>
Industrial (Transp.)	Marshall County	1	1	4	4	4	4
	Albertville	1	1	2	1	-	1
	Arab	1	1	3	3	5	4
	Boaz	1	1	4	0	4	0
	Douglas	1	1	3	3	4	4
	Grant	1	1	5	5	5	5
	Guntersville	1	1	2	2	2	2
	Union Grove	1	-	2	-	5	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>3.1</i>	<i>2.6</i>	<i>4.2</i>	<i>2.9</i>
Controls Failure	Marshall County	-	1	2	1	3	1
	Albertville	-	0	-	1	-	1
	Arab	-	1	-	1	-	1
	Boaz	1	1	1	0	1	0
	Douglas	0	0	1	1	1	1
	Grant	1	1	3	3	4	4
	Guntersville	-	-	-	-	-	-
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.7</i>	<i>0.7</i>	<i>1.8</i>	<i>1.2</i>	<i>2.3</i>	<i>1.3</i>
Nuclear Attack	Marshall County	1	1	1	1	5	5
	Albertville	1	1	2	1	-	1
	Arab	1	1	1	1	5	5
	Boaz	0	1	-	0	-	5
	Douglas	1	1	3	3	4	4
	Grant	1	1	3	3	5	5

APPENDICES

2014 Marshall County Multi-Hazard Mitigation Plan

Human-caused Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
	Guntersville	-	-	-	-	-	-
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>1.0</i>	<i>2.0</i>	<i>1.5</i>	<i>4.8</i>	<i>4.2</i>
Explosive Blast	Marshall County	1	1	2	1	4	4
	Albertville	-	1	2	1	-	1
	Arab	1	1	3	3	5	5
	Boaz	1	1	1	1	1	1
	Douglas	1	1	3	3	3	3
	Grant	1	1	4	4	5	5
	Guntersville	-	1	-	2	-	2
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>2.5</i>	<i>2.1</i>	<i>3.6</i>	<i>3.0</i>
Disease/Pandemic	Marshall County	1	1	3	3	5	4
	Albertville	-	1	-	1	-	1
	Arab	1	1	2	2	5	4
	Boaz	1	1	1	3	1	3
	Douglas	1	1	4	4	4	4
	Grant	1	1	3	4	5	5
	Guntersville	-	1	-	1	-	2
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>1.0</i>	<i>1.0</i>	<i>2.6</i>	<i>2.6</i>	<i>4.0</i>	<i>3.3</i>
Chemical Attack	Marshall County	1	1	1	1	5	5
	Albertville	-	1	2	1	-	1
	Arab	1	1	2	2	3	2
	Boaz	0	1	-	1	-	5
	Douglas	1	1	2	2	4	4
	Grant	1	1	4	4	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	1	-	1	-	5	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>1.0</i>	<i>2.0</i>	<i>1.8</i>	<i>4.4</i>	<i>3.7</i>
Biological Attack	Marshall County	1	1	1	1	5	5
	Albertville	-	1	2	1	-	1
	Arab	1	1	2	2	3	2
	Boaz	0	1	-	1	-	4
	Douglas	0	0	1	1	4	4

APPENDICES

2014 Marshall County Multi-Hazard Mitigation Plan

Human-caused Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
	Grant	1	1	3	3	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	1	-	2	-	4	-
	<i>AVERAGE</i>	<i>0.7</i>	<i>0.8</i>	<i>1.8</i>	<i>1.5</i>	<i>4.2</i>	<i>3.5</i>
Radiological Attack	Marshall County	1	1	1	1	5	5
	Albertville	-	0	-	1	-	1
	Arab	1	1	3	3	4	4
	Boaz	0	1	-	1	-	1
	Douglas	0	0	1	1	4	4
	Grant	1	1	3	3	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	1	-	1	-	5	-
	<i>AVERAGE</i>	<i>0.7</i>	<i>0.7</i>	<i>1.8</i>	<i>1.5</i>	<i>4.6</i>	<i>3.3</i>
Agriterrorism	Marshall County	1	1	3	1	4	4
	Albertville	-	1	2	1	-	1
	Arab	1	1	2	2	2	2
	Boaz	0	1	-	1	-	1
	Douglas	1	1	4	4	4	4
	Grant	1	1	4	4	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>1.0</i>	<i>3.0</i>	<i>2.2</i>	<i>3.8</i>	<i>2.8</i>
Armed Attack	Marshall County	1	1	1	1	5	5
	Albertville	-	1	2	1	-	1
	Arab	1	1	2	2	5	4
	Boaz	0	1	-	3	-	5
	Douglas	1	1	3	3	3	3
	Grant	1	1	3	4	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>1.0</i>	<i>2.2</i>	<i>2.3</i>	<i>4.5</i>	<i>3.8</i>
Cyber Terrorism	Marshall County	1	1	2	3	3	3
	Albertville	-	1	2	1	-	1
	Arab	1	1	3	3	5	5
	Boaz	1	1	1	4	1	4

Human-caused Hazard	Geographic Area	Location (2009)	Location (2014)	Probability (2009)	Probability (2014)	Extent (2009)	Extent (2014)
	Douglas	0	0	1	1	1	1
	Grant	1	1	3	4	5	5
	Guntersville	-	-	-	-	-	-
	Union Grove	-	-	-	-	-	-
	<i>AVERAGE</i>	<i>0.8</i>	<i>0.8</i>	<i>2.0</i>	<i>2.7</i>	<i>3.0</i>	<i>3.2</i>

*Any cells with a dash indicate data was not received

2.0 Hazard Descriptions

2.1 Tornadoes Description

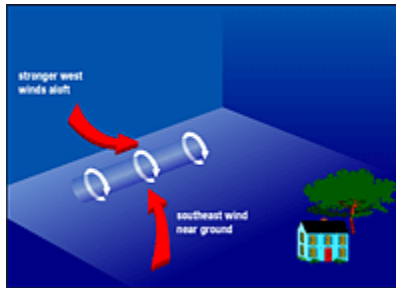
Tornadoes are one of nature's most violent storms, which are characterized by a rapidly rotating column of air extending from the base of a thunderstorm to the ground. In an average year, approximately 1,000 tornadoes are reported across the United States, resulting in over 1,500 injuries and 80 deaths, the greatest number of wind-related deaths. The most violent tornadoes, with wind speeds of 250 mph or more, are capable of tremendous destruction. Damage paths can be more than one mile wide and 50 miles long. Tornadoes can occur anywhere and come in all shapes and sizes.

In Alabama, peak tornado season is generally March through May with a secondary season in late fall; however, tornadoes can strike at any time of the year if the essential conditions are present. Tornadoes in the peak season are often associated with strong, frontal systems that form in central states and move east. Occasionally, large outbreaks of tornadoes occur with this type of weather pattern. Several states may be affected by numerous severe storms and tornadoes.

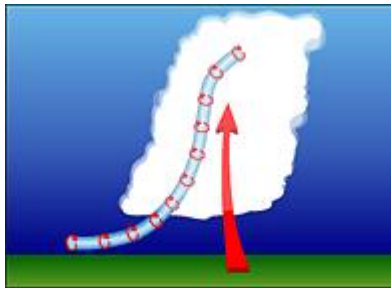
Tornadoes can occur in thunderstorms that develop in warm, moist air masses in advance of eastward-moving cold fronts. These thunderstorms often produce large hail and strong winds, in addition to tornadoes. Thunderstorms spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. Tornadoes occasionally accompany tropical storms and hurricanes that move over land. They are most common to the right and ahead of the path of the storm center as it comes onshore. The winds produced from wildfires have also been known to produce tornadoes.

The following graphic describes the formation of a tornado:

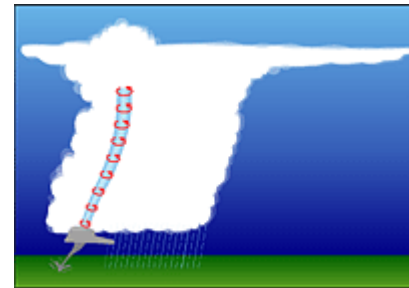
Figure D-1. How a Tornado Forms



▲ Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height create an invisible, horizontal spinning effect in the lower atmosphere.



▲ Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical.



▲ An area of rotation, 2-6 miles wide, now extends through much of the storm. Most strong and violent tornadoes form within this area of strong rotation.



Woodward OK (Ron Przybylinski)

▲ A lower cloud base in the center of the photograph identifies an area of rotation known as a rotating wall cloud. This area is often nearly rain-free. Note rain in the background.



Woodward OK (Ron Przybylinski)

▲ Moments later a strong tornado develops in this area. Softball-size hail and damaging "straight-line" winds also occurred with this storm.

Source: Tornadoes – A Preparedness Guide, National Weather Service, February 1995.

Meteorologists rely on weather radar to provide information on developing storms. The National Weather Service is strategically locating Doppler radars across the country which can detect air movement toward or away from the radar. Early detection of increasing rotation aloft within a thunderstorm can allow life-saving warnings to be issued before the tornado forms.

When conditions are favorable for severe weather to develop, a severe thunderstorm or tornado WATCH is issued. Weather Service personnel use information from weather radar, spotters, and other sources to issue severe thunderstorm and

tornado WARNINGS for areas where severe weather is imminent. Severe thunderstorm warnings are passed to local radio and television stations and are broadcast over local NOAA Weather Radio stations serving the warned areas. These warnings are also relayed to local emergency management and public safety officials who can activate local warning systems to alert communities.

In 1971, Dr. T. Theodore Fujita of the University of Chicago developed the original F-scale for wind damages, including tornadoes. The original F-scale, however, was recently replaced by an enhanced version effective February 1, 2007. The Enhanced F-scale is a more precise method of tornado damage assessment that classifies damage according to calibrations developed by engineers and meteorologists across 28 different types of damage indicators. The underlying premise is that a tornado scale needs to take into account the varying strengths and weaknesses of different types of construction. As with the original F-scale, the enhanced version rates the tornado as a whole based on most intense damage within the path. Historical tornadoes before February 1, 2007, will not be re-evaluated using the Enhanced F-scale.

Table D-3. Enhanced F Scale for Tornado Damage

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	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: NOAA Storm Prediction Center's On-Line [Frequently Asked Questions about Tornadoes](http://www.spc.noaa.gov/faq/tornado/#f-scale3)
(<http://www.spc.noaa.gov/faq/tornado/#f-scale3>)

Table D-4. Fujita Tornado Damage Scale

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds.); trees debarked; incredible phenomena will occur.

Source: NOAA Storm Prediction Center's On-Line Frequently Asked Questions about Tornadoes
<http://www.spc.noaa.gov/faq/tornado/#f-scale3>

(The description of tornadoes presented in this section is based upon information extracted from the FEMA How to Guides Understanding Your Risks (FEMA 386-2), FEMA, August 2001, and Using HAZUS-MH for Risk Assessment (FEMA 433), FEMA, August 2004, Tornadoes – A Preparedness Guide, National Weather Service, February 1995, and the NOAA Storm Prediction Center's On-Line Frequently Asked Questions about Tornadoes (<http://www.spc.noaa.gov/faq/tornado/#f-scale3>).

2.2 Severe Storms Description

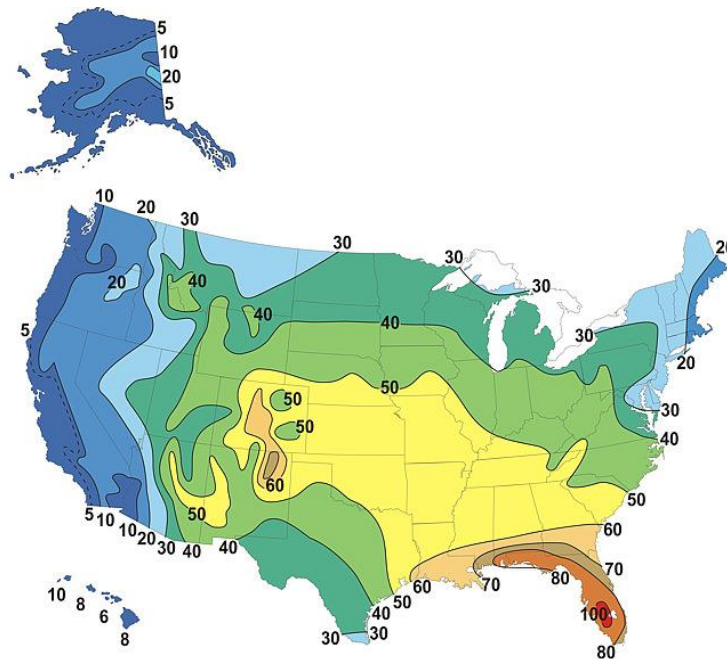
Severe storms, as referred to in this plan, include severe thunderstorms with damaging lightning, hail, and straight-line winds. Severe storms are also associated with tornadoes, hurricanes, and floods, which are described separately in this plan.

Severe storms affect relatively small areas when compared with hurricanes and winter storms. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, thunderstorms can be dangerous. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10 percent are classified as severe. The National Weather Service considers a thunderstorm severe if it produces hail at least 3/4-inch in diameter, winds of 58 mph or stronger, or a tornado.

Thunderstorms are formed by a combination of moisture to form clouds and rain, unstable air, that is, warm air that can rise rapidly, and lift from cold or warm fronts, sea breezes, mountains, or the sun's heat which are capable of lifting air.

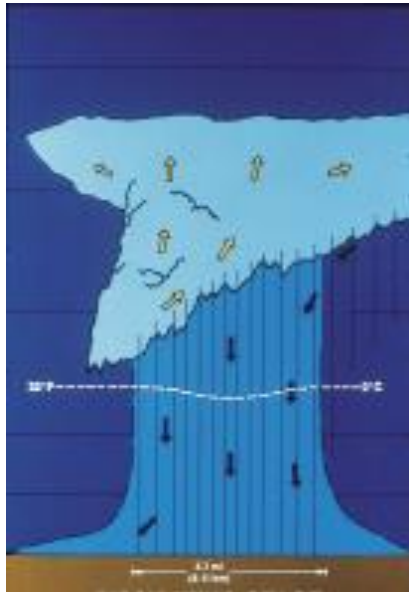
The National Weather Service estimates over 40,000 thunderstorms occur each day world-wide or close to 16 million annually. In the U.S., roughly 100,000 thunderstorms occur each year. The following map shows the average number of thunderstorm days each year throughout the U.S. The most frequent occurrence is in the southeastern states, with Florida having the highest incidence at 80 to 100+ thunderstorm days per year. Alabama's incidence is high at 50 to 80 thunderstorm days per year. Warm, moist air from the Gulf of Mexico and Atlantic Ocean is most readily available to fuel thunderstorm development in this region of the country.

Map D-1. U.S. Average Thunderstorm Days per Year



Source: National Weather Service

Figure D-2. Life Cycle of a Thunderstorm

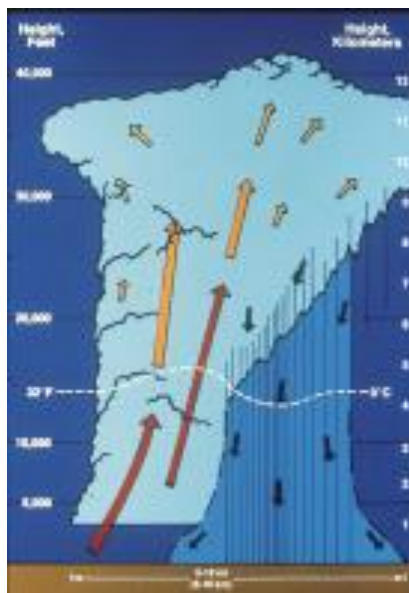
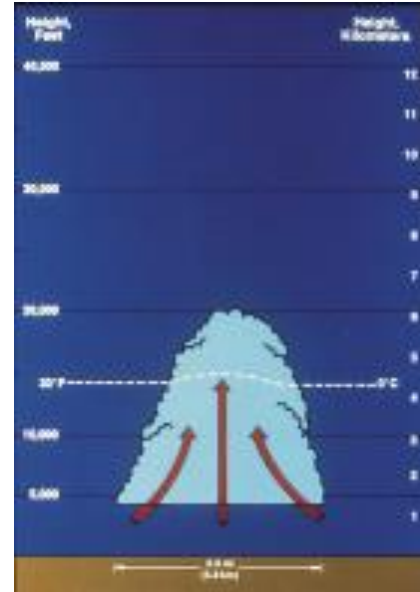


Developing Stage

- Towering cumulus cloud indicates rising air.
- Usually little if any rain during this stage.
- Lasts about 10 minutes.
- Occasional lightning.

Mature Stage

- Most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes.
- Storm occasionally has a black or dark green appearance.
- Lasts an average of 10 to 20 minutes but may last much longer in some storms.



Dissipating Stage

- Rainfall decreases in intensity.
- Can still produce a burst of strong winds.
- Lightning remains a danger

Source: National Weather Service

Lightning results from the buildup and discharge of electrical energy between positively and negatively charged areas. Rising and descending air within a thunderstorm separates these positive and negative charges. Water and ice particles also affect charge distribution. A cloud-to-ground lightning strike begins as an invisible channel of electrically charged air moving from the cloud toward the ground. When one channel nears an object on the ground, a powerful surge of electricity from the ground moves upward to the clouds and produces the visible lightning strike.

Here are some facts about lightning from the National Weather Service:

- Lightning causes an average of 80 fatalities and 300 injuries each year.
- Lightning occurs in all thunderstorms.
- Each year lightning strikes the earth 20 million times. The energy from one lightning flash could light a 100-watt light bulb for more than three months.
- Most lightning fatalities and injuries occur when people are caught outdoors in the summer months during the afternoon and evening.
- Lightning can occur from cloud-to-cloud, within a cloud, cloud-to-ground, or cloud-to-air.
- Many fires in the western United States and Alaska are started by lightning.
- The air near a lightning strike is heated to 50,000°F--hotter than the surface of the sun!
- The rapid heating and cooling of the air near the lightning channel causes a shock wave resulting in thunder.

Another damaging effect of severe storms is **hail**. Hail stones are large ice particles produced by intense thunderstorms. Strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. Ice particles grow in size, becoming too heavy to be supported by the updraft, and fall to the ground. Large stones can fall at speeds faster than 100 mph. Hail causes substantial damage to property and crops each year in the U.S. Most thunderstorm wind damage is caused by **straight-line winds**, which can exceed 100 mph. One type of straight-line wind, the downburst, is a small area of rapidly descending air beneath a thunderstorm. A downburst can cause damage equivalent to a strong tornado.



Figure 5-3. Hail

(The description of severe storms presented in this section is based upon information extracted from National Weather Service on-line publications at <http://www.srh.noaa.gov/jetstream/tstorms/>).

2.3 Floods Description

A flood is a natural event for rivers and streams. Excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers, lakes, and oceans that are subject to recurring floods.

Hundreds of floods occur each year, making it one of the most common hazards in all 50 states and U.S. territories. Floods kill an average of 150 people a year nationwide. They can occur at any time of the year, in any part of the country, and at any time of day or night. Floodplains in the U.S. are home to over nine million households. Most injuries and deaths occur when people are swept away by flood currents, and most property damage results from inundation by sediment-filled water.

Several factors determine the severity of floods, including rainfall intensity (or other water source) and duration. A large amount of rainfall over a short time span can result in flash flood conditions. A small amount of rain can also result in floods in locations where the soil is saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas. Topography and ground cover are also contributing factors for floods. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Frequency of inundation depends on the climate, soil, and channel slope. In regions where substantial precipitation occurs in a particular season each year, or in regions where annual flooding is derived principally from snowmelt, the floodplains may be inundated nearly every year. In regions without extended periods of below-freezing temperatures, floods usually occur in the season of highest precipitation. In areas where flooding is caused by melting snow, and occasionally compounded by rainfall, the flood season is spring or early summer.

Fortunately, most of the known floodplains in the United States have been mapped by FEMA, which administers the NFIP (National Flood Insurance Program). When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). An FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community and includes causes of flooding. The FIS report and associated maps delineate Special Flood Hazard Areas (SFHAs), designate flood risk zones, and establish base flood elevations (BFEs), based on the flood that has a 1% chance of occurring annually, or the 100-year flood. Paper FIRMs and FIS reports are gradually being replaced by DFIRMs (digital FIRMs).

The **100-year flood** designation applies to the area that has a 1 percent chance, on average, of flooding in any given year. However, a 100-year flood could occur two years in a row, or once every 10 years. The 100-year flood is also referred to as the **base flood**. The base flood is the standard that has been adopted for the NFIP. It is a

national standard that represents a compromise between minor floods and the greatest flood likely to occur in a given area and provides a useful benchmark.

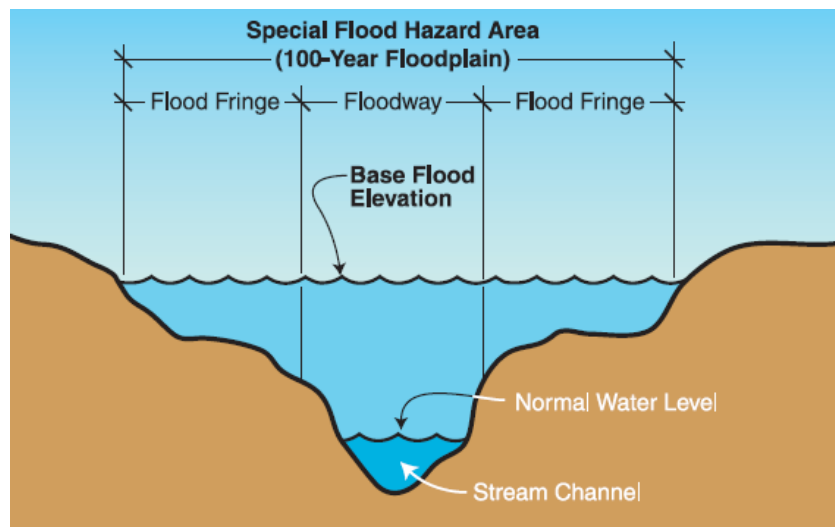
Base Flood Elevation (BFE), as shown on the FIRM, is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year. The BFE is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, the North American Vertical Datum (NAVD) of 1988, or other datum referenced in the FIS report.

Special Flood Hazard Area (SFHA) is the shaded A-Zone or V-Zone area on a FIRM that identifies an area that has a 1% chance of being flooded in any given year or the **100-year floodplain**. FIRMs show different floodplains with different zone designations, as shown on Table 5-7 “Flood Zone Designations.” These are used for insurance rating purposes, but are also necessary for flood permitting and flood hazard mitigation planning purposes. The **500-Year Floodplain** is the shaded X-Zone area shown on a FIRM that has a 0.2% chance of being flooded in any given year.

Floodway is the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without substantial increases in flood heights. The **Flood Fringe** is the remainder of the 100-year floodplain.

The following graphic shows the components of a floodplain along a stream:

Figure D-4. Flood Plain Cross Section



Source: FEMA

Table D-5. Flood Zone Designations

Flood Zones		
A Zones	100-year floodplain areas of high risk.	
	A	The base floodplain mapped by approximate methods. (i.e., BFEs are not determined). This is often called an unnumbered A zone or an approximate A zone.
	AE	The base floodplain where base flood elevations are provided.
	AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
	AH	Shallow flooding base floodplain. BFEs are provided.
	A99	Area to be protected from base flood by levees or Federal flood protection systems under construction. BFEs are not determined.
	AR	The base floodplain that results from the de-certification of a previously accredited flood protection system that is in the process of being restored to provide a 100-year or greater level of flood protection.
V Zones	100-year coastal floodplain areas of high risk	
	V	The coastal area subject to a velocity hazard (wave action) where BFEs are not determined on the FIRM.
	VE	The coastal area subject to a velocity hazard (wave action) where BFEs are provided on the FIRM.
X Zones	Areas of minimal to moderate risk outside the 100-year floodplain.	
	Shaded	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. Also includes areas protected by levees from the 100-year flood and shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
	Unshaded	Area of minimal flood hazard determined to be outside the 500-year floodplain.
D Zone	Area of undetermined but possible flood hazards.	

Source: FEMA

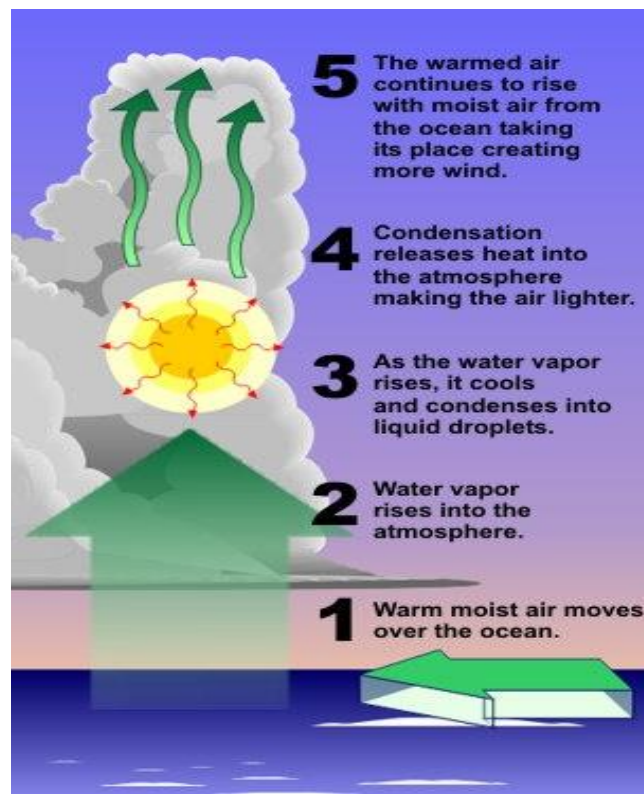
A range of floods, other than just the 100-year flood, could happen within an area. Buildings in very close proximity to a stream or shore line, for example, might experience flooding much more frequently.

(The description of floods presented in this section is based upon information extracted from the FEMA How to Guide Understanding Your Risks (FEMA 386-2), FEMA, August 2001).

2.4 Hurricanes Description

Hurricanes, as referred to in this plan, include all types of tropical cyclones: hurricanes, tropical storms, and tropical depressions. A **tropical cyclone** is a rotating weather system that develops in the tropics. A **tropical depression** is an organized system of persistent clouds and thunderstorms with low level closed circulation and maximum sustained winds of 38 mph or less. A **tropical storm** is an organized system of strong thunderstorms with a well-defined circulation and maximum sustained winds of 39 to 73 mph. All of these tropical cyclones begin as a disturbance. A disturbance may result from a number of different weather events including Easterly Waves, West African Disturbance Line, Tropical Upper Tropospheric Trough or an Old Frontal Boundary. In order for a tropical disturbance to develop into a hurricane, three things must occur. First, the disturbance must gather energy and heat through contact with warm ocean waters. Next, added moisture evaporated from the sea surface then provides power to the tropical storm. And last, the seedling storm forms a wind pattern near the ocean surface that spirals inward. Warm water is the most important of the three, as it provides the fuel for a disturbance to eventually develop into a hurricane. A **hurricane** is a tropical weather system with a well-defined circulation and sustained winds of 74 mph or higher. Even inland areas, well away from the coastline, can experience destructive winds, tornadoes and floods from tropical storms and hurricanes.

Figure D-5. How a Hurricane Forms



Source: National Hurricane Center (www.nhc.noaa.gov)

The Atlantic hurricane season begins on June 1 and lasts through November. Within the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico annually there are an average of 11 tropical storms, 6 of which become hurricanes. In a typical three-year span, the US coastline is struck an average five times, two that are major hurricanes (category 3 or higher.) Hurricanes pose the greatest threat to life and property, but tropical depressions and storms can also cause extensive damage and loss of life. Hurricanes are categorized on a scale of 1 to 5 based on their sustained wind speed. Herbert Saffir, a consulting engineer in Coral Gables, Florida, and Dr. Robert Simpson, then director of the National Hurricane Center, developed this scale in the 1970's. Category 3-5 hurricanes are considered to be major storms. The Saffir-Simpson scale is based primarily on wind speeds and includes estimates of barometric pressure and storm surge associated with each of the five categories.

Table D-6. Saffir-Simpson Scale

Category	Wind Speed	Storm Surge (feet above normal sea level)	Expected Damage
1	74-95 mph	4-5 ft.	Minimal: Damage is done primarily to shrubbery and trees, unanchored mobile homes are damaged, some signs are damaged, no real damage is done to structures
2	96-110 mph	6-8 ft.	Moderate: Some trees are toppled, some roof coverings are damaged, major damage is done to mobile homes
3	111-130 mph	9-12 ft.	Extensive: Large trees are toppled, some structural damage is done to roofs, mobile homes are destroyed, and structural damage is done to small homes and utility buildings.
4	131-155 mph	13-18 ft.	Extreme: Extensive damage is done to roofs, windows, and doors; roof systems on small buildings completely fail, some curtain walls fail
5	>155 mph	>18 ft.	Catastrophic: Roof damage is considerable and widespread, window and door damage is severe, there are extensive glass failures and entire buildings could fail.

Source: National Hurricane Center

The main parts of a hurricane are the eye, the eye wall, and rain bands. The **eye** of a hurricane is the calmest part. The eye is typically 20-40 miles across and has light winds that don't exceed 15 mph. An eye will usually develop when the maximum sustained wind speed is more than 74mph. The strong rotation around the cyclone balances inflow to the center, causing air to ascend about 10-20 miles from the center forming the eyewall. A vacuum of air at the center is caused due to the strong rotation, the vacuum allows air flowing out of the top of the eyewall to turn inward and sink to replace the loss of air mass near the center. Due to the sinking air, cloud formation is

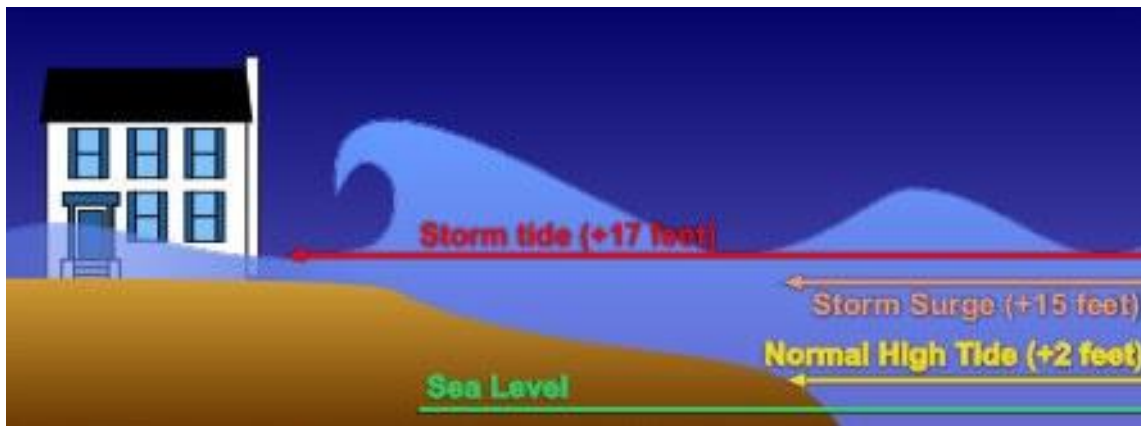
suppressed. The passage of the eye is the calmest part of the hurricane. Since there is a light wind and fair weather, many believe that the storm has passed, which can prove dangerous. Immediately after the passage of the eye, the eyewall winds return but in an opposite direction.

The **eyewall** is the part of a hurricane where the strong winds meet the eye. The eyewall is a group of tall thunderstorms that produce heavy rain and the strongest winds within the storm. Changes in the structure of the eye and eyewall can cause changes in the wind speed, which is an indicator of the storm's intensity. An eye may grow or shrink in size and additional eyewalls can form.

The **rain bands** are the outermost part of the hurricane. They are bands of clouds and thunderstorms that trail away from the eyewall in a spiral fashion. These bands produce heavy rain and strong winds, as well as tornadoes.

A hurricane also has additional hazards associated with it, both direct and indirect. The secondary hazards include storm surge, wind gusts, squalls, inland flooding and tornadoes. **Storm surge** is water that is pushed toward the shore by the winds around the storm. Storm surge combines with the normal tides to create the hurricane storm tide. Wind driven waves also combine into hurricane storm tide. The rise in water level can cause severe flooding in coastal areas. The level of surge is dependent upon the slope of the continental shelf. A shallow slope off of the coast allows a higher surge to inundate the area.

Figure D-6. Storm Surge



Source: NWS Jet Stream- Online School for Weather at www.srh.noaa.gov/srh/jetstream/tropics/tc_hazards.htm

In addition to storm surge, hurricanes are also known for **damaging winds**. They are rated according to their sustained wind speed. This scale does not account for gusts and squalls. **Gusts** are short and rapid bursts in wind speed. They are caused by turbulence over land mixing faster air aloft to the surface. **Squalls** are longer period of increased wind speeds; they are normally located within the outer rain bands.

Hurricanes, tropical storms, and depressions many times bring torrential rains and flooding. This flooding may last many days after the storm has passed. The strength of the storm does not always affect the level of flooding. A slow, weak tropical storm can cause more damage due to flooding than a more powerful fast moving hurricane.

Tornadoes also occur within a tropical cyclone. They are most likely to occur in the right-front quadrant of the storm, but can be embedded within the rain bands well away from the center of the storm. Some hurricanes produce no tornadoes, while others develop numerous ones. According to NOAA studies, half of all land falling hurricanes produce at least one tornado. The effects of a tornado, in addition to hurricane force winds, can produce substantial wind damages. A tornado can develop at any point during landfall, but normally occur within 12 hours after landfall, during daylight hours. Due to the likelihood of a tornado within a hurricane, a tornado watch is normally issued along the anticipated path of a hurricane before landfall.

(The description of hurricanes presented in this section is based upon information extracted from the NOAA publication Hurricanes Unleashing Nature's Fury, A Preparedness Guide, Revised January 2007 at <http://www.nws.noaa.gov/om/hurricane/pdfs/HurricanesUNF07.pdf> and the NWS Jet Stream Online School for Weather at http://www.srh.noaa.gov/srh/jetstream/tropics/tropics_intro.htm).

2.5 Winter Storms/Freezes Description

Winter storms and blizzards originate as mid-latitude depressions or cyclonic weather systems, sometimes following the meandering path of the jet stream. A blizzard combines heavy snowfall, high winds, extreme cold, and ice storms. The origins of the weather patterns that cause severe winter storms are primarily from four sources in the continental United States. Winter storms in the southeast region of the United States are usually a result of Canadian and Arctic cold fronts from the north and mid-western states combining with tropical cyclonic weather systems in the Gulf of Mexico. Typical winter storms in the Southeast include ice storms, crop-killing freezes and occasional snow.

Figure D-7. Types of Winter Precipitation



Source: National Weather Service, Winter Storms, The Deceptive Killers at <http://www.weather.gov/os/winter/resources/winterstorm.pdf>

Types of events that occur within a winter storm include freezing rain, sleet, blizzards, and frost/freeze. **Freezing rain** is rain that freezes when it hits the ground which coats roads, trees and power lines. **Sleet** is rain that turns into ice pellets before hitting the ground. A **blizzard** is snowfall with sustained winds or frequent gusts up to 35mph and considerable amounts of blowing snow. The expectation is that blizzard conditions will last 3 or more hours. Freezes occur when the temperatures will go below freezing. Many times frost/freezes cause substantial damage to crops.

(The description of winter storms/freezes presented in this section is extracted from NOAA/NWS's publication Winter Storms, The Deceptive Killers, A Preparedness Guide at <http://www.weather.gov/os/winter/resources/winterstorm.pdf>).

2.6 Droughts/Heat Waves Description

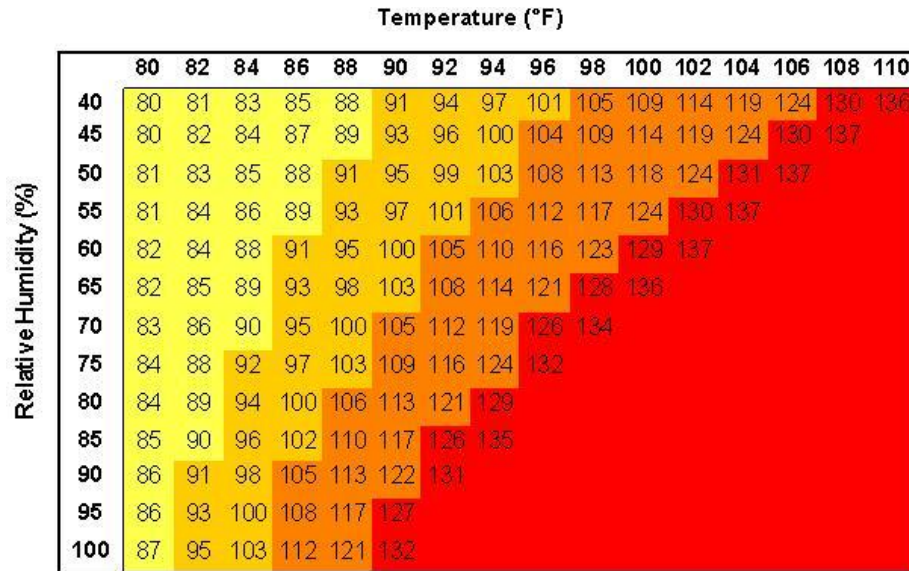
A drought can occur almost anywhere, and its features vary from place to place depending on culture and geography. According to the National Drought Mitigation Center (NDMC), there are four ways of measuring drought. First is a **meteorological drought**, which is a decrease in precipitation in some period of time. These are usually region-specific, and based on a thorough understanding of regional climatology. Meteorological measurements are the first sign of drought. An **agricultural drought** occurs when there is not enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought occurs after a meteorological drought, but before hydrological drought. **Hydrological drought** is deficiencies in surface and subsurface water supplies. It is measured as stream flow and at lake, reservoir and groundwater levels. There is a time lag between lack of rain and less water in rivers, streams, reservoirs and lakes. When precipitation is deficient over time, it will show in these water levels. The last type of drought defined by NDMC is a **socioeconomic drought**, which occurs when water shortages begin to affect people. In addition to the impacts discussed above, water level decline due to drought can also cause sinkholes to form.

The draft Alabama Drought Management Plan (2004) by the Office of Water Resources of the Alabama Department of Economic and Community Affairs (ADECA) explains the potential threats of droughts to Alabama and the need for effective drought planning and management, as follows:

In recent years, drought conditions have endangered Alabama's water resources and adversely affected the livelihood of many people. Drought is a natural event that, unlike floods or tornadoes, does not occur in a violent burst but gradually happens; furthermore, the duration and extent of drought conditions are unknown because rainfall is unpredictable in amount, duration and location. The devastation (environmental, social, and economic) experienced in recent years due to drought conditions has not been successfully mitigated because previous responses to drought conditions at all levels of government has been slow and fragmented, with little focus on preparedness and mitigation. In an effort to be more proactive, the Office of Water Resources worked closely with numerous local, state, and federal agencies and other water resources professionals to develop and implement this statewide approach to drought planning and management.

The State drought plan establishes four phases of drought conditions – drought watch, advisory, warning, and emergency – identified by a compilation of drought indices, which include Crop Moisture Index, Palmer Drought Severity Index, Stream Flow, Reservoir Elevation Level, and Groundwater. Each of these phases requires varying levels of management. The U.S. Drought Monitor by the National Drought Mitigation Center (NDMC) uses a four-tier system to continuously monitor drought intensity based on another combination of drought indices. D1 is the first drought stage with severe conditions, and D4 is most intense drought stage with exceptional drought conditions. D0 includes drought watch areas that are abnormally dry and on the verge of drought or recovering from drought. The primary adverse physical effects of drought are classified as A (adverse impacts to agricultural crops, pastures, and grasslands) or H (adverse impacts to hydrologic resources for water supply, including rivers, reservoirs, and groundwater).

According to NOAA, extreme heat is the number one weather related killer taking an average of 1,500 people in the U.S. annually. The National Weather Service will issue watches and warnings when the heat index is expected to exceed 105°-110° F for at least two consecutive days. The heat index is given in degrees F and is a measure of how hot it really feels when the relative humidity is added to the actual air temperature.



Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

■ Caution
 ■ Extreme Caution
 ■ Danger
 ■ Extreme Danger

Source: NOAA at <http://www.weather.gov/om/heat/index.shtml>

(The description of droughts/extreme heat presented in this section is extracted from: National Drought Mitigation Center, *Defining Drought: Overview* at <http://drought.unl.edu/whatis/define.htm> and NOAA, *Heat Wave: A Major Summer Killer* at <http://www.noaa.gov/themes/heat.php>).

2.7 Wildfires Description

Wildfires are a serious and growing hazard over much of the United States, posing great threats to life and property, particularly when moving from rural forest or rangeland into developed urban areas. Millions of acres burn every year in the United States as a result of wildfires, causing millions of dollars in damage. Each year more than 100,000 wildfires occur in the United States, almost 90 percent of which are started by humans; the rest are caused by lightning. Weather is one of the most significant factors in determining the severity of wildfires. The intensity of fires and the rate with which they spread is directly related to wind speed, temperature, and relative humidity. Climatic conditions, such as long-term drought, also play a major role in the number and the intensity of wildfires.

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed and spread quickly and are usually signaled by dense smoke that fills the area for miles around. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires.

A **wildland fire** is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. An **Urban-**

Wildland Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

States with a large amount of wooded, brush and grassy areas, such as Alabama, are at highest risk of wildfires. Additionally, areas anywhere that have experienced prolonged droughts or are excessively dry, are also at risk of wildfires. People start more than four out of every five wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires. Wildfire behavior is based on three primary factors:

- fuel,
- topography, and
- weather.

The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a factor, in that it expresses the pattern of vegetative growth and open areas. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind (both short and long term) affect the severity and duration of wildfires.

Protecting Alabama's rural areas from wildfire is the number one priority of the Alabama Forestry Commission. Wildfires burn thousands of acres of forestlands in Alabama every year. Through the efforts of the Forestry Commission and local volunteer fire departments, those wildfires are decreasing, but they still take a major toll on Alabama's forest resources.

The Forestry Commission has a modern aggressive detection system that allows it to discover and suppress wildfires in the most efficient way possible. A fleet of airplanes regularly patrols over the forest and looks for wildfires. In addition, the public can report wildfires 24 hours a day through a toll-free telephone system. When a fire is reported, a dispatch center sends Forestry Commission crews and volunteer fire departments as needed to suppress it.



Volunteer fire departments are an essential part of the team when it comes to suppressing wildfires. The Forestry Commission works to help establish, train and maintain rural community fire departments in every county. This strong partnership of government and volunteer agencies working together provides cost efficient, effective fire service.

The Forestry Commission suppresses a wildfire by building a “fire break” which contains the fire by removing fuel from the fire so it cannot spread. These breaks are built using a bulldozer outfitted with a fire plow, which cuts a three foot wide trench across the site, removing all vegetation and exposing bare soil. On hilly sites, these firebreaks are built by hand using rakes and other tools by 20 person crews.

In extreme circumstances where several homes are threatened by a wildfire, the Forestry Commission can call in helicopters with large water buckets. These buckets do not put out the fire, but reduce its intensity so that the Commission crew can plow it out. The helicopter service is extremely expensive and is only done in severe fire conditions.

(The description of wildfires presented in this section is based upon information extracted from the FEMA How to Guides Understanding Your Risks (FEMA 386-2), August 2001, Using HAZUS-MH for Risk Assessment How to Guide (FEMA 433), August 2004, and the Alabama Forestry Commission at <http://www.forestry.alabama.gov>).

2.8 Dam/Levee Failures Description

Dam failure or levee failure can occur with little warning. Strong storms may produce a flood in a few hours or minutes for upstream locations, which can cause a dam or levee failure. Flash floods occur within six hours of the beginning of heavy rainfall and dam failure may occur within hours of the first sign of a breach. Dam failures are potentially the worst flood event. There are more than 80,000 dams in the United States according to the 2007 update of the National Inventory of Dams. According to FEMA, one third of these pose a high or significant hazard to life and property if failure occurs. 56% of dams are privately owned, and the dam owner is responsible for the safety and liability of the dam as well for upkeep, upgrade and repair. This compounds the risk that is posed due to dam or levee failure.



(The description of dam/levee failures presented in this section is extracted from FEMA, Disaster Types, Dam Failure at <http://www.fema.gov/hazard/damfailure/index.shtml>).

2.9 Landslides Description

Landslides occur and can cause damage in all 50 States, at an annual cost of about \$3.5 billion per year (2005). Between 25 and 50 deaths per year in the U.S. are attributable to landslides. Landslides cause damage to the natural environment and economic losses, due to reduced real estate values, decreased agricultural and forestry productivity, among other adverse economic effects.

Severe storms, earthquakes, coastal wave attack, and wildfires can cause widespread slope instability and result in landslides. Landslide danger may be high, even as emergency personnel are providing rescue and recovery services for these other hazard events.

A landslide is a downward and outward movement of slope-forming soil, rock, and vegetation under the influence of gravity, which includes a wide range of ground movement. Numerous types of events, including natural and human-caused changes within the environment, can trigger landslides. Examples of these changes that cause weaknesses in the composition or structures of the rock or soil include heavy rain, changes in ground water level, seismic activity, or construction activity. Human-caused landslides may result from activities such as terracing, cut and fill construction, building construction, mining operations, and changes in irrigation or surface runoff.

There are different types of landslides. **Rock falls** are rapid movement of bedrock characterized by free-fall, bouncing and rolling. **Slides** are movements of soil or rock along a distinct surface of rupture that separates the slide material from the more stable underlying material. There are two major types of slides: rotational and translational slides. In a **rotational slide** the surface of rupture is curved concavely upward and the slide block rotates around an axis parallel to the slope contours. A **translational slide** is a mass that moves down and outward along a relatively planar surface with little rotational movement or backward tilting. **Flows** are mass movements of water-saturated material. The movement of flows can be extremely rapid (debris avalanche), very rapid (debris flow) or very slow (earth flow).



Here are some significant landslide facts from the USGS:

- Landslides often accompany earthquakes, floods, storm surges, hurricanes, wildfires, or volcanic activity. They are often more damaging and deadly than the triggering event (examples: the 1964 Alaska earthquake-induced landslides and the 1980 Mount St. Helens volcanic debris flow).
- Human activities and population expansion are major factors in increased landslide damage and costs.
- The May 1980 eruption of Mount St. Helens caused the largest landslide in history— a rock slide-debris avalanche large enough to fill 250 million dump trucks to the brim traveled about 14 miles, destroying nine highway bridges, numerous private and public buildings, and many miles of highways, roads, and railroads. The debris avalanche also formed several new lakes by

damming the North Fork Toutle River and its tributaries. These lakes posed hazards to downstream communities because of the possible failure of the dams, which could have resulted in catastrophic flooding.

- Although the National Flood Insurance Act covers certain damage from “mudflows,” insurance against landslides is generally unavailable in most areas of the United States. As a result, many victims of landslides resort to litigation in order to recover damages.

(The description of landslides presented in this section is extracted from the Geological Survey of Alabama, Geologic Hazards Section at <http://www.gsa.state.al.us/gsa/geologichazards/landslides/index.html> and the U.S.G.S. Landslides Hazards Program at <http://landslides.usgs.gov>).

2.10 Earthquakes Description

An earthquake is the shaking and vibration at the surface of the earth resulting from underground movement along a fault plane. Earthquakes are caused by the release of built-up stress within rocks along geologic faults or by the movement of magma in volcanic areas. They usually occur without warning and are usually followed by aftershocks. Earthquakes can affect hundreds of thousands of square miles and cause tens of billions of dollars of damage to property. An earthquake event can cause injury and loss of life to hundreds of thousands of persons and can greatly disrupt the social and economic functioning of the affected area. Secondary hazards during an earthquake may occur, such as surface faulting, liquefaction, sinkholes, and landslides.

Earthquakes are caused by the rupture or sudden movement of a fault where stresses have accumulated along fault planes within the earth’s crust. While most earthquakes and active faults occur along the borders of the earth’s tectonic plates, other active faults and earthquake zones lie within plates (intraplate). The plates range from less than 10 miles (for young oceanic crust) to 125 miles (for older continental crust), and are in continuous motion, grinding against or ripping away from each other. All of this motion creates stress within the rock and along either side of faults. While rock can bend over time under this stress, if the stress exceeds the rock’s elastic limit, a break or sudden shift occurs.

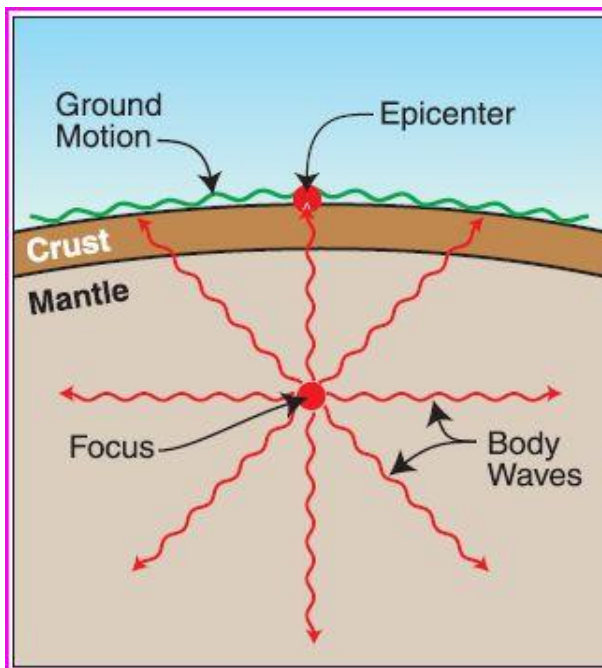
The area of greatest seismic activity in the United States is along the Pacific coast in California and Alaska, but as many as forty states can be characterized as having at least moderate earthquake risk. For example, seismic activity has been recorded in Boston, Massachusetts; New Madrid, Missouri; and Charleston, South Carolina, places not typically thought of as earthquake zones. While some areas have frequent earthquakes, such as in California, forecasting when and where an earthquake will occur is not yet possible. Records show that building inventories in 39 states are vulnerable to earthquake damage.



While most property damage from earthquakes in general is due to nonstructural damage, structural damage and deaths can result from strong magnitude earthquakes or moderate magnitude earthquakes for older structures or structures with lower seismic building designs. Ground shaking is caused by seismic waves generated by the earthquake. The intensity of shaking is influenced by magnitude, distance from the earthquake's epicenter, and regional geology.

Earthquakes create seismic waves that consist of both primary and secondary waves. These waves emanate from the point at which movement first occurs (the focus). While primary waves (body waves) travel within the earth, secondary waves (surface waves), travel through the crust and create the ground shaking that we feel and that can be damaging to structures. See Figure D-8 for illustration of this concept.

Figure D-8. Seismic and Surface Waves



Source: FEMA

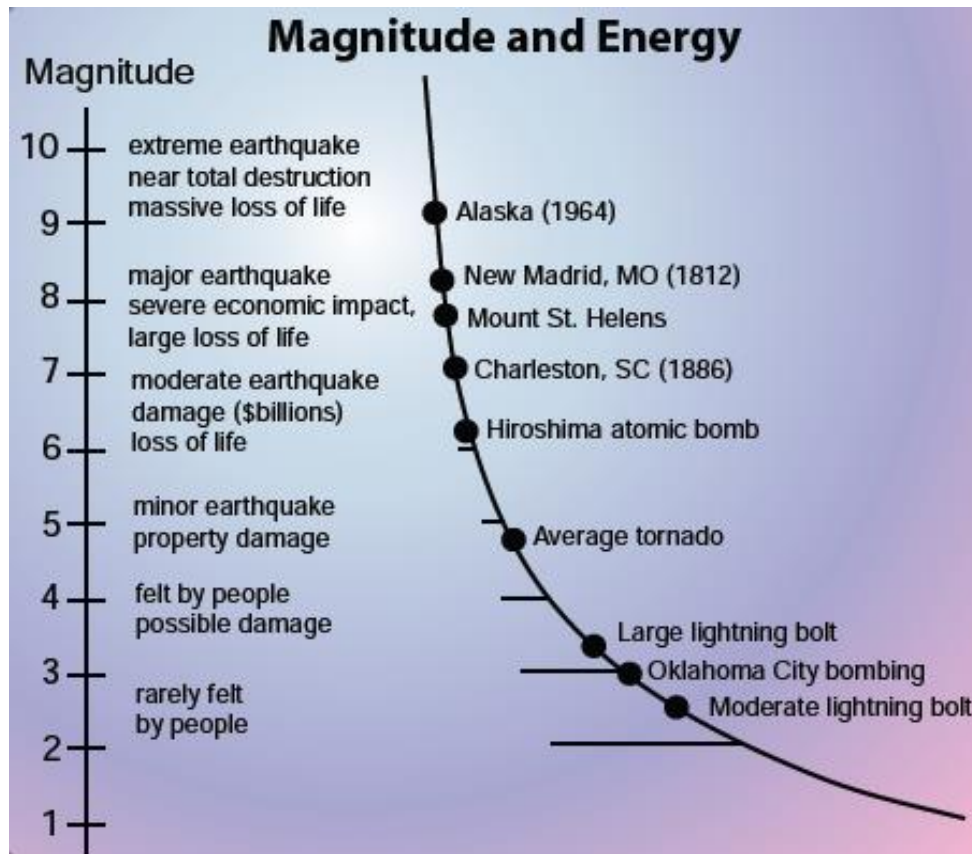
In addition to direct structural damage from earthquake shaking, triggered landslides can also damage structures. Earthquake-induced landslides can occur miles from the epicenter and can result from shaking of over-steepened or weak slopes. They can destroy roads, buildings, utilities, and other critical facilities necessary to respond to or recover from an earthquake. As sloped lands are developed, earthquake-induced landslides pose additional threats to homes and infrastructure. Soil type can substantially increase earthquake risk. **Liquefaction** occurs, when ground shaking causes saturated soft soils to change from a solid to a liquid state.

Liquefaction results in the loss of soil strength and three potential types of ground failure: lateral spreading, flow failure, and loss of bearing strength. Buildings and their occupants are at risk when the ground can no longer support buildings and structures. Areas susceptible to liquefaction include areas with high ground water tables and sandy

soils. The extreme earthquake damage to San Francisco in 1989 was due to liquefaction of the soil used to fill in waterfront properties.

Amplification (strengthening) of shaking also results in areas with soils that are soft, thick, and/or have high water content, such as floodplains, coastal lowlands, infilled areas, and ancient river or marine deposits. Amplification increases the magnitude of the seismic waves generated by the earthquake.

Chart D-1. Earthquake Magnitude Scale



Source: USGS

Seismic activity is described in terms of magnitude and intensity. **Magnitude** describes the total energy released and **intensity** describes the effects at a particular location. Magnitude is defined as the measure of the amplitude of the seismic wave and is expressed by the Richter scale. The **Richter scale** is a logarithmic measurement where an increase in the scale by one whole number represents a tenfold increase in the measured amplitude of the earthquake.

Intensity is defined as the measure of the strength of the shock at a particular location and is expressed by the **Modified Mercalli Intensity (MMI) scale**. The modern MMI scale is a modification by the Italian volcanologist Giuseppe Mercalli of an older 1800s scale. Mercalli's scale was later published in English in 1931 by American

seismologists Harry Wood and Frank Neumann and later modified by Charles Richter. The scale consists of a series of certain key responses such as people awakening, movement of furniture, the damage to structures, and total destruction. The *lower* numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The *higher* numbers of the scale are based on observed non-structural and structural damage. This scale, composed of 12 increasing levels of intensity that range from imperceptible shaking to catastrophic destruction, is designated by Roman numerals. It does not have a mathematical basis; instead it is a ranking based on observed effects. Table D-8 below describes the Modified Mercalli Intensity scale and its description of effects.

Table D-8. Modified Mercalli Intensity Scale

SCALE	INTENSITY	DESCRIPTION OF EFFECTS
I	Instrumental	Detected only on seismographs
II	Feeble	Some people feel it
III	Slight	Felt by people resting; like a truck rumbling by
IV	Moderate	Felt by people walking
V	Slightly Strong	Sleepers awake; church bells ring
VI	Strong	Trees sway; suspended objects swing, objects fall off shelves
VII	Very Strong	Mild Alarm; walls crack; plaster falls
VIII	Destructive	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged
IX	Ruinous	Some houses collapse; ground cracks; pipes break open
X	Disastrous	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves

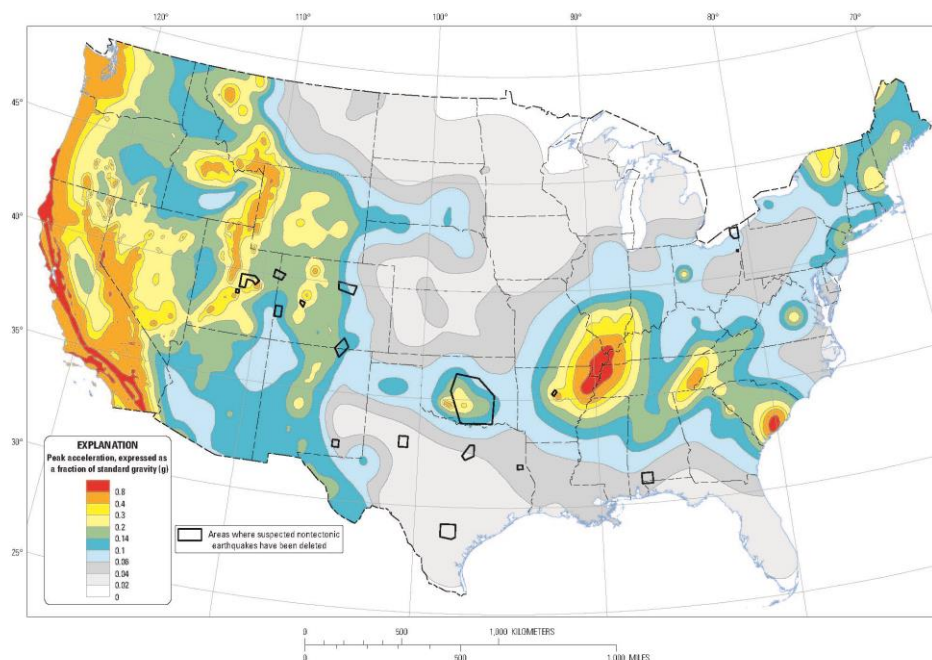
Source: FEMA

Another measurement of seismic activity is **Peak Ground Acceleration (PGA)** which measures the rate of change of motion relative to the rate of acceleration due to gravity. An object falling to Earth will fall faster and faster, until it reaches terminal

velocity. This principle is known as **acceleration** and represents the rate at which speed is increasing. This movement can be described by its changing position as a function of time, or by its acceleration as a function of time. The peak acceleration is the maximum acceleration experienced by the object during the course of the earthquake motion. Peak ground acceleration can be measured in *g* (the acceleration due to gravity at the earth's surface is 9.8 meters per second squared). For example, acceleration of the ground surface of 244 cm/sec/sec (where *g* equals 9.8 meters per second squared) equals a PGA of 25.0 percent.

Map D-2 below shows the 2008 Peak Ground Acceleration (PGA) values for the southeast United States with a 2% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected, the level of acceleration that could be exceeded (color scale), and the probability of exceeding that level within a given time period (probability and time stated in the title).

Map D-2. 2014 PGA for U.S.
Peak Ground Acceleration with 2% Probability of Exceedance in 50 Years



Two-percent probability of exceedance in 50 years map of peak ground acceleration

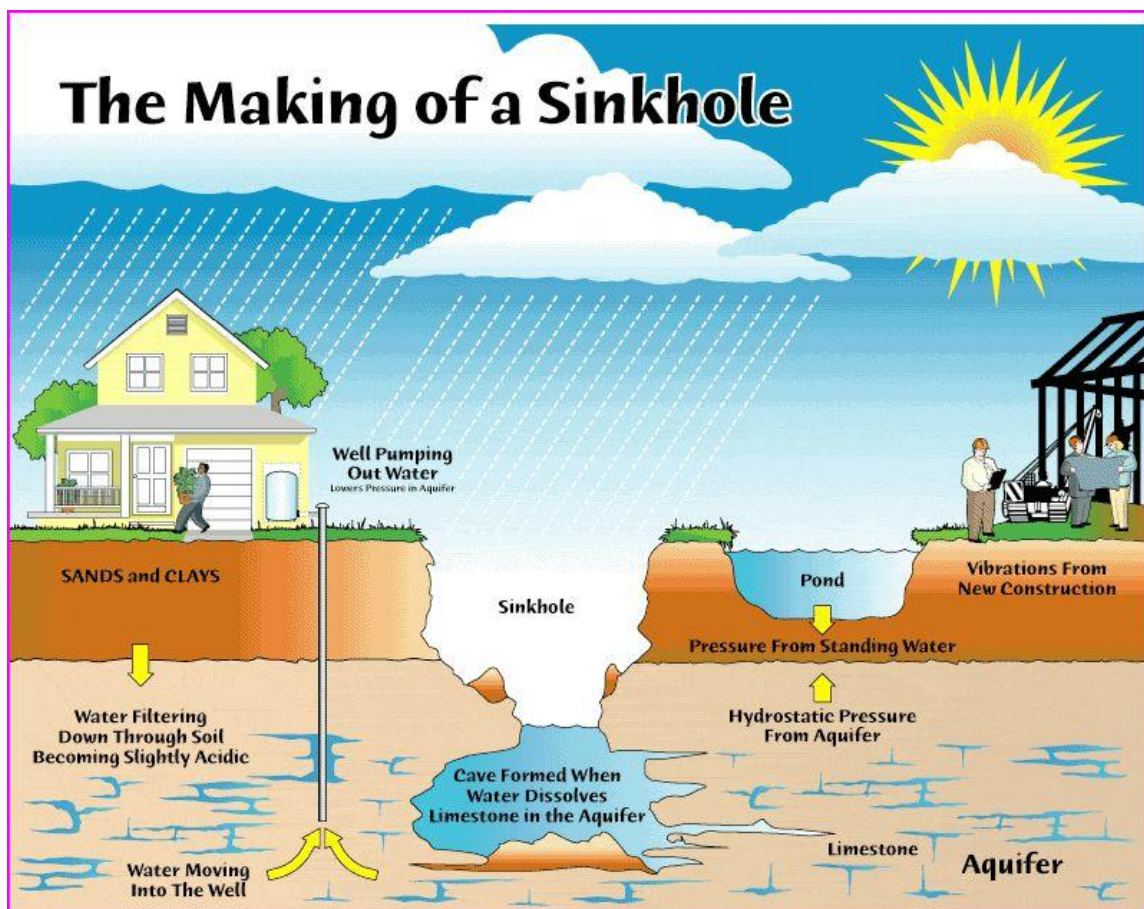
Source: U.S. Geological Survey Earthquake Hazards Program

(The description of earthquakes presented in this section is based upon information extracted from the FEMA How to Guides Understanding Your Risks (FEMA 386-2), August 2001, Using HAZUS-MH for Risk Assessment How to Guide (FEMA 433), August 2004, 2007 Alabama State Hazard Mitigation Plan, U.S. Geological Survey Earthquakes Hazard Program, guidance from the Geological Survey of Alabama, and various FEMA-adopted plans).

2.11 Sinkholes (Land Subsidence) Description

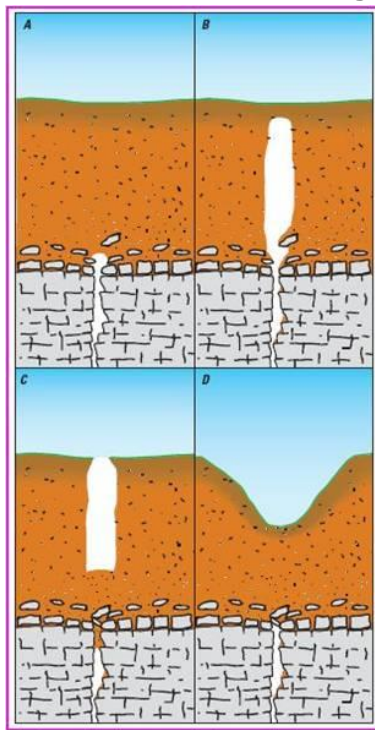
Sinkholes are a naturally occurring geologic feature that can be hazardous to property and the environment. Their formation is due to water dissolving rock below the land surface. The types of rock most susceptible to sinkhole formation are salt and carbonate rocks such as limestone, dolomite, and marble. As bedrock dissolves, voids (such as caves and caverns) develop underground; when a void is large enough, the void's roof collapses, and the ground above falls in, leaving a visible sinkhole at the surface. While some sinkholes form as dramatic instant collapses, the vast majority of sinkholes develop slowly over time, with the ground slowly sinking downward. Although normally no more than a nuisance, some sinkholes can become very large and a house or road may be on top when the collapse occurs. See Figure D-9, which shows the making of a sinkhole. Figure D-10 illustrates the formation of a collapse.

Figure D-9. The Making of a Sinkhole



Source: Southwest Florida Water Management District

Figure D-10. Formation of a Collapse



A - Soil bridges gap where sediment has been washing into a solution enlarged fracture.

B - Over time, the void migrates upward through the soil.

C - After the bridge thins, a sudden collapse occurs.

D - The collapse often plugs the drain and erosion will, after many years, transform the collapse into a more bowl-shaped sinkhole.

Source: U.S. Geological Survey Mid-Continent Geographic Science Center

Sinkholes range in size from a few square feet to hundreds of acres. They may be quite shallow or may extend hundreds of feet deep. The most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. The picture in Figure D-11 shows a sinkhole that quickly opened up causing major damage to a house and yard.

Figure D-11. Sinkhole Collapse of House



Source: U.S. Geological Survey, Water Science for Schools

Water is the most important agent effecting sinkhole development. Areas can become more susceptible to sinkholes when there is a drawdown of groundwater, heavy rains occur, or the land surface is changed. Changes to land such as increased development can add stress to the roof of a void, thus increasing chance of void collapse and sinkhole formation. Drainage for construction purposes or dewatering from mining or quarrying operations can also lower groundwater levels, reducing support for a void's roof. When water resources for populations or agriculture are overused, groundwater drawdown can occur, increasing likelihood of sinkhole development. Groundwater levels can also be lowered naturally during times of drought, when groundwater is not replenished by rainfall. Conversely, heavy rainfall can also lead to increased sinkhole development as rock dissolution increases or underground washouts occur, eroding supporting rock and soil.

Sinkholes also threaten water and environmental resources by draining streams, lakes, reservoirs, and wetlands, and creating pathways for transmitting surface waters directly into underlying aquifers. Where these pathways are developed, movement of surface contaminants into the underlying aquifer systems can persistently degrade ground-water resources. In some areas, sinkholes are used as storm drains, and because they are a direct link with the underlying aquifer systems it is important that their drainage areas be kept free of contaminants. Conversely, when sinkholes become plugged, they can cause flooding by capturing surface-water flow and can create new wetlands, ponds, and lakes.

(The description of sinkholes presented in this section is based upon information extracted from the FEMA How to Guide Understanding Your Risks (FEMA 386-2), FEMA, August 2001, and other sources from the Geological Survey of Alabama Geological Hazards Program, Southwest Florida Water Management District, and the U.S. Geological Survey Mid-Continent Geographic Science Center).

2.12 Human-caused and Technological Hazards Description

Human-caused and technological hazards are hazards that originate from human activity. The two categories of human-caused and technological hazards are **technological hazards** and **terrorism**. Technological hazards are accidental with unintended consequences. They often include the manufacture, transportation, storage and use of hazardous materials. The definition of terrorism has been established by Federal law, as follows: *"Terrorism includes the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives."* 28 CFR Section 0.85. In comparison to technological hazards, acts of terrorism are not accidental and the consequences are intentional.

Technological hazards are divided into three categories: fixed facility industrial accident, transportation industrial accident, and the failure of a supervisory control system. For an industrial accident, the hazard will either exist at a fixed location such as a manufacturing plant or storage facility, or while in transport, i.e. in a vehicle that is

transporting it from one location to another, or while it is moving through a pipeline from one location to another. Supervisory control system failure will affect which ever component within the system it is directing and the extents of the damage possible due to failure are usually easy to predict.

Terrorism includes: the use of weapons of mass destruction – biological, chemical, nuclear, and radiological weapons, explosives, and incendiary devices; arson; armed attacks; agriterrorism; an intentional hazardous materials release; industrial sabotage; and cyber-terrorism. It can be carried out domestically or internationally, by known or unknown assailants, locally or from a distance.

Human-caused and technological hazards are very difficult to assess, terrorism more so than technological hazards. Since terrorism involves the human mind and what actions a person may choose to take, the what, where, how and when is largely unpredictable. On the other hand, with technological hazards, since they primarily involve hazardous materials, the assessment of the manufacture, storage, transportation and use of the materials can at least answer to some degree the where, what and how and those answers can aid in the mitigation of some possible technological disasters. For this reason: ***the scope of human-caused and technological hazards addressed by the Mitigation Strategy in this plan is limited to mitigation of fixed location technological hazards involving hazardous materials.***

The extent of the effects of a human-caused hazard can range from localized to widespread, depending on the type of incident, the mode of application, duration, dynamic/static characteristic and mitigating conditions. A conventional bomb could damage a building in which it was placed or an entire city can be in danger if a hazardous material is released into the water supply. Three noted modes of force to the built environment involved by Human-caused hazards are: contamination, energy, and failure or denial of service. If a hazard remains for an extended period of time, the damage can be far reaching; however, if the hazard lasts for only a short time, the damage can usually be quickly determined and response can be swift and the disaster contained. A dynamic hazard is more damaging and unpredictable than a static hazard. Mitigating conditions can be deterrents or they can at least lessen the effects of a hazard at a certain location which also affects the extent of a disaster.

When trying to mitigate human-caused hazards, measures must address security, unknown risks and civil liberties; concerns not raised by natural disasters. The events will usually occur in specific locations and mitigation measures can usually aid in the alleviation of human-caused disasters. Those specific locations are known as critical facilities. In addition to the facilities usually addressed in vulnerability assessments for natural hazards, the following critical infrastructure is usually assessed: agriculture and food, water, public health, emergency services, defense industrial base, telecommunications, energy, transportation, banking and finance, chemicals and hazardous materials, and postal and shipping. Threats to infrastructure can be carried

out by anyone who has the knowledge, opportunity and desire to do harm. They can be anyone from terrorists to upset employees and are therefore largely unidentifiable.

Table D-9 “Event Profiles for Terrorism and Technological Hazards,” (from the FEMA “How to Guide” for human-caused and technological hazards) explains the ways in which human-caused and technological hazards can interact with the built environment. As presented in the FEMA Guide, for each type of hazard, the following factors are addressed:

- **Application mode** describes the human act(s) or unintended event(s) necessary to cause the hazard to occur.
- **Duration** is the length of time the hazard is present on the target. For example, the duration of a tornado may be just minutes, but a chemical warfare agent such as mustard gas, if not remediated, can persist for days or weeks under the right conditions.
- The **dynamic/static characteristic** of a hazard describes its tendency, or that of its effects, to either expand, contract, or remain confined in time, magnitude, and space. For example, the physical destruction caused by an earthquake is generally confined to the place in which it occurs, and it does not usually get worse unless there are aftershocks or other cascading failures; in contrast, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.
- **Mitigating conditions** are characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; exposure to sunlight can render some biological agents ineffective; and effective perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen. In contrast, *exacerbating conditions* are characteristics that can enhance or magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mail boxes, etc.) can provide concealment opportunities for explosive devices.

Table D-9. Event Profiles for Terrorism and Technological Hazards

Human-caused Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Conventional Bomb/ Improvised Explosive Device	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional "secondary devices" may be used, lengthening the time duration of the hazard until the attack site is determined to be clear.	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device.

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Human-caused Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Chemical Agent	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions.	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.

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Human-caused Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device/accelerant and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device and undetected initiation of a fire. Non-compliance with fire and building codes as well as failure to maintain existing fire protection systems can substantially increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location.	Generally minutes to days.	Varies based upon the perpetrators' intent and capabilities.	Inadequate security can allow easy access to target, easy concealment of weapons and undetected initiation of an attack.
Biological Agent	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers.	Biological agents may pose viable threats for hours to years depending on the agent and the conditions in which it exists.	Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can be spread via human or animal vectors.	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micrometeorological effects of buildings and terrain can influence aerosolization and travel of agents.

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Human-caused Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Cyber-terrorism	Electronic attack using one computer system against another.	Minutes to days.	Generally no direct effects on built environment.	Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.
Agriterrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months.	Varies by type of incident. Food contamination events may be limited to discrete distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Radiological Agent	Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point or line sources such as munitions, covert deposits and moving sprayers.	Contaminants may remain hazardous for seconds to years depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.

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Human-caused Hazard	Application Mode	Hazard Duration	Extent of Effects; Static/Dynamic	Mitigating and Exacerbating Conditions
Nuclear Bomb	Detonation of nuclear device underground, at the surface, in the air or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat and blast effects of a subsurface, ground or air burst are static and are determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.
Hazardous Material Release (fixed facility or transportation)	Solid, liquid and/or gaseous contaminants may be released from fixed or mobile containers.	Hours to days.	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	As with chemical weapons, weather conditions will directly affect how the hazard develops. The micrometeorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes as well as failure to maintain existing fire protection and containment features can substantially increase the damage from a hazardous materials release.

(The information presented in this section was extracted from the FEMA How to Guide Integrating Human-caused Hazards into Mitigation Planning, FEMA 386-7 Version 2.0, FEMA, September 2003).

Appendix E

Hazard Profile Data

App. E - Hazard Profile Data

1.0 Records of Previous Occurrences of Hazard Events

1.0 Records of Previous Occurrences of Hazard Events

This appendix contains the detailed records of previous occurrences of hazard events reported in Section 5.4 “Hazard Profiles,” for events reported by the National Weather Service and National Climatic Data Center.

Past Occurrences of Tornadoes

Table E-1. Marshall Tornadoes, 2009-2013 (NCDC)

25 TORNADO(s) were reported in **Marshall County, Alabama** between **01/01/2009** and **12/31/2013**.
Click on **Location or County** to display Details.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
37 LITTLE NEW YORK	4/10/2009	4:38	Tornado	EF0	0	0	16.00K	0.00K
38 GRANT	4/10/2009	14:02	Tornado	EF3	0	5	0.00K	0.00K
39 LITTLE NEW YORK	4/19/2009	19:35	Tornado	EF1	1	1	0.00K	0.00K
40 MT OLIVE	5/3/2009	14:40	Tornado	EF1	0	0	20.00K	0.00K
41 ALBERTVILLE MUNI ARP	6/28/2009	15:50	Tornado	EF0	0	0	18.00K	0.00K
42 NIXON CHAPEL	4/24/2010	21:05	Tornado	EF3	0	35	14.000M	0.00K
43 NORTH ARAB	10/25/2010	2:23	Tornado	EF0	0	0	35.00K	0.00K
44 MC VILLE	10/26/2010	17:13	Tornado	EF0	0	0	5.00K	0.00K
45 NIXON CHAPEL	4/27/2011	5:22	Tornado	EF1	0	0	40.00K	0.00K
46 RED HILL	4/27/2011	5:22	Tornado	EF1	0	0	0.00K	0.00K
47 RED HILL	4/27/2011	5:24	Tornado	EF1	0	0	0.00K	0.00K
48 WARRENTON	4/27/2011	5:30	Tornado	EF2	0	0	0.00K	0.00K
49 HYATT	4/27/2011	5:30	Tornado	EF1	0	0	0.00K	0.00K
50 HIGHPOINT	4/27/2011	5:30	Tornado	EF1	0	0	0.00K	0.00K
51 HIGHPOINT	4/27/2011	5:30	Tornado	EF1	0	0	0.00K	0.00K
52 GRANT	4/27/2011	5:35	Tornado	EF1	0	0	10.00K	0.00K
53 BIG SPGS	4/27/2011	5:35	Tornado	EF1	0	0	0.00K	0.00K
54 HENRYVILLE	4/27/2011	5:43	Tornado	EF0	0	0	0.00K	0.00K
55 MARTLING	4/27/2011	5:45	Tornado	EF1	0	0	0.00K	0.00K
56 GUNTERSVILLE MUNI AR	4/27/2011	5:45	Tornado	EF1	0	0	0.00K	0.00K
57 GUNTERSVILLE LAKE	4/27/2011	5:49	Tornado	EF1	0	0	0.00K	0.00K
58 RUTH	4/27/2011	14:16	Tornado	EF4	5	48	0.00K	0.00K
59 RED HILL	4/27/2011	16:50	Tornado	EF2	0	0	0.00K	0.00K
60 MC VILLE	3/18/2013	14:41	Tornado	EF1	0	0	0.00K	0.00K
61 BOAZ	3/18/2013	14:41	Tornado	EF0	0	0	0.00K	0.00K
TOTALS					6	89	158.00K	0.00K

Source: National Climatic Data Center

Table E-2. Marshall County Tornadoes, 1884-2013 (NWS)

Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
3/18/2013	Marshall, AL/DeKalb AL	F2	Enhanced Fujita Scale	111-135	220	4.3	Hamby Road to the intersection of Hwy 68/CR 113	0	7	A tornado touched down on Hambey road just east of McVilleville road in Marshall county and tracked east into DeKalb county. Several softwood and hardwood trees were either uprooted or snapped along Hambey road. As the tornado moved east, several wooden power poles were snapped. Several farm buildings were destroyed with debris strewn over 100 yards. Additional tree damage occurred along county roads 381 and 82. The most significant damage of this tornado event occurred in the Kilpatrick community along county road 479. Very large hardwood trees were snapped near the base along with numerous power poles. Several mobile homes sustained significant damage with at least two completely destroyed. Several conventional homes sustained minor to moderate exterior damage in this area as well. At this location, the tornado was at its maximum width of approximately 220 yards and produced maximum estimated winds of 125 mph. This is consistent with an EF-2

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
3:41 PM										rating. The approximate path length of this tornado was 4.3 miles. The tornado continued to move east and did substantial damage to a large livestock building near the intersection of highways 68 and 168. The store at that point suffered minor roof damage. The tornado continued to move east nearly paralleling highway 68. A car wash sustained significant structural damage. A mobile home was flipped and destroyed near the intersection of highway 68 and county road 9004. The tornado narrowed and finally lifted near the intersection of highway 68 and county road 113.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011	Pickens, AL/Tuscaloosa, AL/Fayette, AL/Tuscaloosa, AL/Fayette, AL/Walker, AL/Cullman, AL/Blount, AL/Marshall, AL	F4	Enhanced Fujita Scale	166-200	1408	127.8	4.59 NW of Union Chapel to 2.77 SSW of Crossroads	13	54	The first segment of this long track tornado initially touched down 5 miles northeast of Pickensville near Basinger Rd, north of AL Hwy 86. This tornado continued through portions of Tuscaloosa, Fayette, Walker, Cullman, and Blount Counties, before it dissipated in Marshall County. While the average path width of this tornado in Pickens County was around 0.4 mile (704 yds.), the maximum path width was 0.6 mile (1056 yds.). The tornado crossed AL Hwy 17 and US Hwy 82, across the southern and western extents of the city of Reform. The storm strengthened to an EF1 rating with winds of 110 mph to the northeast of Reform. Along CR 49, several chicken houses were destroyed and grain feed bins were tossed up to 100 yards. As the tornado crossed AL Hwy 159, north of CR 49, several homes sustained roof damage and several outbuildings were destroyed. Numerous trees were snapped or uprooted along the path. The tornado moved northeast entering Tuscaloosa County south of Mid Walters Rd. The second segment of this long track tornado crossed into Tuscaloosa County south of Pleasant Ridge Church Rd. It began in Pickens County, 5 miles northeast of Pickensville, and tracked northeastward into Tuscaloosa County. It continued through portions of Fayette, Walker, Cullman (See Storm Data for

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
3:40 PM										

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011	Cullman, AL/Morgan, AL/Marshall, AL	F4	Enhanced Fujita Scale	166-200	880	46.88	2.85 SE of Crane Hill to 1.35 NE of Hebron	6	48	A violent long track tornado developed on the north side of Lewis Smith Lake along County Road 310 where some light damage was found. The tornado tracked northeast snapping numerous large trees and causing significant structural damage to residences along County Roads 222 and 436 near Grandview. The tornado tracked northeast into the city of Cullman. Some of the worst damage occurred just northeast of U.S. Highways 31 and 278. Several small retail buildings were completely destroyed. Along with the near total destruction of a large church. The tornado tracked across State Highway 157, then caused additional damage north of State Highway 69 between Simcoe and Pleasant View. Just north of Fairview along County Roads 1559 and 1564, 2 homes were destroyed with significant portions of the homes not found. Further northeast along County Road 1589, the tornado caused major structural damage to several old (early 1900s) homes. Numerous hardwood trees were debarked. A 1/4 to 1/2 mile wide corridor of significant damage persisted between Fairview and the Morgan County line. This violent tornado tracked from Cullman County into extreme southeastern Morgan County near the town of Hulaco. Peak wind speeds of up to 175 mph caused significant damage between Hvatt Bottom Road

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
2:40 PM										
4/27/2011	Marshall, AL	F1	Enhanced Fujita Scale	86-110	100	1.55	1.64 NNW of Guntersville Lake to 2.55 WNW of Kirbytown	0	0	A tornado of EF-1 intensity initially touched down between Buck Island and Pine Island on Guntersville Lake in northeast Marshall County. Numerous hardwood and softwood trees were snapped along Highway 79 as the tornado skipped northeast. The tornado touched down again near Pine Island. Numerous homes sustained damage from trees falling on them in a convergent pattern as the tornado moved along the shore of the lake on Preston Island. At this point in the tornado path, width was estimated at 100 yards.
6:49 AM										
4/27/2011	Marshall, AL	F1	Enhanced Fujita Scale	86-110	300	6.89	1.91 SW of Guntersville Municipal Airport to 1.22 WSW of Meltonsville	0	0	A tornado of EF-1 intensity produced peak wind speeds of up to 105 mph. The tornado tracked northeast from Lake Guntersville near McKee Island, west of State Highway 79 across the north end of Buck Island, then lifted near Star Point. The tornado damaged a marina just west of Highway 79 where a canopy collapsed. The tornado then crossed Joe Starnes Field (Airport) and snapped and uprooted many trees along Buck Island Road on the north side of Buck Island. The tornado

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
6:45 AM										produced damage over Star Point, along Milky Way Road, Monsanto Road, and Star Point Road. Trees were mostly snapped, twisted and uprooted at these locations. The tornado crossed over Lake Guntersville at several locations along its path.
4/27/2011 6:45 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	200	4.83	0.35 N of Martling to 0.6 SSE of Meltonsville	0	0	A tornado of EF-1 intensity produced peak wind speeds of 90 mph. This short-lived tornado did most of its damage over portions of Lake Guntersville State Park, near the entrance and across the golf course. Many trees were snapped with a few larger pines uprooted. The tornado continued briefly north-northeast crossing State Highway 227 before lifting near South Sauty Road and Highway 227 after snapping additional trees.
4/27/2011 6:43 AM	Marshall, AL	F0	Enhanced Fujita Scale	65-85	75	2.76	0.85 WNW of Henryville to 0.9 SW of Columbus City	0	0	A tornado of EF-0 intensity producing peak wind speeds of 85 mph touched down new Bakers Chapel Lane, just south of Bakers Chapel Road. The most significant damage was an area of uprooted trees along Bakers Chapel Road just west of U.S. Highway 431 / State Highway 1. The tornado continued northeast and crossed State Highway 79 where a few tree tops were snapped.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011 6:35 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	50	0.32	2.8 S of Grant to 2.71 SSE of Grant	0	0	An EF-1 tornado touched down on Crest Hill Road off of Cathedral Caverns Highway on the south side of Grant Mountain. As the tornado skipped along its short path, several trees were snapped on Crest Hill Road. As it skipped northeast, two very large hardwood trees were snapped and uprooted on Edmonds Road. Minor roof damage was sustained to a house there. Just northeast of this location, the tornado lifted.
4/27/2011 6:35 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	100	4.93	2.56 NE of Big Springs to 0.2 SSE of Lakeview	0	0	A tornado producing EF-1 intensity and peak wind speeds of up to 95 mph touched down along Browns Valley Road near the south end of Lake Guntersville. The tornado tracked northeast along Browns Valley Road and Creek Path Road before lifting near State Highway 79. The tornado snapped and twisted trees along Browns Valley Road. As the tornado crossed a neighborhood along Creek Path Road, more substantial damage occurred. Larger trees were uprooted and one house sustained significant roof loss. The tornado lifted near Highway 79 and Creek Path Road.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011 6:30 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	100	3.39	1.76 N of Hyatt to 1.23 W of Mountainview	0	0	A tornado of EF-1 intensity produced peak wind speeds of up to 110 mph. The tornado touched down just south of Guntersville near the intersection of Pleasant Hill and Section Line Roads (State Highway 166). From there, the tornado moved northeast crossing Pleasant Grove Road, snapping and uprooting numerous hardwood and softwood trees. At the intersection of Pleasant Hill Church Road and Community House Road, the steeple of the Pleasant Hill Church was removed and thrown about 100 feet. The porch columns were also removed. A residence next to the church sustained damage when the wooden front porch was removed and thrown behind the house about 100 feet. Roof damage resulted from large branches being knocked down onto the house. In a field across Pleasant Hill Road, a wide swath of trees were snapped and uprooted.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011 6:30 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	50	5.96	1.72 WNW of Highpoint to 0.49 S of Guntersville	0	0	A tornado of EF-1 intensity produced peak wind speeds up to 110 mph. The tornado touched down near the intersection of Section Line and Beck Roads in Lattiwood. The tornado then moved northeast along Oneonta Cutoff Road and eventually crossed State Highway 205. The tornado snapped numerous hardwood and softwood trees along the path and knocked trees on residences. Snapped power poles were found along the path. Additional tree damage occurred northeast of Highway 205 near the intersection of Brashiers Chapel and Wyeth Mountain Roads. Here, several barns were completely destroyed and numerous outbuildings had most of the tin removed from the roof.
4/27/2011	Marshall, AL	F1	Enhanced Fujita Scale	86-110	50	4.58	1.25 E of Highpoint to 0.61 SSW of Lane	0	0	A tornado of EF-1 intensity produced peak wind speeds up to 110 mph. The tornado touched down near the intersection of State Highway 325 and Max Graben Circle southwest of Albertville. From there, the tornado moved northeast across Section Line Road and State Highway 205. The tornado snapped and uprooted numerous hardwood and softwood trees along the path. Trees were knocked down onto several residences. The tornado crossed State Highway

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
6:30 AM										431 north of Albertville near State Highway 426. As it crossed George Wallace Drive north of Highway 431, a chicken house was completely destroyed on Arbor Acres Road. Other chicken houses on the same property sustained roof damage and lost tin from the sides of the structures.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/27/2011	Marshall, AL/DeKalb, AL	F2	Enhanced Fujita Scale	111-135	880	19.97	0.8 N of Warrentown to 2.31 N of Grove Oak	0	0	The tornado initially touched down just west of Guntersville Lake, near Spindle Top Drive and Highway 69. Numerous trees were snapped and uprooted in this location. The tornado then continued northeast across County Road (CR) 14 and across Cha-la-kee and Cotton Roads, where several homes had damage to shingles and numerous large trees were uprooted. The tornado then moved northeast across Guntersville Lake and strengthened as it crossed Buck Island. Numerous trees were snapped and uprooted across the Buck Island community. Several power poles were snapped near their bases and numerous homes sustained minor roof damage. Several piers and sheds were also destroyed. Damage was rated EF-1 through this area. Next, the tornado crossed east over Guntersville Lake and struck Lake Guntersville State Park as an EF-2. Hundreds of trees were twisted, snapped and uprooted through the northern half of the State Park. Several RV campers were damaged in the camp grounds and minor roof damage was observed at the camp lodge. The tornado continued northeast, just to the east of

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
6:30 AM										Highway 227, where hundreds of additional trees were snapped and uprooted along the west-facing valley wall. The tornado moved northeast as an EF-2, destroying a trailer and rolling another near Oliver Road, between Williams and Martin Drive. A barn and shed were also demolished. This tornado then continued northeast crossing Highway 227 near Morgan Cove Road, twisting and uprooting several trees. The tornado continued its path briefly northeast into DeKalb County, mainly snapping large tree limbs off of trees and uprooting a few trees. The tornado then dissipated between Grove Oak and Bucks Pocket State Park near CR 19 and CR 544.
4/27/2011	Marshall, AL	F1	Enhanced Fujita Scale	86-110	100	6.37	.33 N of Red Hill to 1.22 S of Warrentown	0	0	A fast moving tornado of EF-1 intensity produced peak wind speeds of 95 mph. This tornado was associated with a broad yet well-defined mesoscale convective vortex. The tornado touched down along County Road 14 (Diamond Road), and Red Hill Road. Large hardwood trees were snapped and uprooted in a convergent pattern along County Road 14 (Diamond Road) as the tornado

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
6:24 AM										moved rapidly northeast. Significant roof damage occurred to several chicken houses along Red Hill Road just west of County Road 14. The tornado lifted just north of Brookline Ridge Road near the extreme south side of Lake Guntersville.

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4/27/2011	Cullman, AL/Marshall, AL	F1	Enhanced Fujita Scale	86-110	75	11.04	3.93 ENE of Joppa to 1.96 ENE of Lakeview	0	0	This tornado initially touched down northeast of CR 1850 in Cullman county. It snapped numerous hardwood and softwood trees along its path in this location. The tornado then quickly moved northeast into Marshall county, where it continued its path into Marshall County. As the tornado moved into Marshall county, its peak winds strengthened to around 110 mph, becoming an EF-1 intensity tornado. On Feemster Gap Road a mobile home was rolled over several times. The mobile home hit a tree and fell back on its side with the roof badly damaged and the frame bent. No injuries were sustained at this location, but residents that had been inside the mobile home took shelter in an underground storm shelter minutes before the tornado hit. Other mobile homes nearby only sustained minor damage to the roofs and flashing underneath. Northeast of this, another mobile home was blown several feet from its original location (as noted by the location of its remaining porch). Behind this mobile home, an unanchored outbuilding was rolled several times and numerous large trees were uprooted and snapped in the field behind the home. As the tornado moved through the Johnsons Mill community, several barns were damaged, with one or two completely destroyed. A chicken house on Frv Gap Road was completely

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6:20 AM										
4/27/2011	Blount, AL/Marshall, AL	F1	Enhanced Fujita Scale	86-110	150	14.83	2.26 SSW of Liberty to 1.07 NNW of Hyatt	0	0	A tornado developed along a Quasi-Linear Convective System. It touched down in north central Blount County, northeast of Blountsville, and tracked northeastward into Marshall County (See Storm Data Huntsville). The damage along this track in Blount County was consistent with an EF1 tornado with winds up to 105 mph. The tornado touched down along AL Hwy 79, northeast of CR 26 where it knocked down trees and caused minor roof damage to two chicken houses. The tornado moved northeast and maintained a narrow path width averaging less than 0.10 mile (176 yds.). The tornado crossed US Hwy 278 east of Brooksville and moved into Marshall county near CR 21. Along the path, the tornado knocked down hundreds of trees. Several homes sustained damage due to fallen trees. In addition, several outbuildings and barns were destroyed. This tornado continued its northeastward track with peak wind speeds of

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6:12 AM										95 mph crossing County Road (CR) 21 (Big Spring Brow Road) in Blount County. The tornado then uprooted and snapped numerous large hardwood trees from the Blount/Marshall county line to near the intersection of Cox Gap Road and Highway 64. Just farther northeast, additional trees were uprooted along Fairview Drive and between Nixon Chapel Road and Panky Road where the tornado appeared to broaden/widen its circulation before lifting before Pleasant Grove Road.
10/26/2010	Marshall, AL	F0	Enhanced	65-85	150	0.88	.82 SSE of McVille to 1.43 ESE of McVille	0	0	An EF-0 tornado with peak winds up to 70 mph produced light sporadic damage along Hamby Road. The damage was relegated to a loss of roof materials on barns and light tree damage. One large tree was snapped by the tornado.
5:13 PM										
10/25/2010	Marshall, AL	F0	Enhanced	65-85	300	0.93	location 1.22 E of North Arab to 1.89 W of Grassy	0	0	An EF-0 tornado with peak winds up to 85 mph approached the town of Arab and touched down just east of Highway 231 at Haynes Road. The tornado snapped or uprooted several trees along and produced some minor roof and siding damage at a home at the intersection of Haynes Road and Putter Circle. Additional trees were snapped or uprooted on the golf course across the street from the home. The tornado continued a short track east-northeast causing significant damage to a farm outbuilding on Huckleberry Lane.
2:23 AM										

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4/24/2010 9:05 PM	Marshall, AL/DeKalb, AL	F3	Enhanced Fujita Scale	136-165	3960	38.96	0.4 NW Nixon Chapel to 20.4 E Poplar Springs	0	0	A long track EF-3 tornado produced severe damage in the towns of Albertville and Geraldine. The city of Albertville was especially hard hit with severe damage to numerous residences, Albertville High School and several large retail buildings. Extensive tree damage was also observed throughout the damage path. In the town of Geraldine, numerous large trees were snapped or uprooted which also led to some structural damage to residences. This was also noted along County Roads 227 and 52, just southeast of State Highway 75.
6/28/2009 3:50 PM	Marshall, AL	F0	Enhanced Fujita Scale	65-85	150	1.32	1.4 WSW Albertville Municipal Airport	0	0	A brief tornado touched down 4 miles southwest of Albertville, just southwest of the Albertville airport. Damage was sporadic and generally light, with a few trees uprooted and weaker softwood trees snapped. Light damage was also noted to a barn roof along White Oak road. Some damage also occurred to mature corn crops on the farm.
5/3/2009	Marshall, AL	F1	Enhanced Fujita Scale	86-109	150	0.25	2.0 ENE Mt Olive to 2.2 ENE Mt Olive	0	0	A tornado with a path length 1/4 of a mile, peak wind of 100 mph, and a maximum path width of 50 yards touched down just east of Morgan City. The most extensive damage occurred along Griffin Acres Road, where a roof was uplifted from a shed. This caused the

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2:40 PM										shed to partially collapse. Multiple trees were also uprooted and snapped. A large tree was blown down onto a trailer just before it lifted near Green Briar Cove Road.
4/19/2009 7:35 PM	Marshall, AL	F1	Enhanced Fujita Scale	86-109	180	3	2.0 SE Little New York to 3.0 SSE Poplar Springs	1	1	An EF-1 tornado touched down just south of Gin Road in the Asbury community. A mobile home was completely destroyed with the content blown 40 yards and the frame blown 60 yards. Tragically, one occupant suffered fatal injuries with another suffering life threatening injuries. The tornado continued to track northeast destroying one large chicken house and damaging several others. Several barns and outbuildings sustained substantial damage. The tornado weakened as it continued to move northeast before lifting near Asbury Road.

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4/10/2009	Marshall, AL/Jackson, AL/DeKalb, AL	F3	Enhanced Fujita Scale	138-167	1320	32.53	2.7 SSE Grant to 3.1 WSW Stamp	0	5	A tornado touched down approximately 2.5 miles south southeast of Grant along Campbell Mill Road. A few houses sustained minor roof damage on the southeast side of Grant. At least two mobile homes sustained major damage from falling trees. The tornado continued east crossing Old Union Road, Columbus City Road, and Cardessa Lane before descending into the Tennessee River Valley. The tornado crossed Highway 79 at approximately 307 PM CDT at the Baker Mountain Road intersection. At this point the damage path width was just below a half of a mile wide. One woman was injured when a tree fell on her car near the Waterfront Grocery store. Several houses sustained substantial damage on the east side of Highway 79 and many trees were snapped and uprooted. The roof was blown off of one home and a brick wall collapsed. The tornado crossed a small inlet onto the south side of Preston Island, wiping out several boat docks and boat houses. Several homes sustained significant damage on the island from falling trees. At least two wood homes had complete roof collapse and partial wall collapse. The tornado crossed Lake Guntersville into the South Sauty community. At least one person was injured in this area when he was caught outside during the tornado. At this

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2:02 PM										
4/10/2009 4:38 AM	Marshall, AL	F0	Enhanced Fujita Scale	65-85	600	1.96	0.4 ENE Little New York to 2.3 E Little New York	0	0	An EF-0 tornado with a 1.9 mile path length and maximum path width of 200 yards touched down just west of Martling Road in the Martin/Asbury community. The tornado tracked east across Martling Road, Bell Orr Drive, and Claude Hill Road before weakening and lifting near Asbury Church Road. Along the track, several trees were uprooted and a few were snapped. Most of a metal roof was peeled from a well-constructed barn. A few houses near Claude Hill Road sustained minor roof damage.
4/11/2008 1:33 PM	Marshall, AL	F0	Enhanced Fujita Scale	65-85	300	2.13	2.2 SSE Grant to 2.4 ESE Grant	0	0	Damage consistent with an EF-0 Tornado was found. The tornado exhibited maximum winds of 75 mph, maximum path width of 300 feet, and a path length of approximately 1.2 miles. This tornado uprooted several trees, and caused minor roof damage to several barn structures and homes.
4/11/2008 1:16 PM	Marshall, AL	F0	Enhanced Fujita Scale	65-85	90	1.63	1.6 SE Oleander to 2.1 E Oleander	0	0	The first area, near Union Grove, found damage consistent with an EF-0 tornado. The tornado produced slight damage to the back of one home, destroyed a shed, and several trees were uprooted. The tornado damage path was approximately 1.6 miles in length, and approximately 100 feet in width. Maximum wind speeds were approximately 85 mph with this tornado.

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2/6/2008 4:45 AM	Marshall, AL	F1	Enhanced Fujita Scale	86-110	105	0.16	0.7 SSW Guntersville Airport to 0.6 SSW Guntersville Municipal Airport	0	0	Representatives from the National Weather Service and the Marshall County Emergency Management Agency conducted a storm survey of damage that occurred in Marshall County, Alabama early in the morning of February 6, 2008. The damage was determined to originate from an EF-1 tornado with maximum wind speeds of 90 MPH. The tornado snapped or uprooted eight trees, destroyed an unanchored carport and two small storage sheds, caused minor roof damage to a nearby house, blew out three windows, and destroyed a large telephone pole. The damage occurred near U.S. Highway 431 northeast of the city of Guntersville.
9/22/2006 5:06 PM	Marshall, AL	F1	Fujita Scale	73-112	1500	3.2	2 SSW Albertville to .2 W Albertville	0	0	The tornado initially touched down in the southwest side of Albertville between Whitesville Road and South Broad Street. At this stage, the tornado was 40 yards wide producing F0 intensity wind up to 60 mph along a one quarter mile path. Then the tornado increased to F1 intensity with winds up to 100 mph along a path width of 500 yards. Several trees were snapped and uprooted in its path. Several homes sustained minor roof, awning, and gutter damage. The tornado continued its path north-northeast into western Albertville before dissipating.

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9/22/2006 3:38 PM	Marshall, AL	F0	Fujita Scale	<73	30	0.1	1 N Arab	0	0	A small and brief tornado was witnessed and photographed by two residents along Highway 69 just northeast of Arab looking west along State Highway 69. Trees were knocked down near the location of the photographed tornado.
4/7/2006 10:15 PM	Marshall, AL	F0	Fujita Scale	<73	450	<.1	3 N Arab to 3 NE Arab	0	0	A short lived F0 tornado severely damaged a large barn and storage area near the Cherokee ridge sign and Exxon station near highway 231.
3/29/2002 11:20 PM	Marshall, AL	F1	Fujita Scale	73-112	1500	8.7	.7 W Red Hill to 4.3 WSW Albertville	0	0	A tornado first touched down at a cemetery just west of Red Hill. The F1 tornado traveled on a near due east path crossing CR 14 (Warrenton Road), a small ridge, and SR 179. The tornado then climbed another ridge and downed several trees. Once on top of the ridge, the tornado paralleled Section Line Road (CR 166) downing trees and power lines and causing damage especially to outbuildings. The tornado ended at CR 152 (Oneonta Cut Off Road). Red Cross officials identified 3 structures with major damage and 18 with minor damage. There were no deaths or injuries reported with this tornado.

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11/24/2001 1:41 PM	Marshall, AL	F2	Fujita Scale	113-157	900	2	5.3 NW of Union Grove to just SW of Benton Round Mountain	0	7	A supercell thunderstorm produced a tornado in the Union Grove area. The tornado began at 1:41 pm, 5.3 miles northwest of Union Grove, near Shumate Mountain. The tornado moved northeast crossing CR 240 and ending at 1:44 pm near the base of Benton Round Mountain. The heaviest damage occurred southwest of CR 240. Ten to 15 mobile homes were destroyed, 5 homes suffered varying degrees of damage, several outbuildings and barns were destroyed, an ultra-lite hangar was destroyed, 2 hunting cabins were destroyed, and 7 people received minor injuries.
9/28/1996	Marshall, AL	F2	Fujita Scale	113-157	240	2.5	Near Grant to 3 E Grant	0	0	Around 1:50 am CDT a small but briefly strong tornado struck in northern Marshall County just southeast and east of Grant. The tornado path began about 2.5 miles south-southwest of Grant just off county Road 503 and extended in a northeastward direction for 2.5 miles. The damage path ended 3 miles east of Grant and just south of County Road 34. Total path length was 2.5 miles. Marshall County Emergency Management Agency reported that four houses were

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12:50 AM										destroyed and five homes and four house trailers sustained damage. Six greenhouses were also totally wrecked. Fortunately, many of the destroyed houses were unoccupied at the time of the tornado with occupant away for the weekend.
2/16/1995	Marshall, AL/DeKalb, AL	F2	Fujita Scale	113-157	2100	12	Near Martling to Hopewell to Lakeview	0	3	A tornado first touched down about 2 miles south-southwest of Martling in eastern Marshall County moving toward the east-northeast. The tornado continued on this track primarily across the rural area crossing into DeKalb County at 531 AM. The tornado moved through the Hopewell community in southwest DeKalb County before ending just south of the Lakeview community at Highway 75. Emergency Management reported that more than 10 homes were destroyed, about 40 homes were damaged, and 30 chicken houses were damaged or demolished.
5:28 AM										

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3/27/1994 11:02 AM	Marshall, AL	F2	Fujita Scale	113-157	1200	6	Guntersville	0	30	A tornado traveled southwest to northeast across an area just south of the city of Guntersville. The tornado apparently began along Highway 79 South then cross Big Spring Creek damaging a number of residential structures along Spring Creek Drive. The tornado appeared to weaken, but was still strong enough to rip off the top part of the roof to the Marshall Nursing Home and damaging several houses near the entrance to Happy Home. It crossed U.S. Highway 431 near the high school taking out some trees on the side of the mountain and damaging a couple of homes. A total of 103 houses were damaged, 45 of them along Spring Creek Drive, and 8 along Highway 79 South.
2/23/1994 3:40 AM	Marshall, AL	F0	Fujita Scale	<73	60	0.3	Boaz	0	0	A tornado moved a short distance through Boaz, destroying a barn and a garage. Also, the roof was blown off a storage building. The winds drove several two-by-four posts into the side of a building. Damage was estimated at approximately \$100,000.

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3/12/1986 8:20 PM	Cullman, AL/Marshall, AL	F2	Fujita Scale	113-157	600	7	Arab into Central Western Marshall County	0	5	A tornado first touched down in extreme NE Cullman county at a mobile home park inside the Arab city limits, but in Cullman County, and moved NE. Five members of one family riding in a car and a truck were injured when the tornado struck the vehicles. The father and one daughter were in the truck and the daughter was thrown from the vehicle and suffered some broken bones. The mother and two daughters were in the family car. Other damage included trees and power lines downed, 6 mobile homes and 5 houses damaged, and some industrial buildings damaged.

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4/5/1985	Marshall, AL	F3	Fujita Scale	158-206	831	8	Near Albertville Airport to near Alder Springs	0	5	At least 5 people were injured by a tornado that first touched down about 4 miles WSW of the Albertville Airport and moved NE to around the Alder Springs area. Some of the worst damage appeared to be near and just north of where the storm crossed U.S. 43431. A new building that was to house a new car dealership was destroyed and at least 3 houses were also destroyed in the area just NE of U.S. 431. One mobile home, occupied by 5 people was totally destroyed, but the occupants jumped from the home just before the tornado struck and were not injured. A 55 year old woman and a 58 year old man were injured when their home was destroyed just NE of U.S. 431. Both heard the storm approach, but did not have time to reach their storm shelter in the front yard. The husband grabbed his wife and pulled her into the den and onto the floor of the room. That was the last thing they remembered until they regained consciousness (lying on a

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4:45 PM										concrete slab that had been the floor of the den, but was now on the back porch) and saw that their home had been leveled. Both suffered head injuries, cuts and bruises. Others treated for injuries at a local hospital were: a 35 year old man who was in a chicken house and was struck by flying debris, a 39 year old man that was in a mobile home and a 29 year old woman whose pickup truck was blown into another vehicle. Storm damage included 2 houses destroyed, 6 houses with major damage and 10 mobile homes, 9 farm buildings, and 11 other type buildings damaged or destroyed.
7/5/1984 1:30 AM	Marshall, AL	F1	Fujita Scale	73-112	120	2.5	Guntersville	0	0	An apparent small tornado followed an intermittent path from near the Armory in southwest Guntersville to across the Warrenton Causeway. Damage was mainly to trees, boathouses, piers, and power lines. Three power line poles were broken off and blown into the Lake along the causeway. Some trees were downed and others twisted off.

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5/19/1983 2:35 PM	Marshall, AL	F1	Fujita Scale	73-112	240	1.5	Boaz to Albertville	0	2	A tornado skipped along a short path between Boaz and Albertville in southeast Marshall County. Two people were injured when the tornado destroyed their mobile home outside the outer city limits of Boaz. They were treated and released at a hospital. Three houses suffered major damage as the tornado continued to move northeastward. Trees, including 4 large oaks were downed in the area and some farm outbuildings were demolished.
2/22/1983	Marshall, AL	F2	Fujita Scale	113-157	1320	2.2	Albertville	0	0	A tornado touched down in the Whitesville Road area of Albertville and inflicted heavy damage as it moved northeast. There were several close calls that included the tornado passing very near a school bus loaded with children and one lady that held onto a tree as her nearby home was hit. The storm destroyed 4 houses, 11 mobile homes, 1 business and 1 chicken house. One home, 4 mobile homes, and 17 other buildings were heavily damaged. Thirteen homes and one chicken house had minor damage. There was also extensive damage to utility lines and trees and 3 school buildings received some damage. The most concentrated damage was in a small mobile home park about 1 mile north of where the tornado first touched down. Only 1 of the 10

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3:28 PM										mobile homes in the park escaped damage. Large hail preceded the tornado. A free-lance photographer captured the storm on film from his vantage point about 5 miles away as it moved through Albertville. This was a classic event in that the tornado came out of a well-defined wall cloud under the rain free base and a second, but much smaller wall could was also visible.
1/3/1982 10:45 PM	Marshall, AL	F2	Fujita Scale	113-157	300	2.5	Highway 69 northeast of Arab	0	1	A tornado touched down near Highway 69 northeast of Arab and damaged homes, outbuildings, trees and utility lines in the area. One house was unroofed and blown off its foundation. The couple that owned the home was awakened by the sound of the roof cracking. The husband suffered a cut on the head and a broken collar bone when hit by a falling piece of lumber. An oddity of the storm was the complete disappearance of a "huge" magnolia tree believed to be at least 20 years old from the yard.
5/18/1981 6:10 PM	Marshall, AL	F1	Fujita Scale	73-112	51	0.1	Guntersville	0	0	Brief tornado touchdown peeled the tin roof off a motorcycle repair shop. Eye witnesses saw funnel approaching over open field west of building and reported that it remained mostly aloft. Witnesses were also quoted as reporting that "it came roaring in making a noise like a freight train."

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5/12/1978 11:35 PM	Marshall, AL	F1	Fujita Scale	73-112	600	8	UNK	0	0	NONE AVAILABLE
7/31/1976 12:00 PM	Marshall, AL	F1	Fujita Scale	73-112	150	0.1	Claysville	0	0	A very small tornado dipped down in the Claysville Community. All property damage was confined to an area 50- yards wide by 100 yards long. Several businesses and a mobile home were damaged.
5/6/1976 5:50 PM	Marshall, AL	F1	Fujita Scale	73-112	UNK	2	Guntersville Lake	0	0	A small tornado touched down over Guntersville Lake and damaged 15 large boats in a marina. Path was mostly over water; only 1/4 mile was over land.
5/8/1975 9:48 PM	Marshall, AL	F1	Fujita Scale	73-112	300	0.5	Near Boaz (South)	0	0	A tornado was reported by the State Police touching down just south of Boaz, Alabama damaging 2 homes and 4 barns.
10/15/1974 3:30 PM	Blount, AL/Marshall, AL	F1	Fujita Scale	73-112	UNK	28.8	Cleveland to Albertville	0	1	A tornado moved northeastward in a skipping path across two counties. Tornado struck first at Cleveland, Alabama where several chicken houses were destroyed and water sucked from a small pond. An hour later, the tornado dipped briefly into downtown Albertville where it remained on the ground for about 30 seconds overturning an automobile and injuring one of the occupants. Several reports of loud roaring aloft came later from northeast of Albertville in Geraldine.

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5/2/1974 1:30 PM	Marshall, AL	F2	Fujita Scale	113-157	1200	2	Mt Hebron (near Arab)	0	0	A small tornado moved east-northeast through Mt. Hebron community 4 miles southwest of Boaz. House heavily damaged and several farm buildings destroyed.
5/27/1973 1:30 PM	Marshall, AL	F2	Fujita Scale	113-157	1500	31.5	North of Joppa to Eddy to Arab	0	3	This tornado moved ENE from north of Joppa to the Arab and Eddy communities. About 50 buildings were damaged or destroyed, including a motel and an egg factory.
5/8/1973 4:10 AM	Marshall, AL/DeKalb, AL	F2	Fujita Scale	113-157	2700	29.1	Guntersville to just S of Rainsville	2	12	Tornado first touched ground south of Guntersville and moved northeastward for 30 miles ending just southeast of Rainsville. Numerous mobile homes were destroyed and numerous farm buildings damaged. Several buildings totally destroyed. Both fatalities and most of the injuries occurred as the tornado passed just north of Geraldine.
1/26/1973 3:45 PM	Marshall, AL	F2	Fujita Scale	113-157	UNK	UNK	Albertville	0	0	Tornado struck mobile home park 1.5 miles northeast of Albertville destroying 2 unoccupied trailers and heavily damaging another. It moved northeastward damaging a store slightly.
6/27/1972 8:45 AM	Marshall, AL	F2	Fujita Scale	113-157	1200	0.3	Arab	0	2	Tornado destroyed mobile home, heavy damage to service station, workshop destroyed. Funnel sighted by many.

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4/4/1968 1:00 PM	Marshall, AL	F2	Fujita Scale	113-157	UNK	4.1	Albertville community	0	0	Moved NE from south of Albertville to the edge of town. Five homes were damaged. A barn and a machine shop were destroyed. This tornado was a minimal F2 tornado.
4/7/1964 10:00 AM	Marshall, AL	F1	Fujita Scale	73-112	UNK	UNK	Arab	0	0	Tornado dipped down unroofing large café and service station.
3/25/1962 5:15 PM	Marshall, AL	F1	Fujita Scale	73-112	300	0.5	North of Walnut Grove	0	0	This tornado struck in rural area demolishing or heavily damaging several farm buildings and damaging 3 houses. Moved from west to east.
3/7/1961 11:40 PM	Cullman, AL/Morgan, AL/Marshall, AL	F3	Fujita Scale	158-206	600	19.3	Fairview to Hulaco to Eddy to Union Grove to the Guntersville Dam	0	8	Damage first occurred near Fairview, then the tornado moved east-northeast across Hulaco, Eddy and Union Grove. It dissipated after passing Guntersville Dam. About 25 houses destroyed and 50 other houses or building damaged. Most damage at Eddy and Union Grove.
4/6/1958 12:03 AM	Marshall, AL/Jackson, AL	F3	Fujita Scale	158-206	300	25.7	Albertville to Section	0	1	This tornado skipped NE, destroying a half dozen homes from Albertville to Section.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
11/18/1957 5:30 PM	Blount, AL/Marshall, AL	F4	Fujita Scale	207-260	300	26.1	Near Rosa to E of Cleveland to E of Snead to NW of Albertville	3	12	This tornado moved NNE from near "Rosa", east of Cleveland, passing east of Snead, and NW of Albertville. All deaths occurred in Blount County as 40 homes were destroyed. A pilot reported the path to be "straight as an arrow".
4/8/1957 10:30 AM	Cullman, AL/Morgan, AL/Marshall, AL	F3	Fujita Scale	158-206	UNK	16.3	Extreme NW corner of Cullman County to north of Hulaco (passed near Piney Grove)	0	0	This tornado moved ENE across the extreme NW corner of Cullman County, passing near Piney Grove in the SE corner of Morgan County, to north of Hulaco. This was the "twin" of the event to occur at 1015 am on the same day. It destroyed small homes and barns.
4/8/1957 10:15 AM	Morgan, AL/Marshall, AL	F3	Fujita Scale	158-206	600	38.8	6 miles W of Falkville to 10 miles north of Arab	2	90	This strong tornado moved ENE from 6 miles W of Falkville, passing two miles S of that town, between Florette and Oleander, to ten miles N of Arab. Over 150 rural homes were damaged or destroyed in Morgan county, and two people were killed. The small communities of "Rock Creek", "Lawrence Grove", Bridal Mountain, and "Cotaco Valley" were torn apart (This area is what local papers called the "tornado alley" of Morgan county).

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
3/6/1944 3:00 PM	Blount, AL/Marshall, AL	F2	Fujita Scale	113-157	300	10	2 miles SE of Douglas to N of Boaz	2	40	This tornado moved NE from 2m SW of Douglas to North of Boaz. Near Horton, NE of Douglas, the tornado ripped the upper story off the Pine Grove School as 50 students fled the building. A 12 year old boy was killed, and 20 students were injured by flying debris. When the teacher regained consciousness, she drove a mile for help. About 10 homes were destroyed. An elderly man was killed when he was caught working in the field.
4/11/1939 12:00 PM	Madison, AL/Marshall, AL	F2	Fujita Scale	113-157	300	4	5 miles SW of Woodville	1	11	Several small homes and a mill were destroyed on the Paint Rock River, 5m SW of Woodville. One man was killed when he and a fishing companion sought shelter in the mill. Two other fishermen who stayed in the car were injured. The other eight injuries occurred in homes.
3/21/1932 4:30 PM	Cullman, AL/Morgan, AL/Marshall, AL	F4	Fujita Scale	207-260	1800	25	4 miles S Cullman to 3 miles E of Arab	18	100	This tornado moved NE from 4 miles south of Cullman and devastated homes in and near the rural communities of Phelan, Bolti, Berlin, and Fairview. South of Berlin, many people were injured in a box factory. One home was leveled and 6 occupants were killed. A teacher was killed in a school in Fairview an hour after the students had left. All deaths occurred in Cullman county, where 74 homes were destroyed. The tornado dissipated 3 miles E of Arab.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
5/28/1917 1:00 AM	Madison, AL/Marshall, AL/Jackson, AL	F3	Fujita Scale	158-206	600	18	SW of New Hope ENE 18 miles	6	35	This tornado moved ENE from SW of New Hope, destroying 20 homes on the S edge of town. The six deaths were in 4 different homes.
10/14/1909 5:00 PM	Marshall, AL/Jackson, AL	F2	Fujita Scale	113-157	1200	15	S of Woodville to E of Dutton	7	50	This powerful tornado moved E through rugged rural terrain, from south of Woodville, passing 8 miles south of Scottsboro. As many as 8 people were rumored to have died in northern Marshall county, and ten more in small communities in Jackson county. At least 40 homes were damaged or destroyed. At least one death occurred in Marshall county and six more died near "Wyeth Cove" in Jackson county. Other communities hit were "Wrights Cove", "Dry Cove", and "Keith". Some of these may be under the waters of Guntersville Lake today.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
4/24/1908 2:40 PM	Walker, AL/Jefferson, AL/Blount, AL/Marshall, AL/DeKalb, AL	F4	Fujita Scale	207-260	1500	105	Southeast Walker county to Sylvania in DeKalb county	35	188	The tornado first touched down in southeast Walker county and produced a half mile wide damage track near Dora and through Bergens, killing 12 people. Most of Bergens was destroyed. Local residents suggested that a ridge of hills forced the tornado to shift its path, thus missing Dora. Further to the northeast, two people were killed at Warrior, in Jefferson county, 1 near Royal, in Blount county, and two at Winnville. Fifteen people were killed and 150 others were injured at the south edge of Albertville, in Marshall county. Here, a nine-ton oil tank was reportedly carried for a half mile. The funnel dissipated at the north edge of Sylvania, in DeKalb county. The path is plotted as a single tornado, but nature of the forested and sparsely populated areas of the northern half of the track is such that a reformation would have been possible without being detected. Total damage was over \$500,000.
6/9/1896 11:00 AM	Marshall, AL	F2	Fujita Scale	113-157	600	2	Wyeth City	0	15	This tornado moved NE through Wyeth city, 3 miles south of Guntersville. Five small homes were destroyed and 7 damaged.

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Date/Time	County(ies)	F-scale	Enhanced or Traditional F-Scale Rating	Sustained Wind Speeds (MPH)	Path Width (feet)	Path Length (miles)	Locations Affected	Fatalities	Injuries	Description
1/11/1885 7:00 PM	Cullman, AL/Blount, AL/Marshall, AL/DeKalb, AL	F3	Fujita Scale	113-157	1500	35	Just west of Warrior River ENE to 7 miles SE of Albertville	3	20	This tornado moved ENE from just west of the Warrior River to 4 miles south of Albertville. At least one person was killed in Marshall county and 2 died in DeKalb county. Like the other AL events that day, this track may have been a family of tornadoes and downbursts. The last tornado dissipated into a downburst near Collinsville at the base of Sand Mountain. About 4 miles west of Collinsville, a child was killed and 13 injured in one house.
3/11/1884 8:00 PM	Marshall, AL	F2	Fujita Scale	113-157	900	10	8 miles N of Friendship ENE 10 miles (passing 5 m NE of Guntersville)	2	20	This tornado moved ENE beginning 8 miles N of "Friendship". It then passed 5 miles NE of Guntersville. Buildings were damaged or destroyed on 15 farms. Thirty buildings were blown down. A man was killed when he was caught in the open in a wagon heading home from Guntersville. The funnel was up to half mile wide.

Source: National Weather Service

News Reports of Tornadoes (2006-2013) – Arab Tribune On-Line[15 tornadoes in Marshall Co.](#)

The National Weather office in Huntsville has confirmed four more tornado tracks in Marshall County from the historic outbreak on April 27. That brings the total number of known tornado tracks in the county to 15 and the number across North Alabama t...

1.2K - Jun. 20, 2011; scored 782.0

[EF-4 kills 5; damage untold](#)

"Long track." That's the term the National Weather Service uses to describe the EF-4 tornado that started about 2:40 p.m. last Wednesday at Smith Lake in western Cullman County, clobbered downtown Cullman, clipped the old general store in Hulaco...

6.7K - May. 5, 2011; scored 306.0

[It was small, but storm on Monday had tornado](#)

The National Weather Service confirmed that a small tornado touched down in Arab early Monday morning. It was part of two and a half days of storms that brought the area the bulk of the rain it received for the entire month. The EF-0 tornado had wind...

2.0K - Nov. 1, 2010; scored 765.0

[Tornado, sirens raise concerns](#)

Minor damage was reported on Brindley Mountain last Wednesday as yet another storm system hit. Trees were uprooted and limbs strewn in several areas. Most of the damage occurred in Morgan County. A woman hunkered down in a closet in her home at Union...

4.7K - May. 11, 2009; scored 1000.0

[Tornado-packed storm hits Union Grove](#)

Rated EF-0, it damages home, church By DAVID MOORE - The Arab Tribune While it wasn't a big one, it was still a tornado. And was strong enough to damage the home of Mike, Deb and Jenna Stone Friday afternoon in Union Grove. It also caused some damage...

5.5K - Apr. 16, 2008; scored 1000.0

[Arab ducks 'tornado'](#)

Linn's lake house on Buck Island burns By DAVID MOORE - The Arab Tribune Arab apparently ducked a tornado early Wednesday morning, but the storm brought nearly two inches of rain and washed out a section of 10th Street NW. Winds from the same storm...

5.3K - Feb. 11, 2008; scored 1000.0

[Couple from Arab at school when tornado rips Enterprise](#)

Arab natives Kevin and Heather Hart Collins were at Enterprise High School and Enterprise Elementary School when a tornado hit Thursday, killing eight people. The 1985 Arab High School graduates work at the schools, which are located next to each other...

1.7K - Mar. 5, 2007; scored 1000.0

[Tornado buzzes Brindley Mountain](#)

Marcus Broadway was at home on Arrowhead Drive Friday afternoon listening to the police scanner when he heard a funnel cloud had been spotted moving east from Arab toward Grassy. He drove the block or so up to the intersection of Ala. 69 east of town...

6.6K - Sep. 27, 2006; scored 1000.0

[Be prepared, be safe during tornado season](#)

Sixty-three - the number of tornadoes that swept across the Midwest and South Sunday night, according to estimates by the National Weather Service. Twenty-seven - the number of people killed by the deadly twisters. Fifteen - the number of people killed...

2.7K - Apr. 5, 2006; scored 1000.0

Table E-3. Additional Local News Reports of Tornadoes

Tornado Events, Local News Reports		
Date	Source	Comment
5/22/69	The Advertiser-Glean	Small tornado caused structural damage
1/28/74	Arab Tribune	Tornado hits Brashiers Chapel Community destroying chicken house with 18,700 chickens.
4/12/79	The Advertiser-Glean	Tornado damaged 7 Gunters Mountain buildings, power outage
7/85	The Advertiser-Glean	Small tornado ripped up trees, power lines and damaged boat houses in Signal Point.
8/15/85	Arab Tribune	Tornadoes across Marshall County cause much damage.
4/5/86	The Advertiser-Glean	Tornado hits causing property damage
6/12/89	The Advertiser-Glean	Small tornado tore up a barn, ripped roof off mobile home, downed trees, power outage
11/22/92	Arab Tribune	Small tornado hits Union Grove
4/21/96	Arab Tribune	Tornado destroyed chicken house and killed 18,000 chickens.
3/5/97	Arab Tribune	Tornado hits downtown Arab, roofs ripped from businesses, barn toppled.
5/26/98	The Advertiser-Glean	Tornado tore off roofs, damaged homes, blew down trees, hail

Past Occurrences of Severe Storms

Table E-4. Marshall County Heavy Rain Events, 1994-2013

4 PRECIPITATION event(s) were reported in **Marshall County, Alabama** between **01/01/1994** and **12/31/2013**.

Mag: Magnitude

Dth: Deaths

Inj: Injuries

PrD: Property Damage

CrD: Crop Damage

*Click on **Location or County** to display Details.*

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Arab	3/27/1994	0	Heavy Rain	N/A	0	0	0.00K	0.00K
2 Countywide	6/1/1997	12:00 AM	Heavy Rain	N/A	0	0	0.00K	50.00K
3 Albertville	6/28/1999	3:00 PM	Heavy Rain	N/A	1	1	0.00K	0.00K
6 BOAZ	4/20/2011	23:25	Heavy Rain	N/A	0	0	0.00K	0.00K
TOTALS:					1	1	0.00K	50.00K

Source: National Climatic Data Center

Table E-5. Marshall County Thunderstorm and High Wind Events, 1960-2013

302 THUNDERSTORM & HIGH WIND event(s) were reported in **Marshall County, Alabama** between **01/01/1960** and **12/31/2013**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

*Click on **Location or County** to display Details.*

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MARSHALL	6/9/1960	1500	T'stm Wind	0 kts.	0	0	0	0
2 MARSHALL	3/18/1961	2300	T'stm Wind	53 kts.	0	0	0	0
3 MARSHALL	4/17/1964	900	T'stm Wind	0 kts.	0	0	0	0
4 MARSHALL	4/12/1965	230	T'stm Wind	0 kts.	0	0	0	0
5 MARSHALL	5/7/1967	130	T'stm Wind	0 kts.	0	0	0	0
6 MARSHALL	7/8/1969	1630	T'stm Wind	0 kts.	0	0	0	0
7 MARSHALL	5/27/1973	1440	T'stm Wind	0 kts.	0	0	0	0
8 MARSHALL	1/28/1974	815	T'stm Wind	0 kts.	0	0	0	0
9 MARSHALL	3/7/1975	1340	T'stm Wind	0 kts.	0	0	0	0
10 MARSHALL	6/14/1975	1500	T'stm Wind	0 kts.	0	0	0	0
11 MARSHALL	6/20/1975	2130	T'stm Wind	0 kts.	0	0	0	0
12 MARSHALL	4/4/1977	1150	T'stm Wind	0 kts.	0	0	0	0
13 MARSHALL	4/8/1979	2355	T'stm Wind	75 kts.	0	0	0	0
14 MARSHALL	5/31/1981	1200	T'stm Wind	0 kts.	0	0	0	0
15 MARSHALL	7/24/1981	1730	T'stm Wind	0 kts.	0	0	0	0
16 MARSHALL	5/31/1982	1700	T'stm Wind	0 kts.	0	0	0	0

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<u>17 MARSHALL</u>	11/20/1983	140	T'stm Wind	0 kts.	0	0	0	0
<u>18 MARSHALL</u>	11/23/1983	1400	T'stm Wind	0 kts.	0	0	0	0
<u>19 MARSHALL</u>	3/27/1984	2013	T'stm Wind	0 kts.	0	0	0	0
<u>20 MARSHALL</u>	7/22/1984	1730	T'stm Wind	0 kts.	0	0	0	0
<u>21 MARSHALL</u>	4/5/1985	1635	T'stm Wind	0 kts.	0	0	0	0
<u>22 MARSHALL</u>	4/5/1985	1710	T'stm Wind	0 kts.	0	0	0	0
<u>23 MARSHALL</u>	6/7/1985	1645	T'stm Wind	0 kts.	0	0	0	0
<u>24 MARSHALL</u>	6/7/1985	1645	T'stm Wind	0 kts.	0	0	0	0
<u>25 MARSHALL</u>	6/25/1985	1530	T'stm Wind	0 kts.	0	0	0	0
<u>26 MARSHALL</u>	7/10/1985	2050	T'stm Wind	0 kts.	0	0	0	0
<u>27 MARSHALL</u>	7/10/1985	2110	T'stm Wind	0 kts.	0	0	0	0
<u>28 MARSHALL</u>	7/15/1985	1755	T'stm Wind	0 kts.	0	0	0	0
<u>29 MARSHALL</u>	7/15/1985	1811	T'stm Wind	0 kts.	0	0	0	0
<u>30 MARSHALL</u>	8/1/1985	1635	T'stm Wind	0 kts.	0	0	0	0
<u>31 MARSHALL</u>	12/1/1985	915	T'stm Wind	0 kts.	0	0	0	0
<u>32 MARSHALL</u>	2/17/1986	2103	T'stm Wind	0 kts.	0	0	0	0
<u>33 MARSHALL</u>	2/17/1986	2155	T'stm Wind	0 kts.	0	0	0	0
<u>34 MARSHALL</u>	3/13/1986	120	T'stm Wind	0 kts.	0	0	0	0
<u>35 MARSHALL</u>	7/28/1986	2030	T'stm Wind	0 kts.	0	0	0	0
<u>36 MARSHALL</u>	7/6/1987	1710	T'stm Wind	0 kts.	0	0	0	0

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37 MARSHALL	1/19/1988	1830	T'stm Wind	0 kts.	0	0	0	0
38 MARSHALL	7/16/1988	1250	T'stm Wind	0 kts.	0	0	0	0
39 MARSHALL	9/24/1988	1800	T'stm Wind	0 kts.	0	0	0	0
40 MARSHALL	6/12/1989	1810	T'stm Wind	0 kts.	0	0	0	0
41 MARSHALL	6/12/1989	1810	T'stm Wind	0 kts.	0	0	0	0
42 MARSHALL	11/15/1989	1730	T'stm Wind	0 kts.	0	0	0	0
43 MARSHALL	8/4/1990	1735	T'stm Wind	0 kts.	0	0	0	0
44 MARSHALL	8/18/1990	1740	T'stm Wind	0 kts.	0	0	0	0
45 MARSHALL	8/29/1990	2222	T'stm Wind	0 kts.	0	0	0	0
46 MARSHALL	4/8/1991	1235	T'stm Wind	0 kts.	0	0	0	0
47 MARSHALL	4/27/1991	1445	T'stm Wind	0 kts.	0	0	0	0
48 MARSHALL	6/4/1991	1628	T'stm Wind	0 kts.	0	0	0	0
49 MARSHALL	3/10/1992	157	T'stm Wind	0 kts.	0	0	0	0
50 MARSHALL	3/10/1992	240	T'stm Wind	0 kts.	0	0	0	0
51 MARSHALL	6/18/1992	1615	T'stm Wind	0 kts.	0	0	0	0
52 MARSHALL	7/5/1992	1300	T'stm Wind	65 kts.	0	0	0	0
53 MARSHALL	4/15/1993	615	Thunderstorm Winds	0 kts.	0	0	0	0
54 Arab; Martling & Pop.	4/15/1994	915	Thunderstorm Winds/hail	1 kts.	0	0	5K	0
55 MARSHALL	5/15/1994	1920	Thunderstorm Winds	0 kts.	0	0	5K	0
56 Guntersville	6/16/1994	1800	Thunderstorm Winds	50 kts.	0	0	500K	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
57 Grant	6/26/1994	2218	Thunderstorm Winds	0 kts.	0	0	50K	0
58 Grant And Union Grove	6/29/1994	549	Thunderstorm Winds	50 kts.	0	0	5K	0
59 Grant	3/7/1995	1805	Thunderstorm Winds	0 kts.	0	0	0	0
60 Swaenging	3/7/1995	1832	Thunderstorm Winds	0 kts.	0	0	5K	0
61 Albertville	6/6/1995	2002	Thunderstorm Winds	0 kts.	0	0	25K	0
62 Guntersville	6/10/1995	1300	Thunderstorm Winds	50 kts.	0	0	10K	0
63 Guntersville Union Gr	7/4/1995	1615	Thunderstorm Winds	0 kts.	0	0	8K	0
64 Warrenton	8/20/1995	1355	Thunderstorm Winds	0 kts.	0	0	3K	0
65 ALZ001>050	10/4/1995	1200	Hurricane Opal/high Winds	N/A	2	0	0.1B	10.0M
66 ALZ001>018 - 020 - 022	1/18/1996	6:00 PM	High Wind	40 kts.	0	0	400K	0
67 Arab	4/14/1996	9:00 PM	T'stm Wind	55 kts.	0	0	75K	10K
68 Arab	4/20/1996	11:10 PM	T'stm Wind	56 kts.	0	0	130K	2K
69 Arab	4/29/1996	3:05 PM	T'stm Wind/hail	50 kts.	0	0	35K	4K
70 Boaz	7/7/1996	4:45 PM	T'stm Wind	50 kts.	0	0	10K	0K
71 Arab	8/24/1996	2:10 PM	T'stm Wind	50 kts.	0	0	15K	3K
72 Guntersville	8/24/1996	2:15 PM	T'stm Wind/hail	75 kts.	0	0	15K	3K
73 Boaz	9/16/1996	4:30 PM	T'stm Wind	50 kts.	0	0	8K	1K
74 Grant	9/16/1996	9:00 AM	T'stm Wind	55 kts.	0	0	35K	5K
75 Douglas	1/24/1997	4:40 PM	T'stm Wind	50 kts.	0	0	7K	1K

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76 Douglas	1/24/1997	5:00 PM	T'stm Wind	50 kts.	0	0	8K	1K
77 Arab	3/5/1997	2:35 PM	T'stm Wind	55 kts.	0	0	20K	0K
78 Albertville	3/5/1997	3:00 PM	T'stm Wind	50 kts.	0	0	10K	0K
79 Guntersville	3/5/1997	3:00 PM	T'stm Wind	0 kts.	0	0	6K	0K
80 Albertville	5/28/1997	7:15 AM	T'stm Wind	50 kts.	0	0	9K	0K
81 Union Grove	7/28/1997	2:45 PM	T'stm Wind	50 kts.	0	0	7K	0K
82 Arab	7/28/1997	2:50 PM	T'stm Wind	50 kts.	0	0	4K	0K
83 ALZ008	2/16/1998	3:30 AM	High Wind	39 kts.	0	0	3K	0K
84 ALZ008 - 017 - 024>025 - 032>033 - 035 - 039	2/22/1998	11:00 AM	High Wind	44 kts.	0	0	54K	0K
85 Grant	3/19/1998	10:45 PM	T'stm Wind	55 kts.	0	0	0K	0K
86 Guntersville	5/7/1998	5:45 AM	T'stm Wind	50 kts.	0	0	10K	5K
87 Grant	5/26/1998	3:24 PM	T'stm Wind	55 kts.	0	0	5K	10K
88 Countywide	6/5/1998	4:40 AM	T'stm Wind	55 kts.	0	0	45K	10K
89 Arab	6/15/1998	9:00 PM	T'stm Wind	50 kts.	0	0	20K	5K
90 Albertville	6/25/1998	3:55 PM	T'stm Wind	50 kts.	0	0	5K	0K
91 Albertville	6/30/1998	4:30 PM	T'stm Wind	50 kts.	0	0	5K	0K
92 Albertville	7/20/1998	2:50 PM	T'stm Wind	55 kts.	0	0	10K	0K
93 Guntersville	7/23/1998	6:00 PM	T'stm Wind	50 kts.	0	0	5K	0K
94 Boaz	7/24/1998	2:30 PM	T'stm Wind	50 kts.	0	0	5K	0K

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95 Horton	1/22/1999	7:37 PM	T'stm Wind	50 kts.	0	0	0K	0K
96 Boaz	2/27/1999	7:45 PM	T'stm Wind	50 kts.	0	0	0K	0K
97 Warrenton	4/19/1999	10:30 AM	T'stm Wind	50 kts.	0	0	2K	0K
98 Albertville	6/2/1999	12:25 PM	T'stm Wind	50 kts.	0	0	2K	0K
99 Arab	6/5/1999	2:10 AM	T'stm Wind	50 kts.	0	0	5K	0K
100 Boaz	6/5/1999	2:20 AM	T'stm Wind	50 kts.	0	0	2K	0K
101 Boaz	7/7/1999	5:30 PM	T'stm Wind	50 kts.	0	0	5K	0K
102 Boaz	7/24/1999	12:30 PM	T'stm Wind	50 kts.	0	0	5K	0K
103 Grant	8/19/1999	6:15 PM	T'stm Wind	55 kts.	0	0	5K	0K
104 Boaz	2/13/2000	8:05 PM	T'stm Wind	65 kts.	0	0	45K	0K
105 Countywide	7/20/2000	4:20 PM	T'stm Wind	65 kts.	0	0	70K	0K
106 Guntersville	8/10/2000	5:10 PM	T'stm Wind	50 kts.	0	0	3K	0K
107 ALZ006>010 - 016>019 - 023>025 - 027	11/24/2000	3:00 PM	High Wind	50 kts.	0	0	26K	0K
108 Countywide	2/16/2001	3:40 PM	T'stm Wind	55 kts.	0	0	5K	0K
109 Grant	6/21/2001	7:08 PM	T'stm Wind	50 kts.	0	0	3K	0K
110 Guntersville	7/3/2001	3:00 PM	T'stm Wind	50 kts.	0	0	2K	0K
111 Countywide	7/5/2001	12:15 PM	T'stm Wind	55 kts.	0	0	4K	0K
112 Union Grove	5/13/2002	10:57 AM	T'stm Wind	55 kts.	0	0	5K	0K
113 Boaz	7/2/2002	3:19 PM	T'stm Wind	50 kts.	0	0	3K	0K

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<u>114 Union Grove</u>	8/2/2002	9:35 PM	T'stm Wind	55 kts.	0	0	10K	0K
<u>115 Boaz</u>	8/20/2002	2:30 PM	T'stm Wind	60 kts.	0	0	70K	0K
<u>116 Arab</u>	11/10/2002	9:45 PM	T'stm Wind	65 kts.	0	0	125K	0K
<u>117 Union Grove</u>	2/22/2003	2:10 AM	T'stm Wind	60 kts.	0	0	0	0
<u>118 Claysville</u>	3/19/2003	9:55 AM	T'stm Wind	60 kts.	0	0	0	0
<u>119 Boaz</u>	5/2/2003	4:45 PM	T'stm Wind	60 kts.	0	0	0	0
<u>120 Albertville</u>	5/5/2003	1:10 PM	T'stm Wind	50 kts.	0	0	0	0
<u>121 Albertville</u>	5/5/2003	1:20 PM	T'stm Wind	60 kts.	0	0	0	0
<u>122 Albertville</u>	5/5/2003	5:00 AM	T'stm Wind	60 kts.	0	0	0	0
<u>123 Albertville</u>	5/5/2003	5:10 AM	T'stm Wind	50 kts.	0	0	0	0
<u>124 Guntersville</u>	5/5/2003	12:46 PM	T'stm Wind	50 kts.	0	0	2K	0
<u>125 Guntersville</u>	6/11/2003	11:18 AM	T'stm Wind	50 kts.	0	0	0	0
<u>126 Arab</u>	7/21/2003	3:27 PM	T'stm Wind	50 kts.	0	0	0	0
<u>127 Douglas</u>	11/18/2003	1:54 PM	T'stm Wind	60 kts.	0	0	0	0
<u>128 Grant</u>	6/22/2004	5:15 PM	T'stm Wind	50 kts.	0	0	0	0
<u>129 Boaz</u>	7/6/2004	6:35 PM	T'stm Wind	50 kts.	0	0	0	0
<u>130 Arab</u>	7/7/2004	4:07 PM	T'stm Wind	50 kts.	0	0	0	0
<u>131 Douglas</u>	7/7/2004	4:45 PM	T'stm Wind	50 kts.	0	0	0	0
<u>132 Horton</u>	7/7/2004	4:45 PM	T'stm Wind	50 kts.	0	0	0	0
<u>133 Guntersville</u>	7/12/2004	1:05 PM	T'stm Wind	50 kts.	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
134 Warrenton	7/12/2004	1:08 PM	T'stm Wind	50 kts.	0	0	0	0
135 Guntersville	7/13/2004	11:10 PM	T'stm Wind	60 kts.	0	0	0	0
136 Countywide	7/14/2004	3:20 PM	T'stm Wind	60 kts.	0	0	0	0
137 Hustlerville	7/14/2004	6:05 PM	T'stm Wind	50 kts.	0	0	5K	0
138 Arab	7/25/2004	3:40 PM	T'stm Wind	50 kts.	0	0	0	0
139 ALZ001>010 - 016	9/16/2004	4:55 AM	High Wind	50 kts.	0	3	2.5M	0
140 Arab	12/9/2004	7:55 AM	T'stm Wind	60 kts.	0	0	0	0
141 Guntersville	12/9/2004	8:35 AM	T'stm Wind	60 kts.	0	0	0	0
142 Albertville	12/9/2004	9:15 AM	T'stm Wind	60 kts.	0	0	0	0
143 Grant	4/1/2005	4:50 PM	T'stm Wind	55 kts.	0	0	0	0
144 Grant	4/1/2005	4:55 PM	T'stm Wind	55 kts.	0	0	0	0
145 Boaz	4/30/2005	3:20 AM	T'stm Wind	50 kts.	0	0	0	0
146 Arab	7/27/2005	3:32 PM	T'stm Wind	50 kts.	0	0	0	0
147 Albertville	8/12/2005	11:25 AM	T'stm Wind	50 kts.	0	0	0	0
148 Arab	8/22/2005	3:07 PM	T'stm Wind	50 kts.	0	0	0	0
149 Union Grove	11/15/2005	9:30 PM	T'stm Wind	60 kts.	0	0	0	0
150 Arab	3/9/2006	5:34 PM	T'stm Wind	70 kts.	0	0	1K	0
151 Union Grove	3/13/2006	6:35 PM	T'stm Wind	70 kts.	0	0	5K	0
152 Hebron	4/3/2006	3:47 AM	T'stm Wind	60 kts.	0	0	0	0
153 Guntersville	4/21/2006	4:45 PM	T'stm Wind	60 kts.	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
154 Guntersville	4/21/2006	4:48 PM	T'stm Wind	60 kts.	0	0	0	0
155 Guntersville	5/11/2006	8:45 PM	T'stm Wind	50 kts.	0	0	0	0
156 Albertville	7/2/2006	3:15 PM	T'stm Wind	50 kts.	0	0	0	0
157 Albertville	7/19/2006	1:10 PM	T'stm Wind	70 kts.	0	0	20K	0
158 Arab	7/19/2006	1:10 PM	T'stm Wind	50 kts.	0	0	0	0
159 Albertville	7/19/2006	12:35 PM	T'stm Wind	50 kts.	0	0	0	0
160 Boaz	7/28/2006	2:05 PM	T'stm Wind	50 kts.	0	0	0	0
161 Arab	9/22/2006	4:00 PM	T'stm Wind	50 kts.	0	0	0	0
162 ALZ008	12/25/2006	12:00 AM	High Wind	50 kts.	0	0	1K	0K
163 Little New York	4/3/2007	22:57 PM	Thunderstorm Wind	60 kts.	0	0	0K	0K
164 Swearengin	7/1/2007	13:40 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
165 Grant	8/1/2007	16:28 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
166 Guntersville Lake	8/1/2007	16:28 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
167 Arab	8/10/2007	11:55 AM	Thunderstorm Wind	50 kts.	0	0	0K	0K
168 Claysville	8/17/2007	14:02 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
169 Guntersville	8/17/2007	14:38 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
170 Oleander	8/17/2007	16:04 PM	Thunderstorm Wind	70 kts.	0	0	0K	0K
171 Union Grove	8/17/2007	16:11 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
172 Arab	8/17/2007	16:47 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
173 Columbus City	1/10/2008	17:10 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
174 Martling	1/10/2008	17:20 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
175 Union Grove	1/10/2008	18:10 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
176 ALZ006>008 - 016	1/29/2008	20:00 PM	High Wind	43 kts.	0	0	10K	0K
177 Guntersville	2/6/2008	5:43 AM	Thunderstorm Wind	52 kts.	0	0	1K	0K
178 Grant	4/11/2008	13:50 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
179 Douglas	5/20/2008	16:15 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
180 Whitesville	5/20/2008	16:15 PM	Thunderstorm Wind	61 kts.	0	0	2K	0K
181 Guntersville	5/27/2008	16:22 PM	Thunderstorm Wind	52 kts.	0	0	1K	0K
182 Grant	12/10/2008	1:10 AM	Thunderstorm Wind	50 kts.	0	0	0K	1K
183 Guntersville	12/10/2008	1:10 AM	Thunderstorm Wind	50 kts.	0	0	0K	1K
184 GUNTERSVILLE MUNI AR	2/11/2009	13:05	Thunderstorm Wind	52 kts. EG	0	0	1.00K	0.00K
185 LITTLE NEW YORK	3/28/2009	18:15	Thunderstorm Wind	60 kts. EG	0	0	5.00K	0.00K
186 CROSSROADS	4/2/2009	20:35	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
187 ARAB	4/10/2009	4:30	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
188 ARAB	4/10/2009	4:30	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
189 MARSHALL (ZONE)	4/13/2009	1:00	High Wind	55 kts. EG	0	0	600.00K	0.00K
190 COTTONVILLE	5/1/2009	16:35	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
191 RUTH	5/1/2009	17:20	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
192 ARAB	6/11/2009	9:51	Thunderstorm Wind	52 kts. ES	0	0	50.00K	0.00K
193 RUTH	6/15/2009	19:10	Thunderstorm Wind	52 kts. EG	0	0	4.00K	0.00K
194 HORTON	6/28/2009	15:44	Thunderstorm Wind	61 kts. EG	0	0	8.00K	0.00K
195 HIGHPOINT	6/28/2009	15:45	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
196 ALBERTVILLE MUNI ARP	6/28/2009	15:50	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
197 ALBERTVILLE MUNI ARP	6/28/2009	15:55	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
198 NEEDMORE	6/28/2009	16:00	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
199 ARAB	7/12/2009	23:40	Thunderstorm Wind	56 kts. EG	0	0	6.00K	0.00K
200 GUNTERSVILLE MUNI AR	7/12/2009	23:40	Thunderstorm Wind	56 kts. EG	0	0	6.00K	0.00K
201 BOAZ	7/13/2009	0:00	Thunderstorm Wind	56 kts. EG	0	0	6.00K	0.00K
202 MOUNTAINVIEW	7/30/2009	17:56	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
203 MARSHALL (ZONE)	12/2/2009	3:30	Strong Wind	43 kts. EG	0	0	1.00K	0.00K
204 RUTH	12/8/2009	22:10	Thunderstorm Wind	56 kts. EG	0	0	50.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>205 MARSHALL (ZONE)</u>	12/24/2009	17:00	High Wind	35 kts. ES	0	0	0.00K	0.00K
<u>206 MARTLING</u>	3/12/2010	9:25	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
<u>207 DOUGLAS</u>	6/4/2010	13:24	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>208 LAKEVIEW</u>	6/15/2010	12:52	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
<u>209 UNION GROVE</u>	6/15/2010	16:17	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
<u>210 HENRYVILLE</u>	6/19/2010	11:05	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
<u>211 RUTH</u>	7/25/2010	15:05	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K
<u>212 GUNTERSVILLE LAKE</u>	7/26/2010	15:00	Thunderstorm Wind	50 kts. EG	0	0	18.00K	0.00K
<u>213 HYATT</u>	8/6/2010	12:05	Thunderstorm Wind	65 kts. EG	0	0	20.00K	0.00K
<u>214 SWEARENGIN</u>	8/6/2010	13:00	Thunderstorm Wind	65 kts. EG	0	0	30.00K	0.00K
<u>215 MOUNTAIN GAP</u>	9/11/2010	15:50	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
<u>216 BOAZ</u>	9/21/2010	12:33	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>217 MOUNTAIN GAP</u>	10/25/2010	2:25	Thunderstorm Wind	56 kts. EG	0	0	5.00K	0.00K
<u>218 MT CARMEL</u>	10/25/2010	2:27	Thunderstorm Wind	56 kts. EG	0	0	8.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
219 CLAYSVILLE	10/25/2010	2:28	Thunderstorm Wind	56 kts. EG	0	0	20.00K	0.00K
220 GUNTERSVILLE MUNI AR	10/25/2010	2:30	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
221 POPLAR SPGS	10/25/2010	2:37	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
222 ALBERTVILLE	10/25/2010	3:07	Thunderstorm Wind	56 kts. EG	0	0	20.00K	0.00K
223 LAKEVIEW	10/26/2010	16:27	Thunderstorm Wind	61 kts. EG	0	0	40.00K	0.00K
224 GUNTERSVILLE MUNI AR	10/26/2010	23:18	Thunderstorm Wind	74 kts. EG	0	0	10.00K	0.00K
225 ARAB	2/24/2011	23:50	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
226 ARAB	2/28/2011	13:28	Thunderstorm Wind	52 kts. EG	0	0	16.00K	0.00K
227 LAKEVIEW	2/28/2011	13:38	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
228 GUNTERSVILLE MUNI AR	2/28/2011	13:42	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
229 MT CARMEL	3/26/2011	18:57	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
230 LAKEVIEW	3/26/2011	18:58	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
231 ALBERTVILLE MUNI AR	4/4/2011	18:15	Thunderstorm Wind	49 kts. EG	0	0	0.10K	0.00K
232 UNION GROVE	4/11/2011	18:15	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
233 ARAB	4/11/2011	18:15	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K
234 EDDY	4/20/2011	4:32	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
235 UNION GROVE	4/20/2011	4:35	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
236 ARAB	4/20/2011	4:50	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
237 MARSHALL (ZONE)	4/20/2011	5:04	High Wind	52 kts. MG	0	0	0.00K	0.00K
238 MARSHALL (ZONE)	4/20/2011	5:05	High Wind	50 kts. EG	0	0	100.00K	0.00K
239 MARSHALL (ZONE)	4/20/2011	5:10	High Wind	50 kts. EG	0	0	0.00K	0.00K
240 MARSHALL (ZONE)	4/20/2011	5:15	High Wind	50 kts. EG	0	0	0.00K	0.00K
241 MARSHALL (ZONE)	4/20/2011	5:30	High Wind	50 kts. EG	0	0	0.00K	0.00K
242 GUNTERSVILLE MUNI AR	4/20/2011	23:14	Thunderstorm Wind	40 kts. EG	0	0	1.00K	0.00K
243 ARAB	4/20/2011	23:14	Thunderstorm Wind	40 kts. EG	0	0	1.00K	0.00K
244 WARRENTON	6/18/2011	14:07	Thunderstorm Wind	39 kts. EG	0	0	2.00K	0.00K
245 LANE	6/18/2011	14:09	Thunderstorm Wind	39 kts. EG	0	0	2.00K	0.00K
246 LITTLE NEW YORK	6/18/2011	14:14	Thunderstorm Wind	39 kts. EG	0	0	2.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
247 DOUGLAS	6/21/2011	14:08	Thunderstorm Wind	52 kts. EG	0	0	18.00K	0.00K
248 ARAB	6/21/2011	14:08	Thunderstorm Wind	58 kts. EG	0	0	4.00K	0.00K
249 DOUGLAS	6/21/2011	14:10	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
250 NEIGHBORS MILL	6/21/2011	14:13	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
251 HYATT	6/21/2011	14:15	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
252 ARAB	6/21/2011	14:15	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
253 ARAB	6/21/2011	14:15	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
254 WARRENTON	6/21/2011	14:22	Thunderstorm Wind	43 kts. EG	0	0	2.00K	0.00K
255 SCANT CITY	6/21/2011	14:25	Thunderstorm Wind	43 kts. EG	0	0	2.00K	0.00K
256 ALBERTVILLE	6/21/2011	14:30	Thunderstorm Wind	48 kts. EG	0	0	20.00K	0.00K
257 ALBERTVILLE	6/21/2011	14:40	Thunderstorm Wind	65 kts. EG	0	0	20.00K	0.00K
258 WHITESVILLE	6/21/2011	14:45	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
259 LITTLE NEW YORK	6/21/2011	14:45	Thunderstorm Wind	52 kts. EG	0	0	8.00K	0.00K
260 ARAB	6/21/2011	14:59	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>261 DOUGLAS</u>	6/21/2011	15:02	Thunderstorm Wind	61 kts. EG	0	0	10.00K	0.00K
<u>262 DOUGLAS</u>	6/21/2011	15:02	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
<u>263 ARAB</u>	6/21/2011	15:03	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
<u>264 NORTH ARAB</u>	6/21/2011	15:03	Thunderstorm Wind	58 kts. EG	0	0	2.00K	0.00K
<u>265 RUTH</u>	6/21/2011	15:03	Thunderstorm Wind	58 kts. EG	0	0	2.00K	0.00K
<u>266 ARAB</u>	6/21/2011	15:03	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
<u>267 EDDY</u>	6/21/2011	15:05	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
<u>268 MT CARMEL</u>	6/21/2011	15:25	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
<u>269 NORTH ARAB</u>	6/21/2011	15:25	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
<u>270 BOAZ</u>	6/26/2011	14:00	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
<u>271 BOAZ</u>	6/26/2011	14:00	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
<u>272 BOAZ</u>	6/26/2011	14:01	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
<u>273 HUSTLERVILLE</u>	6/26/2011	14:11	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
<u>274 CLAYSVILLE</u>	6/28/2011	6:30	Thunderstorm Wind	43 kts. EG	0	0	1.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>275 WARRENTON</u>	7/4/2011	15:35	Thunderstorm Wind	43 kts. EG	0	0	2.00K	0.00K
<u>276 COLUMBUS CITY</u>	7/4/2011	16:37	Thunderstorm Wind	43 kts. EG	0	0	2.00K	0.00K
<u>277 HYATT</u>	7/12/2011	15:30	Thunderstorm Wind	52 kts. EG	0	0	2.00K	0.00K
<u>278 HORTON</u>	8/3/2011	23:20	Thunderstorm Wind	45 kts. EG	0	0	5.00K	0.00K
<u>279 HEBRON</u>	8/4/2011	0:20	Thunderstorm Wind	52 kts. EG	0	0	75.00K	0.00K
<u>280 MC VILLE</u>	3/2/2012	21:17	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
<u>281 HYATT</u>	3/31/2012	16:35	Thunderstorm Wind	61 kts. EG	0	0	2.00K	0.00K
<u>282 CROSSROADS</u>	5/29/2012	20:25	Thunderstorm Wind	35 kts. EG	0	0	0.50K	0.00K
<u>283 GUNTERSVILLE</u>	7/1/2012	18:35	Thunderstorm Wind	78 kts. EG	0	0	100.00K	0.00K
<u>284 GRANT</u>	7/1/2012	19:03	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>285 GUNTERSVILLE</u>	7/5/2012	19:49	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
<u>286 GUNTERSVILLE</u>	7/5/2012	20:05	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>287 ARAB</u>	7/5/2012	20:25	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>288 MELTONSVILLE</u>	7/16/2012	15:37	Thunderstorm Wind	52 kts. EG	0	0	3.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>289 MARSHALL (ZONE)</u>	12/25/2012	21:00	High Wind	35 kts. ES	0	0	10.00K	0.00K
<u>290 MARSHALL (ZONE)</u>	2/25/2013	23:50	Strong Wind	43 kts. EG	0	0	35.00K	0.00K
<u>291 ALLEN XRDS</u>	3/5/2013	13:11	Thunderstorm Wind	51 kts. MG	0	0	0.00K	0.00K
<u>292 GRANT</u>	3/5/2013	13:13	Thunderstorm Wind	54 kts. MG	0	0	0.00K	0.00K
<u>293 GUNTERSVILLE MUNI AR</u>	3/5/2013	13:30	Thunderstorm Wind	39 kts. EG	0	0	1.00K	0.00K
<u>294 ARAB</u>	3/18/2013	14:23	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>295 GUNTERSVILLE</u>	3/18/2013	14:30	Thunderstorm Wind	52 kts. EG	0	0	20.00K	0.00K
<u>296 ALBERTVILLE</u>	3/18/2013	14:35	Thunderstorm Wind	87 kts. EG	0	0	0.00K	0.00K
<u>297 ALBERTVILLE</u>	3/18/2013	14:35	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
<u>298 RABBIT TOWN</u>	3/18/2013	14:35	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
<u>299 GRASSY</u>	4/19/2013	1:20	Thunderstorm Wind	43 kts. EG	0	0	0.50K	0.00K
<u>300 BIG SPGS</u>	6/1/2013	18:00	Thunderstorm Wind	43 kts. EG	0	0	0.20K	0.00K
<u>301 DOUGLAS</u>	8/21/2013	16:36	Thunderstorm Wind	43 kts. EG	0	0	10.00K	0.00K
<u>302 GUNTERSVILLE</u>	9/2/2013	2:34	Thunderstorm Wind	52 kts. EG	0	0	25.00K	0.00K
TOTALS:					2	3	106.251M	10.062M

Source: National Climatic Data Center

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2014 Marshall County Multi-Hazard Mitigation Plan

Table E-6. Marshall County Lightning Events, 1994-2013

35 LIGHTNING event(s) were reported in **Marshall County, Alabama** between **01/01/1994** and **12/31/2013**.

Mag: Magnitude

Dth: Deaths

Inj: Injuries

PrD: Property Damage

CrD: Crop Damage

*Click on **Location or County** to display Details.*

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Boaz	3/24/1994	1637	Lightning	N/A	0	0	5K	0
2 Guntersville	4/15/1994	930	Lightning	N/A	0	0	50K	0
3 Albertville	6/22/1994	1230	Lightning	N/A	0	0	5K	0
4 Brindlee Mountain	2/15/1995	1630	Lightning	N/A	0	1	5K	0
5 Boaz	7/15/1995	1321	Lightning	N/A	0	0	25K	0
6 Boaz	7/15/1995	1349	Lightning	N/A	0	0	8K	0
7 Boaz	8/6/1995	1710	Lightning	N/A	0	0	25K	0
8 Arab	4/29/1996	2:45 PM	Lightning	N/A	0	0	15K	0K
9 Boaz	8/8/1996	3:00 PM	Lightning	N/A	0	0	15K	0K
10 Horton	6/14/1997	1:00 AM	Lightning	N/A	0	0	7K	0K
11 Arab	7/7/1998	5:30 PM	Lightning	N/A	0	0	30K	0K
12 Guntersville	2/9/1999	7:30 PM	Lightning	N/A	0	0	12K	0K
13 Guntersville	7/24/1999	2:40 PM	Lightning	N/A	0	0	5K	0K
14 Grant	6/25/2002	10:00 AM	Lightning	N/A	0	0	25K	0K
15 Albertville	4/3/2006	3:57 AM	Lightning	N/A	0	0	2K	0
HEBRON	3/4/2008	4:00	Lightning		0	0	75.00K	0.00K
UNION GROVE	6/28/2009	16:30	Lightning		0	0	0.50K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
COTTONVILLE	7/25/2010	15:30	Lightning		1	4	0.00K	0.00K
LAKEVIEW	10/26/2010	16:46	Lightning		0	1	0.00K	0.00K
WHITESVILLE	4/11/2011	18:15	Lightning		0	0	1.00K	0.00K
GRANT	4/11/2011	18:15	Lightning		0	0	1.00K	0.00K
ALBERTVILLE	4/11/2011	18:15	Lightning		0	0	1.00K	0.00K
DOUGLAS	4/11/2011	18:15	Lightning		0	0	1.00K	0.00K
SCANT CITY	6/21/2011	14:25	Lightning		0	0	1.00K	0.00K
MOUNTAINVIEW	3/5/2013	13:30	Lightning		0	0	1.00K	0.00K
ALBERTVILLE	8/2/2013	7:30	Lightning		0	0	15.00K	0.00K
ALBERTVILLE	8/10/2013	13:10	Lightning		0	1	0.00K	0.00K
TOTALS:					1	7	330.5	0.00K

Source: National Climatic Data Center

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Table E-7. Marshall County Hail Events, 1967-2013

148 HAIL event(s) were reported in **Marshall County, Alabama** between **01/01/1967** and **12/31/2013**.

*Click on **Location or County** to display Details.*

Mag: Magnitude

Dth: Deaths

Inj: Injuries

PrD: Property Damage

CrD: Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MARSHALL	5/12/1967	950	Hail	0.75 in.	0	0	0	0
2 MARSHALL	4/14/1968	1730	Hail	2.00 in.	0	0	0	0
3 MARSHALL	1/28/1974	815	Hail	0.75 in.	0	0	0	0
4 MARSHALL	3/7/1975	1340	Hail	2.75 in.	0	0	0	0
5 MARSHALL	5/8/1975	2148	Hail	0.75 in.	0	0	0	0
6 MARSHALL	2/22/1983	1500	Hail	2.75 in.	0	0	0	0
7 MARSHALL	5/2/1984	1410	Hail	1.75 in.	0	0	0	0
8 MARSHALL	7/31/1986	1332	Hail	2.75 in.	0	0	0	0
9 MARSHALL	3/5/1989	1423	Hail	2.00 in.	0	0	0	0
10 MARSHALL	4/4/1989	420	Hail	1.00 in.	0	0	0	0
11 MARSHALL	4/4/1989	1000	Hail	0.75 in.	0	0	0	0
12 MARSHALL	4/4/1989	1035	Hail	0.75 in.	0	0	0	0
13 MARSHALL	5/3/1990	1820	Hail	1.00 in.	0	0	0	0
14 MARSHALL	3/6/1992	1522	Hail	1.00 in.	0	0	0	0
15 MARSHALL	10/10/1992	1442	Hail	1.00 in.	0	0	0	0
16 Arab; Martling & Pop.	4/15/1994	915	Thunderstorm Winds/hail	1 kts.	0	0	5K	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
17 Grant	6/26/1994	2226	Hail	0.75 in.	0	0	0	0
18 Black Island	6/26/1994	2248	Hail	0.75 in.	0	0	0	0
19 Beulah	1/28/1995	1555	Hail	0.75 in.	0	0	0	0
20 Arab	3/15/1996	1:42 PM	Hail	0.75 in.	0	0	12K	0
21 Arab	4/29/1996	3:05 PM	T'stm Wind/hail	50 kts.	0	0	35K	4K
22 Guntersville	8/24/1996	2:15 PM	T'stm Wind/hail	75 kts.	0	0	15K	3K
23 Arab	1/24/1997	4:20 PM	Hail	1.50 in.	0	0	8K	2K
24 Albertville	1/24/1997	4:49 PM	Hail	0.75 in.	0	0	7K	0K
25 Guntersville	1/24/1997	5:00 PM	Hail	1.75 in.	0	0	10K	3K
26 Douglas	4/28/1997	3:45 PM	Hail	1.00 in.	0	0	5K	0K
27 Albertville	4/28/1997	5:28 PM	Hail	0.75 in.	0	0	3K	0K
28 Guntersville	5/2/1997	6:48 PM	Hail	1.75 in.	0	0	15K	5K
29 Arab	3/19/1998	10:58 PM	Hail	0.75 in.	0	0	0K	0K
30 Union Grove	4/3/1998	5:18 PM	Hail	0.75 in.	0	0	0K	0K
31 Albertville	4/3/1998	5:55 PM	Hail	0.75 in.	0	0	0K	0K
32 Arab	4/8/1998	6:37 PM	Hail	0.75 in.	0	0	0K	0K
33 Arab	4/8/1998	6:45 PM	Hail	2.75 in.	0	0	50K	20K
34 Arab	4/8/1998	6:52 PM	Hail	2.75 in.	0	0	55K	18K
35 Guntersville	4/8/1998	6:59 PM	Hail	1.75 in.	0	0	10K	5K
36 Albertville	4/8/1998	7:11 PM	Hail	0.88 in.	0	0	0K	0K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
37 Albertville	4/8/1998	7:14 PM	Hail	1.75 in.	0	0	20K	10K
38 Horton	4/16/1998	9:40 PM	Hail	0.75 in.	0	0	0K	0K
39 Boaz	2/27/1999	7:45 PM	Hail	0.88 in.	0	0	0K	0K
40 Highpoint	4/19/1999	10:30 AM	Hail	0.88 in.	0	0	0K	0K
41 Grant	5/5/1999	11:40 PM	Hail	1.00 in.	0	0	3K	0K
42 Arab	2/13/2000	7:45 PM	Hail	1.00 in.	0	0	2K	0K
43 Guntersville	4/27/2000	7:10 PM	Hail	1.00 in.	0	0	2K	0K
44 Arab	7/26/2000	2:57 PM	Hail	0.75 in.	0	0	0K	0K
45 Arab	5/28/2001	4:35 PM	Hail	1.00 in.	0	0	0K	0K
46 Arab	6/26/2001	2:25 PM	Hail	1.75 in.	0	0	2K	0K
47 Albertville	11/24/2001	1:45 PM	Hail	0.75 in.	0	0	0K	0K
48 Horton	5/3/2002	11:40 AM	Hail	1.00 in.	0	0	0K	0K
49 Highpoint	7/2/2002	3:19 PM	Hail	0.75 in.	0	0	0K	0K
50 Guntersville	8/20/2002	2:13 PM	Hail	1.00 in.	0	0	0K	0K
51 Arab	8/26/2002	3:35 PM	Hail	0.75 in.	0	0	0K	0K
52 Grant	2/22/2003	4:05 AM	Hail	0.75 in.	0	0	0	0
53 Albertville	3/19/2003	12:15 PM	Hail	0.75 in.	0	0	0	0
54 Albertville	3/19/2003	12:27 PM	Hail	0.75 in.	0	0	0	0
55 Albertville	3/19/2003	12:38 PM	Hail	0.75 in.	0	0	0	0
56 Guntersville	4/25/2003	4:05 PM	Hail	1.00 in.	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
57 Albertville	4/25/2003	4:15 PM	Hail	1.00 in.	0	0	0	0
58 Albertville	5/2/2003	1:30 PM	Hail	1.75 in.	0	0	0	0
59 Arab	5/2/2003	1:30 PM	Hail	1.75 in.	0	0	0	0
60 Arab	5/2/2003	1:55 PM	Hail	1.75 in.	0	0	0	0
61 Guntersville	5/2/2003	2:05 PM	Hail	1.00 in.	0	0	0	0
62 Horton	5/2/2003	2:15 PM	Hail	0.88 in.	0	0	0	0
63 Arab	5/2/2003	3:40 PM	Hail	0.75 in.	0	0	0	0
64 Albertville	5/2/2003	4:22 PM	Hail	0.75 in.	0	0	0	0
65 Boaz	5/2/2003	4:23 PM	Hail	0.75 in.	0	0	0	0
66 Albertville	5/2/2003	4:30 PM	Hail	1.00 in.	0	0	0	0
67 Boaz	5/2/2003	4:30 PM	Hail	1.00 in.	0	0	0	0
68 Guntersville	5/5/2003	12:46 PM	Hail	0.88 in.	0	0	0	0
69 Albertville	5/5/2003	12:50 PM	Hail	0.75 in.	0	0	0	0
70 Union Grove	3/30/2004	2:30 PM	Hail	0.75 in.	0	0	0	0
71 Guntersville	7/13/2004	11:30 PM	Hail	0.75 in.	0	0	0	0
72 Union Grove	2/21/2005	6:43 PM	Hail	0.75 in.	0	0	0	0
73 Arab	2/21/2005	6:49 PM	Hail	0.75 in.	0	0	0	0
74 Scant City	2/21/2005	6:49 PM	Hail	0.88 in.	0	0	0	0
75 Albertville	2/21/2005	7:42 PM	Hail	0.88 in.	0	0	0	0
76 Douglas	2/21/2005	8:10 PM	Hail	0.88 in.	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
77 Grant	4/7/2005	1:36 PM	Hail	0.75 in.	0	0	0	0
78 Guntersville	4/22/2005	5:39 PM	Hail	1.25 in.	0	0	0	0
79 Arab	6/20/2005	6:40 PM	Hail	1.00 in.	0	0	0	0
80 Union Grove	12/4/2005	2:00 AM	Hail	0.75 in.	0	0	0	0
81 Union Grove	4/7/2006	10:22 PM	Hail	1.75 in.	0	0	15K	0
82 Grant	4/7/2006	10:32 PM	Hail	1.75 in.	0	0	20K	0
83 Albertville	4/18/2006	4:15 PM	Hail	1.00 in.	0	0	0	0
84 Boaz	4/18/2006	4:50 PM	Hail	1.00 in.	0	0	0	0
85 Albertville	4/19/2006	4:19 PM	Hail	0.88 in.	0	0	0	0
86 Albertville	4/19/2006	4:21 PM	Hail	1.00 in.	0	0	0	0
87 Mc Ville	4/19/2006	4:25 PM	Hail	1.00 in.	0	0	0	0
88 Boaz	4/19/2006	4:30 PM	Hail	1.00 in.	0	0	0	0
89 Boaz	4/19/2006	4:44 PM	Hail	1.25 in.	0	0	0	0
90 Arab	4/20/2006	2:40 PM	Hail	0.75 in.	0	0	0	0
91 Union Grove	4/20/2006	5:08 PM	Hail	1.00 in.	0	0	0	0
92 Arab	4/20/2006	5:09 PM	Hail	1.75 in.	0	0	0	0
93 Arab	4/21/2006	2:30 AM	Hail	1.75 in.	0	0	0	0
94 Grant	4/21/2006	3:50 AM	Hail	0.88 in.	0	0	0	0
95 Grant	5/13/2006	8:55 PM	Hail	0.88 in.	0	0	0	0
96 Douglas	6/22/2006	5:26 PM	Hail	0.88 in.	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
97 Albertville	5/3/2007	13:35 PM	Hail	0.75 in.	0	0	0K	0K
98 Union Grove	4/11/2008	13:20 PM	Hail	1.75 in.	0	0	0K	0K
99 Grant	4/11/2008	13:40 PM	Hail	0.88 in.	0	0	0K	0K
100 Union Grove	4/11/2008	13:40 PM	Hail	1.00 in.	0	0	0K	0K
101 Saratoga	6/1/2008	14:59 PM	Hail	0.75 in.	0	0	0K	0K
102 Highpoint	6/1/2008	15:00 PM	Hail	1.00 in.	0	0	0K	0K
104 Arab	12/10/2008	1:10 AM	Hail	0.88 in.	0	0	0K	0K
105 GUNTERSVILLE MUNI AR	3/28/2009	18:10	Hail	1.00 in.	0	0	0.00K	0.00K
106 MOUNTAINVIEW	3/28/2009	18:12	Hail	1.25 in.	0	0	0.00K	0.00K
107 GUNTERSVILLE MUNI AR	3/28/2009	18:12	Hail	0.88 in.	0	0	0.00K	0.00K
108 ARAB	4/10/2009	4:20	Hail	0.88 in.	0	0	0.00K	0.00K
109 ALLEN XRDS	4/10/2009	13:30	Hail	0.75 in.	0	0	0.00K	0.00K
110 GRANT	4/10/2009	13:50	Hail	2.75 in.	0	0	0.00K	0.00K
111 SWEARENGIN	4/10/2009	13:55	Hail	2.00 in.	0	1	0.00K	0.00K
112 GUNTERSVILLE LAKE	4/10/2009	14:03	Hail	2.75 in.	0	0	0.00K	0.00K
113 ARAB	4/10/2009	14:26	Hail	0.88 in.	0	0	0.00K	0.00K
114 MT CARMEL	4/10/2009	14:35	Hail	1.00 in.	0	0	0.00K	0.00K
115 GUNTERSVILLE MUNI AR	4/10/2009	14:36	Hail	2.00 in.	0	0	0.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>116 COTTONVILLE</u>	4/10/2009	14:38	Hail	2.00 in.	0	0	0.00K	0.00K
<u>117 HYATT</u>	4/10/2009	14:55	Hail	1.50 in.	0	0	0.00K	0.00K
<u>118 HUSTLERVILLE</u>	4/10/2009	15:05	Hail	1.25 in.	0	0	0.00K	0.00K
<u>119 ALBERTVILLE MUNI ARP</u>	4/10/2009	15:21	Hail	1.00 in.	0	0	0.00K	0.00K
<u>120 SARATOGA</u>	4/10/2009	15:26	Hail	1.75 in.	0	0	0.00K	0.00K
<u>121 ALBERTVILLE</u>	4/19/2009	19:21	Hail	0.88 in.	0	0	0.00K	0.00K
<u>122 ALBERTVILLE</u>	4/19/2009	19:24	Hail	0.88 in.	0	0	0.00K	0.00K
<u>123 HENRYVILLE</u>	5/1/2009	17:04	Hail	0.88 in.	0	0	0.00K	0.00K
<u>124 GUNTERSVILLE MUNI AR</u>	3/12/2010	9:09	Hail	0.75 in.	0	0	0.00K	0.00K
<u>125 MARTLING</u>	3/12/2010	9:25	Hail	1.75 in.	0	0	50.00K	0.00K
<u>126 NORTH ARAB</u>	3/25/2010	18:56	Hail	0.88 in.	0	0	0.00K	0.00K
<u>127 ARAB</u>	10/24/2010	21:50	Hail	1.00 in.	0	0	0.00K	0.00K
<u>128 UNION GROVE</u>	3/26/2011	18:56	Hail	1.00 in.	0	0	0.00K	0.00K
<u>129 UNION GROVE</u>	3/26/2011	18:59	Hail	1.75 in.	0	0	0.00K	0.00K
<u>130 ALBERTVILLE</u>	3/26/2011	19:25	Hail	0.75 in.	0	0	0.00K	0.00K
<u>131 HEBRON</u>	4/11/2011	18:27	Hail	1.75 in.	0	0	0.00K	0.00K
<u>132 GRANT</u>	6/15/2011	13:03	Hail	0.88 in.	0	0	0.00K	0.00K
<u>133 GRANT</u>	6/15/2011	13:04	Hail	1.00 in.	0	0	0.00K	0.00K
<u>134 LAKEVIEW</u>	6/24/2011	15:40	Hail	0.88 in.	0	0	0.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
135 ALLEN XRDS	7/4/2011	16:30	Hail	0.88 in.	0	0	0.00K	0.00K
136 GRANT	8/4/2011	10:20	Hail	1.75 in.	0	0	5.00K	0.00K
137 DOUGLAS	3/2/2012	18:49	Hail	1.00 in.	0	0	0.00K	0.00K
138 DOUGLAS	3/2/2012	18:58	Hail	1.00 in.	0	0	0.00K	0.00K
139 ALBERTVILLE MUNI ARP	3/2/2012	21:12	Hail	0.88 in.	0	0	0.00K	0.00K
140 ARAB	3/31/2012	16:15	Hail	1.00 in.	0	0	0.00K	0.00K
141 ARAB	3/31/2012	16:28	Hail	1.00 in.	0	0	0.00K	0.00K
142 GUNTERSVILLE	4/5/2012	17:45	Hail	0.88 in.	0	0	0.00K	0.00K
143 GRANT	4/5/2012	18:20	Hail	1.75 in.	0	0	0.00K	0.00K
144 GUNTERSVILLE	4/5/2012	18:50	Hail	0.88 in.	0	0	0.00K	0.00K
146 BOAZ	6/7/2013	11:25	Hail	0.75 in.	0	0	0.00K	0.00K
147 BOAZ	6/7/2013	11:25	Hail	0.75 in.	0	0	0.00K	0.00K
148 BOAZ	6/13/2013	11:25	Hail	0.75 in.	0	0	0.00K	0.00K
TOTALS:						1	349.00K	70.00K

Source: National Climatic Data Center

News Reports of Severe Storms

[Windy storm snaps oak to welcome homeowners](#)

Devin and Danielle Marsh's experience as homeowners has been short and smashing. They moved into their 7th Street N.E. house on April 20 and had not even made their first payment when a large oak tree in the front yard snapped in an approaching storm...

 1.8K - Jun. 13, 2012; scored 448.0

[Loud storm winds nearly hit 29 mph](#)

The storms that kept a lot of people up Sunday night and Monday morning were loud but they

didn't bring as much rain as it might have sounded like. The wind in Arab, however, hit 28.8 mph. Rainfall measured between 1.42 inches and 1.9 inches, accordi...

1.6K - Jan. 25, 2012; scored 672.0

[Storms bring needed rain](#)

Rains Wednesday through Friday morning dropped about an inch and a half of rain, the first real rain of June. The accompanying storms Wednesday also brought several power outages. Ed Reed at Pine Lake Village measured 0.6 inches Wednesday and 0.95 in...

0.9K - Jun. 20, 2011; scored 448.0

[Stormy deja vu](#)

A sense of deja vu blew across Brindley Mountain Tuesday afternoon as winds howled, trees toppled, torrential rain fell, lights flickered - and then went out, with some flickering, for up to 10 hours. The storm Tuesday afternoon proved far less destr...

5.7K - Jun. 27, 2011; scored 304.0

[Storm knocks out power and Hulaco carport](#)

A STAFF REPORT - The Arab Tribune The sound of chainsaws and trucks filled the clear air at Marshall County Sheriff's Deputy Billy Pickett's house Tuesday afternoon. That's because Monday night the sounds of thunder and pelting rain accompanied the r...

1.4K - Apr. 13, 2011; scored 207.0

[Waves of T-storms almost spin tornadoes](#)

Ken Moore is something of a tornado magnet. By his own count, the owner of Arby's in Arab has been in six or seven tornados over the years. He thinks he almost was in one about 11:30 p.m. Sunday while still at his restaurant. And he may almost have b...

5.6K - Oct. 27, 2010; scored 896.0

[Lightning kills girl; injures others](#)

Lightning strikes in Arab and Marshall County caused damage, injuries and one death Sunday. A 15-year-old Huntsville girl was killed by a lightning strike while she was swimming at Honeycomb Beach. Her 13-year-old sister and mother were injured. A Hu...

3.3K - Jul. 28, 2010; scored 1000.0

[No tornado hit, just a month's worth of rain](#)

The first severe weather of the spring cut short the Marshall North Relay for Life Friday night in Arab and brought with it a month's worth of rain in just over a day. It also gave the area two close calls with tornado-generating storms as two last f...

3.5K - Apr. 28, 2010; scored 1000.0

[Weekend's rain only 1 inch shy of May average](#)

Heavy rains the last weekend of April and the first weekend of May caused major problems for roads in Arab and Marshall County. An Arab woman was trapped on top of her car when she drove it through flooded Haynes Road. Ed Reed at Pine Lake Village me...

2.3K - May. 5, 2010; scored 761.0

[Storms and rain](#)

The dramatic lightning storm that rumbled (and rumbled) through Arab Monday night also dumped 0.8 inches of rain, as measured at Pine Lake, and knocked out power to 300-400 customers of Arab Electric Cooperative. Power was restored by 2:30 a.m. Tuesd...

0.7K - Jun. 17, 2009; scored 131.0

[Arab spared Sunday, but storm kills two](#)

No storm damage was reported in the Arab area Sunday, but two people were killed in Marshall and Morgan counties. The storm hit Morgan County first about 6:30 p.m. Robert "Jay" Irwin, 63, of Priceville was in the living room of his mobile home on Bet...

1.7K - Apr. 22, 2009; scored 1000.0

[Trees topple as sustained winds wail](#)

Some people slept through all of the stormy commotion early Monday morning, even as trees hit their home. The racket had already awakened others when near disaster hit. Meteorologists are blaming the sustained, howling winds on gravity waves. Whateve...

4.6K - Apr. 15, 2009; scored 259.0

Table E-8. Additional Local News Reports of Severe Storms

Severe Events, Local News Reports		
Date	Source	Comment
6/7/62	Arab Tribune	Windstorm in Ruth Community, blew off roofs, downed trees, cut off power.
3/10/63	Arab Tribune	Wide spread damage through Marshall County.
4/7/70	The Advertiser-Gleam	Buildings damaged, trees down, blackout
1/5-6/70	The Advertiser-Gleam	Swearengin hit by storm, roofing blown off, trees toppled, chickens drown
5/18/73	Arab Tribune	High winds and possible tornado did heavy damage to homes and trailers in Brindlee Mountain area.
5/80	The Advertiser-Gleam	Major windstorm, property damage, trees toppled, traffic lights out
1/18/83	Arab Tribune	60 mph winds cause damage in Marshall County.
6/24/87	Arab Tribune	Storm with high winds, rain and possible tornado leaves 1,800-2,000 without power across Marshall County.
12/14/87	Arab Tribune	High winds cause minor damage in Arab area.
6/14/89	Arab Tribune	Wind left 4,000 customers without power
8/24/89	Arab Tribune	High winds cause 500 customers to be without power.
5/20/90	Arab Tribune	5,000 customers without power due to wind, lightning and rain.
6/23/91	Arab Tribune	High winds blew out church wall, culverts and roads washed out, power off.
6/20/93	Arab Tribune	High winds downed trees in Brindlee Mountain area.
8/18/93	Arab Tribune	High winds blow steeple off of church.
7/26/95	Arab Tribune	High winds down trees, damage roofs in Marshall County.

Past Occurrences of Floods

Table E-9. Marshall County Flood Events, 1997-2013

54 FLOOD event(s) were reported in **Marshall County, Alabama** between **01/01/1997** and **12/31/2013**.

Mag: Magnitude

Dth: Deaths

Inj: Injuries

PrD: Property Damage

CrD: Crop Damage

*Click on **Location or County** to display Details.*

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Arab	1/5/1997	1:05 AM	Flash Flood	N/A	0	0	5K	2K
2 Guntersville	5/2/1997	8:00 PM	Flash Flood	N/A	0	0	40K	5K
3 Albertville	6/17/1997	9:00 AM	Flash Flood	N/A	0	0	12K	0K
4 Countywide	1/7/1998	9:30 AM	Flash Flood	N/A	0	0	50K	5K
5 Boaz	6/28/1999	2:00 AM	Flash Flood	N/A	0	0	8K	0K
6 Countywide	4/3/2000	12:00 PM	Flash Flood	N/A	0	0	10K	0K
7 Arab	7/5/2001	12:30 PM	Flash Flood	N/A	0	0	3K	0K
8 Countywide	8/10/2001	8:00 AM	Flash Flood	N/A	0	4	100K	0K
9 Countywide	2/22/2003	6:45 AM	Flash Flood	N/A	0	0	0	0
10 Countywide	2/22/2003	9:46 AM	Flash Flood	N/A	0	0	0	0
11 Countywide	5/6/2003	10:00 AM	Flash Flood	N/A	0	0	250K	0
12 Douglas	6/17/2003	4:00 PM	Flash Flood	N/A	0	0	0	0
13 Claysville	6/19/2003	4:30 PM	Flash Flood	N/A	0	0	0	0
14 ALZ001 - 004 - 008 - 010 - 010	2/6/2004	1:00 AM	Flood	N/A	0	0	0	0
15 Arab	3/5/2004	11:05 PM	Flash Flood	N/A	0	0	0	0
16 Guntersville	3/5/2004	11:05 PM	Flash Flood	N/A	0	0	0	0

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
17 Countywide	9/16/2004	4:36 PM	Flash Flood	N/A	0	0	0	0
18 Guntersville	10/19/2004	2:25 PM	Flash Flood	N/A	0	0	0	0
19 Countywide	12/9/2004	9:45 AM	Flash Flood	N/A	0	0	0	0
20 Arab	2/6/2008	6:34 AM	Flash Flood	N/A	0	0	27K	0K
21 Albertville	2/6/2008	6:39 AM	Flash Flood	N/A	0	0	0K	0K
22 ALLEN XRDS	1/6/2009	8:16	Flood		0	0	450.00K	0.00K
23 NORTH ARAB	1/6/2009	17:00	Flash Flood		0	0	0.00K	0.00K
24 RUTH	1/6/2009	20:32	Flash Flood		0	0	0.00K	0.00K
25 GRASSY	2/27/2009	13:15	Flash Flood		0	0	0.00K	0.00K
26 MT OLIVE	5/6/2009	5:25	Flash Flood		0	0	0.00K	0.00K
27 DOUGLAS	5/6/2009	5:25	Flash Flood		0	0	10.00K	0.00K
28 OLEANDER	5/6/2009	7:15	Flood		0	0	5.00K	0.00K
29 DOUGLAS	5/6/2009	9:00	Flood		0	0	5.00K	0.00K
30 BOAZ	6/28/2009	16:03	Flash Flood		0	0	0.00K	0.00K
31 HORTON	12/18/2009	9:47	Flood		0	0	0.00K	0.00K
32 ROCKY RIDGE	1/24/2010	10:30	Flash Flood		0	0	0.00K	0.00K
33 ALBERTVILLE	8/16/2010	18:50	Flash Flood		0	0	0.00K	0.00K
34 ARAB	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K
35 NORTH ARAB	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K
36 ARAB	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>37 LITTLE NEW YORK</u>	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K
<u>38 GRASSY</u>	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K
<u>39 LITTLE NEW YORK</u>	3/9/2011	7:00	Flash Flood		0	0	0.00K	0.00K
<u>40 HULACO</u>	3/9/2011	11:00	Flood		0	0	0.00K	0.00K
<u>41 ALBERTVILLE</u>	9/5/2011	9:30	Flash Flood		0	0	15.00K	0.00K
<u>42 GUNTERSVILLE</u>	9/5/2011	14:15	Flash Flood		0	0	0.00K	0.00K
<u>43 ROCKY RIDGE</u>	11/30/2011	7:00	Flood		0	0	0.00K	0.00K
<u>44 HEBRON</u>	1/23/2012	5:30	Flash Flood		0	0	100.00K	0.00K
<u>45 HORTON</u>	1/26/2012	13:35	Flash Flood		0	0	0.00K	0.00K
<u>46 BOAZ</u>	1/26/2012	13:50	Flash Flood		0	0	0.00K	0.00K
<u>47 ALBERTVILLE MUNI ARP</u>	1/26/2012	13:50	Flash Flood		0	0	0.00K	0.00K
<u>48 SARATOGA</u>	1/26/2012	19:00	Flood		0	0	5.00K	0.00K
<u>49 BOAZ</u>	4/28/2013	15:47	Flood		0	0	0.00K	0.00K
<u>50 ALBERTVILLE MUNI ARP</u>	5/6/2013	5:50	Flood		0	0	0.00K	0.00K
<u>51 ROCKY RIDGE</u>	5/6/2013	5:50	Flood		0	0	0.00K	0.00K
<u>52 SARATOGA</u>	5/6/2013	5:51	Flood		0	0	0.00K	0.00K
<u>53 HEBRON</u>	7/7/2013	17:21	Flash Flood		0	0	0.00K	0.00K
<u>54 MOUNTAINVIEW</u>	8/6/2013	9:10	Flash Flood		0	0	0.00K	0.00K
Totals:					0	4	1.095M	12.00K

Source: National Climatic Data Center

News Reports of Floods

[Weekend's rain only 1 inch shy of May average](#)

Heavy rains the last weekend of April and the first weekend of May caused major problems for roads in Arab and Marshall County. An Arab woman was trapped on top of her car when she drove it through flooded Haynes Road. Ed Reed at Pine Lake Village me...

2.3K - May. 5, 2010; scored 159.0

[7.15 inches of rain hit Morgan City, area last week](#)

By the time it finally drizzled out, a frog-strangling 7.15 inches of rain fell last Monday and Tuesday in the Morgan City area and nearly that much inundated parts of Arab. January's 20-year average for Arab is 6.49 inches. For the month last year, ...

2.7K - Jan. 12, 2009; scored 126.0

[Off the bridge, into the drink](#)

Flood washes teens, Jeep into Cotaco Creek By CHARLES WHISENANT - The Arab Tribune They just wanted to get a close-up look at how fast the water was running over Ruth Road at the foot of Ruth Mountain in Moon Hollow. And they did get a close look - t...

3.2K - Jan. 12, 2009; scored 126.0

[It rained](#)

5.5 inches falls in 24 hours By DAVID MOORE - The Arab Tribune In 24 hours Monday and Tuesday, a deluge of 4.4 to 5.5 inches of rain fell, saturating Brindley Mountain and closing roads with the overflow. Those amounts were measured through only 2 p....

4.3K - Jan. 7, 2009; scored 185.0

Table E-10. Additional Local News Reports of Flooding

Flooding in Marshall County, Local News Reports		
Date	Source	Comment
2/9/69	The Advertiser-Gleam	Parches Cove, Paint Rock River Valley and Greenbrier Cove flooded
12/31/69-1/3/70	The Advertiser-Gleam	7 families evacuated
1/8/70	The Advertiser-Gleam	4 families in Greenbrier Cove and 3 in Parches Cove were marooned by flood
3/17/73	Arab Tribune	Flooding in low-lying areas of County, more than 8 inches of rain
4/26/73	The Advertiser-Gleam	Damaged houses, roads, school flooded. Parches Cove knew in advance and took precautions.
3/79	The Advertiser-Gleam	4 inches of rain, 1 death, Paint Rock River overflowed banks, roads washed out, oil entered building
3/20/80	The Advertiser-Gleam	Paint Rock River overflowed, courthouse flooded
9/16/88	Arab Tribune	3.85 inches of rain, washed out roads, caused by Hurricane Gilbert
2/21/90	The Advertiser-Gleam	County schools closed, washed out bridges, lake second highest it has been since 1939
12/23/90	Arab Tribune	12 inches of rain, washed out roads, \$300,000 in damages

Flooding in Marshall County, Local News Reports		
Date	Source	Comment
2/10/94	Arab Tribune	5.25 inches of rain brings flooding to Marshall County.
2/21/97	Arab Tribune	Roads in Arab closed
2/5/04	The Advertiser-Glean	4 - 5 inches of rain, flooding, trees down, roads closed

Past Occurrences of Hurricanes

Table E-11. Marshall County Hurricane and Tropical Storm Events, 1995-2013

3 HURRICANE & TROPICAL STORM event(s) were reported in **Marshall County, Alabama** between **01/01/1995** and **12/31/2013**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

*Click on **Location or County** to display Details.*

Alabama								
Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 ALZ001>050	10/04/1995	1200	Hurricane Opal/high Winds	N/A	2	0	0.1B	10.0M
2 ALZ001 - 001>003 - 005>010 - 016	07/10/2005	06:00 PM	Tropical Storm	N/A	0	0	0	0
3 ALZ001>010 - 016	08/29/2005	08:00 PM	Tropical Storm	N/A	0	0	0	0
TOTALS:					2	0	100.000M	10.000M

Source: National Climatic Data Center

Past Occurrences of Winter Storms/Freezes

Table E-12. Marshall County Snow and Ice Events, 1993-2013

22 SNOW & ICE event(s) were reported in **Marshall County, Alabama** between **01/01/1993** and **12/31/2013**.

*Click on **Location or County** to display Details.*

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 ALZ001>018	3/12/1993	2200	Winter Storm	N/A	4	0	5.0B	0
2 ALZ001>011 - 014 - 016>018 - 020	2/6/1995	2100	Snow/ice	N/A	0	0	0	0
3 North Alabama	2/11/1995	1300	Snow/ice	N/A	0	0	0	0
4 ALZ001>038	1/6/1996	8:00 PM	Winter Storm	N/A	0	0	380K	38K
5 ALZ001>027 - 030>032 - 034	2/1/1996	3:00 PM	Winter Storm	N/A	0	0	595K	0
6 ALZ003>015	2/16/1996	2:00 AM	Winter Storm	N/A	0	0	195K	0
7 ALZ001>010	1/10/1997	10:00 AM	Winter Storm	N/A	0	0	64K	0K
8 ALZ001>010 - 016 - 018>021 - 028>029 - 037>038 - 047	12/29/1997	1:00 AM	Winter Storm	N/A	0	0	0K	0K
9 ALZ006>010 - 018>021	2/4/1998	1:30 AM	Winter Storm	N/A	0	0	27K	0K
10 ALZ001>008 - 011>017	12/23/1998	2:00 AM	Ice Storm	N/A	1	0	14.4M	0K
11 ALZ001>010 - 016>018 -	1/6/1999	12:00 PM	Winter Storm	N/A	0	0	0K	0K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>020 - 026</u>								
<u>12 ALZ006 - 008 - 018>019 - 028</u>	1/28/2000	4:00 AM	Winter Storm	N/A	0	0	75K	0K
<u>13 ALZ006>010 - 016>018 - 024>027</u>	3/20/2001	12:00 AM	Heavy Snow	N/A	0	0	0K	0K
<u>14 ALZ008 - 010</u>	2/26/2004	2:05 AM	Winter Storm	N/A	0	0	0	0
<u>15 ALZ008 - 009</u>	12/1/2008	2:30 AM	Winter Weather	N/A	0	0	0K	0K
<u>16 MARSHALL (ZONE)</u>	2/12/2010	7:30	Heavy Snow		0	0	0.00K	0.00K
<u>17 MARSHALL (ZONE)</u>	3/2/2010	0:00	Heavy Snow		0	0	0.00K	0.00K
<u>18 MARSHALL (ZONE)</u>	12/25/2010	7:30	Heavy Snow		0	0	0.00K	0.00K
<u>19 MARSHALL (ZONE)</u>	1/9/2011	17:30	Heavy Snow		0	0	0.00K	0.00K
<u>20 MARSHALL (ZONE)</u>	2/3/2011	14:00	Heavy Snow		0	0	0.00K	0.00K
<u>21 MARSHALL (ZONE)</u>	1/17/2013	13:00	Heavy Snow		0	0	0.00K	0.00K
<u>22 MARSHALL (ZONE)</u>	1/17/2013	13:00	Heavy Snow		0	0	0.00K	0.00K
TOTALS:					5	0	5.016B	38K

Source: National Climatic Data Center

Table E-13. Marshall County Extreme Cold Events, 1996-2013

3 COLD TEMPERATURE EXTREME event(s) were reported in **Marshall County, Alabama** between **01/01/1950** and **12/31/2013**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

*Click on **Location** or **County** to display Details.*

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
MARSHALL (ZONE)	2/3/1996	18:00	Cold/Wind Chill		0	0	0.00K	0.00K
MARSHALL (ZONE)	3/7/1996	8:00	Cold/Wind Chill		0	0	0.00K	1.000M
MARSHALL (ZONE)	1/16/2009	3:20	Cold/Wind Chill		0	0	0.00K	0.00K
Totals:					0	0	0.00K	1.000M

Source: National Climatic Data Center

News Reports of Winter Storms

[Let it snow](#)

Brody Ivey, Dameon Haggard and Bryson Ivey, from left to right above, got out at Stone Creek Apartments during the second and largest wave of snow to blow through North Alabama Thursday. Dyllan Thorpe, 8, below, of Spring Valley Drive found more than...

0.7K - Jan. 21, 2013; scored 525.0

[More snow expected to fall tonight, in morning](#)

If you're a former cheerleader for snow who's now sick of it - or if you never liked it to start with - you won't like this forecast. On the other hand, if you're still a snow fan... A brewing winter storm is expected to bring at least 2 inches of sn...

2.2K - Feb. 9, 2011; scored 878.0

[Third most snow in 116 years](#)

and CHARLES WHISENANT The Arab Tribune It probably will be Friday before Arab and North Alabama thaw out from the third heaviest snowfall in 116 years. It can't come soon enough for city and county road crews, who have been hard at it trying to keep ...

4.4K - Jan. 12, 2011; scored 629.0

[Slip-sliding away](#)

Icy roads could have been worse Wednesday afternoon, but they were bad enough as they were. Ice and two wrecks about 2:30 p.m. closed Ala. 69 on the slippery side of Georgia Mountain. Alabama State Trooper information was minimal, but one wreck invol...

1.1K - Dec. 20, 2010; scored 306.0

[Another snow day](#)

Snow moved into the Brindley Mountain area about 5 a.m. Tuesday and didn't let up until about

11:30 a.m. leaving these horses near Morgan City with a cold breakfast. Temperatures remained above freezing, but after several inches of snow built up, Mar...

0.3K - Mar. 2, 2010; scored 451.0

[11 snows and counting](#)

4 snows in 5 days; Morgan gets most By CHARLES WHISENANT - The Arab Tribune The Morgan City and Union Grove areas were blanketed with about an inch of snow Tuesday morning. Arab got a dusting. That followed "snow days" on Friday, Sunday and Monday. A...

3.5K - Feb. 17, 2010; scored 946.0

[Finally... some snow](#)

A gray sky hung over Brindley Mountain last Saturday morning, but the snow was bright, as were the smiles on many faces. It had finally come a snow - at least a good inch or two. The snow left the statue of Arab founder Tuttle Thompson frozen downto...

0.4K - Dec. 9, 2009; scored 581.0

Table E-14. Additional Local News Reports of Winter Storms/Freezes

Date	Source	Comment
3/1/1960	Arab Tribune	Called out National Guard, Civil Defense, Highway Patrol, Electric and telephone crews from across Southeast. Parts of Alabama without power for 3 weeks.
3/17/1960	Arab Tribune	5 inches of snow
2/2/1961	Arab Tribune	700 without power in Arab area due to ice storm.
1/9/1962	Arab Tribune	More than 5inches of snow fell in parts of Marshall County.
12/18/1962	Arab Tribune	-4° F.
1/12/1963	Arab Tribune	Sub-freezing weather, ice then snow, closed Highway 231
12/22/1963	Arab Tribune	Snow turns to ice, closes roads, power out
12/31/1963	Arab Tribune	10.5 inches of snow, some drifts 18-20 inches
11/2/1966	Arab Tribune	3 inches of snow
1/11/1968	Arab Tribune	5 inches of snow, schools closed
2/15/1968	Arab Tribune	Major power outages in Marshall County
2/28/1968	The Advertiser-Glean	2-5 inches of snow, schools closed, power outages
2/20/1969	Arab Tribune	Ice covers Brindlee Mountain topped by snow, power outages.
1/6/1970	Arab Tribune	3 inches of snow on Brindlee Mountain
1/14/1970	Arab Tribune	Ice, snow and fog cause travel problems on Brindlee Mountain for several days.
1/20/1970	Arab Tribune	Ice and snow closed schools and some roads.
2/2/1970	Arab Tribune	6° F at Brindlee Mountain
1/3/1977	Arab Tribune	Ice and snow closed roads in Arab area.
1/10/1977	Arab Tribune	6° F low and 27° F high for one week causes energy shortage in both gas and electricity.
1/9/1978	Arab Tribune	1.5 inches of snow fell on Brindlee Mountain, schools

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Date	Source	Comment
		closed
2/18/1979	Arab Tribune	Ice storm paralyzed Arab and Brindlee Mountain. Power outage.
1/14/1982	Arab Tribune	4.5 inches of snow fell on Marshall County, roads closed
1/13/1983	Arab Tribune	Ice and snow close roads and schools in Marshall County.
1/2/1984	Arab Tribune	Hard freeze (0° F) caused broken water lines at Water Works storage tanks causing water shortage in some areas.
1/19/1985	Arab Tribune	1-3 inches of snow in Brindlee Mountain area.
1/19/1985	Arab Tribune	-11° F with 1 to 3 inches of snow in Brindlee Mountain area.
2/12/1985	Arab Tribune	2-4 inches of snow fell in Brindlee Mountain area, schools and roads closed.
1/27/1986	Arab Tribune	0° F, 2 inches of snow
1/21/1987	Arab Tribune	3 inches of snow in Arab, schools closed.
4/3/1987	Arab Tribune	5 inches of snow
1/6/1988	Arab Tribune	10-12 inches of snow fell across Alabama. About 175 chicken houses in five counties collapsed under the weight of ice and snow.
2/23/1989	Arab Tribune	2-3 inches of snow on Brindlee Mountain, schools closed, Hwy 69 closed.
1/15/1994	Arab Tribune	7° F deep freeze
2/2/1996	The Advertiser-Gleam	Half of County without power, parts of the lake froze, schools out for a week.
1/6/2001	The Advertiser-Gleam	Snow and ice closed schools.

Past Occurrences of Droughts/Heat Waves

Table E-15. Marshall County Drought Events, 2007-2013

21 DROUGHT event(s) were reported in **Marshall County, Alabama** between **01/01/2007** and **12/31/2013**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

*Click on **Location or County** to display Details.*

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 ALZ001>004 - 008 - 010 - 016	3/27/2007	12:00 AM	Drought	N/A	0	0	0K	0K
2 ALZ001>010 - 016	4/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
3 ALZ001>010 - 016	5/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
4 ALZ001>010 - 016	6/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
5 ALZ001>010 - 016	7/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
6 ALZ001>010 - 016	8/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
7 ALZ001>010 - 016	9/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
8 ALZ001>010 - 016	10/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
9 ALZ001>010 - 016	11/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
10 ALZ001>010 - 016	12/1/2007	12:00 AM	Drought	N/A	0	0	0K	0K
11 ALZ001>010 - 016	1/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K

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Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
<u>12</u> <u>ALZ001>010</u> <u>- 016</u>	2/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>13</u> <u>ALZ001>010</u> <u>- 016</u>	3/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>14</u> <u>ALZ001>010</u> <u>- 016</u>	4/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>15</u> <u>ALZ001 -</u> <u>004>010 -</u> <u>016</u>	5/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>16</u> <u>ALZ004 -</u> <u>006>010 -</u> <u>016</u>	6/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>17</u> <u>ALZ004>010</u> <u>- 016</u>	7/1/2008	12:00 AM	Drought	N/A	0	0	0K	0K
<u>18</u> <u>MARSHALL</u> <u>(ZONE)</u>	10/19/2010	0:00	Drought		0	0	0.00K	0.00K
<u>19</u> <u>MARSHALL</u> <u>(ZONE)</u>	11/1/2010	0:00	Drought		0	0	0.00K	0.00K
<u>20</u> <u>MARSHALL</u> <u>(ZONE)</u>	12/1/2010	0:00	Drought		0	0	0.00K	0.00K
<u>21</u> <u>MARSHALL</u> <u>(ZONE)</u>	3/1/2011	0:00	Drought		0	0	0.00K	0.00K
TOTALS:					0	0	0	0

Source: National Climatic Data Center

Table E-16. Marshall County Extreme Heat Events, 1996-2013

9 HEAT EXTREME event(s) were reported in **Marshall County, Alabama** between **01/01/1996** and **12/31/2013**.

*Click on **Location or County** to display Details.*

Mag: Magnitude

Dth: Deaths

Inj: Injuries

PrD: Property Damage

CrD: Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 ALZ001>050	2/23/1996	8:00 AM	Excessive Heat	N/A	0	0	0	0
2 ALZ008	6/24/2000	5:00 PM	Excessive Heat	N/A	1	0	0K	0K
3 ALZ001>010 - 016	8/1/2007	12:00 AM	Heat	N/A	0	0	0K	0K
4 MARSHALL (ZONE)	7/7/2010	22:00	Heat	N/A	0	0	0.00K	0.00K
5 MARSHALL (ZONE)	7/23/2010	10:00	Heat	N/A	0	0	0.00K	0.00K
6 MARSHALL (ZONE)	8/1/2010	0:00	Heat	N/A	0	0	0.00K	0.00K
7 MARSHALL (ZONE)	6/29/2012	12:00	Heat	N/A	0	0	0.00K	0.00K
8 MARSHALL (ZONE)	6/30/2012	12:00	Heat	N/A	0	0	0.00K	0.00K
9 MARSHALL (ZONE)	7/1/2012	12:00	Heat	N/A	0	0	0.00K	0.00K
TOTALS:					1	0	0	0

Source: National Climatic Data Center

News Reports of Droughts/Heat Waves[November brought only 2.2 in. of rain](#)

It was Arab's second driest November in nearly a quarter of a century, and, in case you didn't notice, it was a cooler month than it's been in recent years. Arab needs 15.38 inches of rain in December just to reach the annual average over the past 23...

0.6K - Dec. 4, 2012; scored 108.0

[Arab is 12 inches below in rainfall as temps top 103](#)

No rain has been measured in Arab in 19 days while temperatures hovered in the mid-to-upper 90s before hitting triple digits for the first time this year. On Thursday afternoon, the temperature at Allens Crossroads hit 103.5 degrees, according to Dan...

2.2K - Jul. 2, 2012; scored 139.0

[July miserable mix: little rain, scorching days](#)

Very little rain and high temperatures make for crunchy grass, wilted tree leaves, burned corn and other crops and an uncommonly miserable July. The U.S. Drought Monitor has the northern half of Marshall County listed as abnormally dry, the first of ...

2.9K - Aug. 4, 2010; scored 217.0

[Drought not far off the radar for area if rain doesn't fall soon](#)

If it didn't rain yesterday afternoon, the Brindley Mountain area missed its best chance for the coming week. And while the "D" word - drought - has not yet come into play, it's not far off if the area doesn't get some moisture soon, says Zachary Bur...

2.2K - Jul. 12, 2010; scored 782.0

[August rains help with drought](#)

August rains went a long way toward easing drought in Marshall County. August saw the most rainfall since 7.95 inches was measured in October 2006. Ed Reed at Pine Lake Village measured 6.90 inches in August, while Thomas Bodine at Brashiers Chapel...

0.6K - Sep. 5, 2008; scored 1000.0

[June sets back effort to wash away drought:](#)

rain lags average by over 5 inches in areas By CHARLES WHISENANT - The Arab Tribune Through the end of May it appeared as though the Brindley Mountain area was recovering from months of drought. But after less than stellar rainfall in June, that is...

1.5K - Jul. 3, 2008; scored 1000.0

[Drought status downgraded](#)

Amelioration - perhaps the word of the week - is the act of improving something; the process of something getting better; an improvement in something or somebody. On Wednesday, 1.5 inches of rain brought amelioration to the life of a duck that got to...

3.5K - Mar. 24, 2008; scored 1000.0

[Drought not drying water underground](#)

Couch: Greenbriar well has 'bookoos' of water By DAVID MOORE - The Arab Tribune As regional drought continues into its second year, water sources on the surface might be emptying and drying up, but water under the surface is apparently a different...

4.0K - Dec. 5, 2007; scored 1000.0

[AEC expected to pass on TVA's drought surcharge](#)

Arab Electric Cooperative customers likely will have to pay more for electricity because of a drought related to a fuel surcharge TVA is levying. AEC manager Joe Van Bunch said the surcharge likely will be added to customer's bills, but the board of ...

1.9K - Aug. 22, 2007; scored 1000.0

[Worst drought in nation bans Fourth of July fireworks](#)

It will be a quiet Fourth of July for residents on Brindley Mountain and elsewhere because fireworks have been outlawed until the worst drought conditions in the nation improve. Violating the order could result in fines, jail time or both. Thirty-three...

3.7K - Jun. 15, 2007; scored 1000.0

[2007 is driest in 104 years, says weather service](#)

The National Weather Service in Huntsville says that, so far, 2007 is the driest year on record, and May was the second driest May on record. Their records date back 104 years. The rain deficit for Arab in 2007 also continues to worsen. Rainfall measures...

2.3K - Jun. 5, 2007; scored 1000.0

[Drought not hurting Arab water supply](#)

The Arab Tribune There's plenty of water. While Marshall County has been placed to under a drought warning, and Gov. Bob Riley has urged water systems to carefully monitor conditions and prepare emergency procedures in case the situation worsens,...

2.8K - May. 30, 2007; scored 1000.0

[Hey! Hay grows scarce, expensive after drought](#)

Hey - there's not any hay. Cattle farmers and horse owners looking for hay aren't likely to find any this winter. It is scarce all over Alabama, said Kent Stanford, a regional county agent from St. Clair County. "It's been a tough year because of the...

3.8K - Dec. 8, 2006; scored 1000.0

[Writer shriveling up, blowing - even without the drought](#)

John Smith - Perspective I hate heat and drought, especially when you get a large dose of both at the same time. I know every silver lining has its dark cloud, but lately there haven't been any silver linings at my house on account of there haven't...

5.4K - Jul. 25, 2006; scored 1000.0

Table E-17. Additional Local News Reports of Droughts/Heat Waves

Drought/Heat Waves in Marshall County, Local News Reports		
Date	Source	Comment
7/24/80	Arab Tribune	Heat wave breaks after eleven days of 100° F + weather. Power restrictions in place, thousands of broilers died
5/14/86	Arab Tribune	20 - 31" below normal, water conservation in effect
6/22/88	Arab Tribune	12" below normal, 60-70% corn damage

Appendix F
Alternative Mitigation Measures

App. F – Identification and Analysis of Mitigation Measures

- 1.0 Alternative Mitigation Measures
- 2.0 Types of Mitigation Measures

1.0 Alternative Mitigation Measures

This appendix documents the range of alternative mitigation measures considered by the Hazard Mitigation Planning Committee (HMPC) in the development of its mitigation strategy and its selection of final action programs for each participating community. This documentation supports the Federal requirement that the plan must identify and analyze “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” (44 CFR Section 201.6 (c)(3)(ii)). Included here are the following supporting documents:

1. Committee Exercise – Alternative Mitigation Measures. This is the exercise administered by the planning team to the HMPC used to gather information on the priority issues to be addressed by the mitigation strategy, the recommended mitigation measures, and the recommended projects for potential funding under the FEMA hazard mitigation assistance programs.
2. Types of Mitigation Measures. This list describes the comprehensive range of mitigation measures by program area type (Prevention, Protection, Public Outreach and Awareness, Natural Resources Protection, and Structural Projects types), which was one resource to the HMPC in completing the exercise listed above.
3. Table of Alternative Mitigation Measures. This summary table identifies a measure as an action or project, whether new or existing buildings and infrastructure are affected, and the hazard effects that would be reduced by the measure.

The alternative measures described here are all intended to affect the built environment and thereby reduce loss of life and damages to buildings and infrastructure. Excluded from these alternatives are measures which might propose to establish disaster response procedures. The mitigation plan is not an emergency response, recovery, or preparedness plan. Consequently, all emergency services measures designed to prepare emergency operations plans, train or equip emergency personnel, programs to reduce mobile technological hazards, plans to counter terrorism and the like are not included in the range of alternatives considered for adoption in this plan. Rather, the purpose of these mitigation measures is to decrease the need for response and recovery through long-term mitigation actions and projects; the intent is not to increase capabilities for response to disasters and recovery from the effects.

According to recent FEMA guidance (Local Multi-Hazard Mitigation Planning Guidance, FEMA, July 1, 2008, page 59), “hazard mitigation is defined as any sustained action taken to

reduce or eliminate long-term risk to people and property from hazards and their effects.” All of the mitigation measures presented here have been evaluated for compatibility with this recent FEMA definition.

Committee Exercise Alternative Hazard Mitigation Measures

Completed by: _____ Community: _____

PART I: PRIORITY HAZARD MITIGATION ISSUES. List or briefly describe the most critical hazard issues within the community. These are the priority issues that the mitigation measures should address. You may describe general hazard conditions or specific problems:

PART II: RECOMMENDATIONS FOR MITIGATION MEASURES. What priority mitigation measures do you prefer for your community? Keep in mind the benefits in reducing economic losses, the priority (low, high), and the potential funding source (e.g., existing funds or FEMA mitigation assistance grants). Please place your recommendations in the spaces provided or continue on a separate sheet or the reverse side.

1. Prevention measures. *Adopting and administering ordinances, regulations, and programs that manage the development of land and buildings to minimize risks of loss due to hazards.*

Types: Comprehensive Plans, Geographic Information Systems (GIS), Technical Studies, Capital Improvements Plans (CIP). Zoning, Open Space Preservation, Floodplain Management Regulations, Subdivision Regulations, Building and Technical Codes, Safe Room/ Shelter Requirements, Landscape Ordinances, Open Fire Regulations, Storm Water Regulations, Public Right-of-Way Maintenance, Dam Safety Management, Community Rating System (CRS) Program.

- 2. Property Protection Measures.** *Protecting structures and their occupants and contents from the damaging effects of natural hazard occurrences, including retrofitting existing structures to increase their resistance to damage and exposure of occupants to harm; relocating vulnerable structures and occupants from hazard locations; and conversion of developed land to permanent open space through acquisition and demolition of existing structures.*

Types: Relocation, Acquisition, Building Elevation, Flood Proofing, Building Retrofits

- 3. Public Education and Awareness.** *Educating and informing the public about the risks of hazards and the techniques available to reduce threats to life and property.*

Types: Map Information, Outreach Projects, Real Estate Disclosure, Library, Technical Assistance, Environmental Education

- 4. Natural Resources Protection Measures.** *Preserving and restoring the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.*

Types: Wetlands Protection, Open Space Easements and Acquisitions, River/Stream Corridor Restoration and Protection, Urban Forestry Programs.

- 5. Structural Projects Measures.** Engineering structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of a hazard on a community.

Types: Reservoirs, Levees/Floodwalls, Diversions, Channel Modifications, Dredging, Drainage Modifications, Storm Sewers, Dam Modifications, Ground Stabilization

[illegible]

2.0 Types of Mitigation Measures

Prevention Measures. Prevention measures involve adopting and administering ordinances, regulations, programs, and plans that can influence the development of land and buildings to minimize risks of loss due to natural and man-made hazards.

- *Comprehensive Plans and Smart Growth.* Comprehensive plans guide future development over a long-range framework through land use, community facilities, economic development, environmental conservation, public infrastructure, and related planning. Effective comprehensive planning can help create safer and more sustainable communities with improved disaster resistance. By incorporating “Smart Growth” principles in a community’s comprehensive plan, a community can improve the effectiveness and responsiveness of its comprehensive plan to hazards identified in the mitigation planning process. Smart Growth can result in safe growth through these fundamental principles of sustainable community development: (a) promote compact infill development vs. urban sprawl, (b) preserve open space and protect the natural and beneficial functions of flood plains, coastal zones, wetlands, hillsides, and other vulnerable locations; and (c) steer growth away from hazardous areas. A comprehensive plan can designate vulnerable lands for open space uses that would not be incompatible with occasional hazard events. For instance, vulnerable areas subject to flooding, dam failure inundation, landslide risk, and land subsidence could be planned for parks, greenways, wildlife refuges, and other open space uses. For a comprehensive plan to be truly effective, the hazard vulnerability of lands and buildings assessed through the mitigation planning process should influence a community’s comprehensive plan for future land use and development patterns, community facilities, and infrastructure. The comprehensive plan should direct growth toward the most suitable land areas and avoid exposure of new buildings and infrastructure to high risk hazard locations assessed in the mitigation plan. Equally important to the effectiveness of a comprehensive plan, is the integration of planning strategies. A community’s mitigation strategy should be carried over into the goals, objectives and policies of its comprehensive plan.
- *Capital Improvements Plans (CIP).* A CIP can recommend the setting aside of funds for public improvements, including water and sewer service extensions, new community facilities, land acquisitions for open space, emergency service facilities, improvements to retrofit or relocate vulnerable critical facilities, and other capital improvements that can be tied to both the comprehensive plan and the mitigation plan. The CIP schedules capital projects over a 5-6 year time frame, with funding identified. The capital expenditure requirements of high priority projects within a hazard mitigation plan may be included in a CIP. A CIP for public infrastructure improvements, when combined with zoning and land development controls, can establish a growth management program to direct the

location and timing of new development in accordance with a comprehensive plan and smart growth principles to avoid hazard areas.

- *Zoning and Land Development Controls.* The zoning ordinance is the primary tool to regulate development in vulnerable areas by limiting development. Zoning can be combined with a variety of related land development controls and special purpose ordinances. Growth management controls of density and infrastructure improvements may reduce risks in areas exposed to severe hazards, such as flooding, landslides, sinkholes, and other location specific hazards. Limited density controls could be applied to certain zones to discourage future development, or vulnerable areas could be zoned for recreation or agricultural uses or other uses that are compatible with the natural restrictions of the location. Landscaping standards can be incorporated into zoning ordinances to set aside minimum areas for tree and vegetation plantings. Planting areas can be used for drainage and help cool urban environments, as well as improve appearances. Tolerant species can be used to mitigate the effects of drought conditions, often referred to as “xeriscapes.” Other special purpose ordinances might address hillside development by placing limits or setting minimum standards for building construction in steeply-sloped areas that are prone to landslides. Transfer of development rights (TDR) programs are another tool for growth management by allowing landowners to transfer the right to develop one parcel of land to a different parcel of land. This could benefit the developer if incentives are given for building in suitable land areas and not building in hazardous areas.
- *Subdivision Regulations.* These regulations govern how land can be divided into separate lots or sites. Subdivision plats can be required to show hazard areas, such as flood zones, areas subject to landslides, and potential sinkhole locations. The regulations should establish minimum buildable lot areas that are sufficient to meet property protection objectives. Requiring new subdivisions to space buildings, install fire hydrants, and provide adequate access are some of the measures available to reduce the risks of fires.
- *Building and Technical Codes.* Standards can be incorporated into building and technical codes that address resistance against natural hazard threats for all new and substantially improved or repaired buildings. The International Code Series are the latest available codes. Building codes can prohibit loose masonry, overhangs, etc. that might be affected by earthquakes. Building code standards for roof materials and spark arrestors can mitigate fires. Standards can be set for roof construction to protect against wind damage from hurricanes, tornadoes, and severe storms. Performance standards for foundation supports, utility protection, also add to building protection. Design standards can mandate that quality building products and construction applications are used. These codes can better assure quality constructed structures, which are more likely to withstand high winds, severe storms, and other natural hazards. A site plan review process as part of local building permitting can ensure that site elements are organized and planned to lessen the effects of potential hazards on new development.

- *Flood Plain Management Programs.* Participation in the NFIP (National Floodplain Insurance Program) is based on a community agreement with FEMA to meet minimum program requirements, including the adoption and continuing enforcement of a flood plain management ordinance. Flood Insurance Rate Maps (FIRM) are not only a tool for managing flood plain development, but the maps also create broad-based awareness of flood hazards. Flood Insurance Studies and accompanying FIRMs provide the data needed to administer floodplain management programs and to establish flood insurance rates for new and existing buildings. Often, Flood Insurance Rate Maps need updates to reflect changing developing in a given watershed. This may require comprehensive and detailed hydrologic and hydraulic modeling and improved topographic mapping to modernize existing maps. Updated FIRMs may also be needed in “Approximate” flood zones where no flood elevations or profiles are available. DFIRMS or Digital FIRMS can be created for computer and on-line access to maps and data. The Community Rating System (CRS) Program of the (NFIP) is an option that covers all flood hazard mitigation program elements. The CRS rewards communities for conducting a full range of flood mitigation programs that exceed the minimum NFIP requirements by awarding points to achieve a rating classification. Total points determine the class of a community. The higher the class, the more savings to flood insurance holders and more recognition to the successes of the local flood plain management program. With or without CRS participation, a community can establish “Higher Regulatory Standards” for flood plain management. Floodplain management regulations do not prohibit development in the special flood hazard area; instead, the regulations impose construction standards to minimize damages. Communities may adopt more stringent standards than those set forth by the NFIP, such as additional building elevation requirements, additional limitations on building enclosures, and other standards designed to better mitigate flood damages. Another method to improve the effectiveness of flood plain management programs is to appoint a Certified Floodplain Manager (CFM) who has passed minimum criteria of the Association of State Floodplain Managers to administer the community’s ordinance and program.
- *Storm Water Management Regulations.* Development outside of a floodplain can contribute significantly to flooding by creating impervious surfaces or altering natural drainage management systems, which increase storm water runoff. Storm water management is usually addressed in subdivision regulations or other land development controls. Developers are typically required to build retention or detention basins to minimize any increase in runoff rates caused by new or expanded impervious surfaces, or new drainage systems. Generally, there is a prohibition against storm water leaving the site at a rate higher than it did before the development based on a given design storm. One technique is to use wet basins as part of the landscaping plan of a development. It might even be possible to site these basins based on a watershed analysis. Since detention only controls the runoff rates and not volumes, other measures may be applied

for storm water infiltration, such as, swales, infiltration trenches, vegetative filter strips, and permeable paving blocks for parking areas. Erosion and sedimentation control regulations not only assure improved water quality but help preserve the carrying capacity of drainage ways and reduce localized flooding. These regulations are typically a component of a larger storm water management program or included in a storm water management ordinance.

- *Dam Safety Management.* A comprehensive dam safety program should begin with dam failure inundation maps. These areas should be kept clear of new development and preserved as open space to prevent future damages. Flood plain regulations could establish minimum building elevations based on predicted flood elevation in the event of dam failure. Regular dam safety inspections identify risks of failures.
- *Coastal Zone Management Regulations.* The physical factors that have the greatest influence on coastal land loss are reductions in sediment supply, relative sea level rise, and frequent storms. The most important human activities are sediment excavation, river modification, and coastal construction. As a result of these agents and activities, coastal land loss is manifested most commonly as beach/bluff erosion and coastal submergence. Implementation of Coastal Zone Management Plans helps to alleviate some of these problems.
- *Open Space Requirements.* Preserving open space is the most effective method for preventing damages. Open space preservation for flood control should not, however, be limited to the flood plain, since other areas within the watershed may contribute to runoff that exacerbates flooding. Comprehensive plans can identify areas to be preserved by acquisition. Other means, such as purchasing easements or accepting donations of land are also available. Open space can also be protected through maintenance agreements with the landowners, or by requiring developers to dedicate land for parks, public facilities, and drainage.
- *Open Burning Regulations.* Open burning restrictions can be enforced to prevent the spread of wild fires, especially during times of drought when emergency measures could be enacted.
- *Safe Room/Shelter Requirements.* Some communities have enacted safe room or shelter requirements for new housing construction and require community shelters for manufactured home parks, apartment complexes, and other planned residential communities.
- *Public Right-of-Way Maintenance Regulations.* An effective drainage system maintenance program should also include regulations that prevent dumping and littering in ditches and stream channels and require adjoining property owners to keep these areas clear of fallen trees, limbs, dead brush, and any other debris. These efforts not only prevent obstructions to drainage but can also help mitigate wild fires.
- *Critical Facilities Assessments.* Assessments of critical facilities (hospitals, schools, fire and police stations, emergency operation centers, special needs housing, and others) can address building and site vulnerabilities to hazards and

identify damage control measures in the event of severe weather and other natural hazards. This type of assessment can result in a plan to identify a variety of mitigation retrofit measures to reduce vulnerability to damage and disruption of operations during severe weather and disaster events.

- *Geographic Information Systems (GIS).* GIS applies computer technology to hazard mitigation planning by linking data to maps. Detailed property information, socioeconomic data, critical facilities inventories, and hazard locations, among other relevant information, can be continuously updated to provide a complete assessment resource for mitigation planning and other planning studies. HAZUS-MH is a risk assessment tool developed by FEMA to apply loss estimation models for earthquakes, hurricane winds, and flooding within a GIS framework.
- *Technology Programs.* Modern technology has created new opportunities for improving planning systems to support hazard mitigation. These systems can serve dual functions - to monitor hazard events as they happen for disaster warning purposes and to forecast and simulate events for advance planning purposes. The U.S. Geologic Survey (USGS) ALERT gage networks for select rivers and streams allow the National Weather Service (NWS) to handle early recognition of flooding. Local gages to cover high risk flood areas can be integrated into these systems with local EMA access. New technology has become available to monitor tornado activities. A comprehensive system can tie a variety of gages into a single automated network to monitor rainfall, river/stream stages, icy bridges and highways, tornadoes, winds, water quality, chemical spills into water ways, and hazardous air emissions. Remote cameras can enhance the monitoring capabilities of the system. These systems when used to simulate events can test a variety of mitigation alternatives, such as flood simulations, evaluation of structural alternatives on flood levels, and damage estimates from simulated events.
- *Planning Studies.* Planning for areas of special consideration might be considered in certain situations. These planning studies might evaluate the feasibility of various mitigation alternatives to address a specific hazard concern, such as a detailed flood hazard mitigation plan for a stream that updates hydrology, generates new flood profiles, and evaluates economic feasibility of structural and non-structural alternatives using sophisticated economic models. Another example would be geologic investigations to identify areas subject to landslides and recommendations for corrective measures.

Property Protection Measures. Property protection measures protect structures and their occupants and contents from the damaging effects of natural hazard occurrences, including retrofitting existing structures to increase their resistance to damage and exposure of occupants to harm; relocating vulnerable structures and occupants from hazard locations; and conversion of developed land to permanent open space through acquisition and demolition of existing structures.

- *Acquisition Projects.* Acquisition of land in a highly vulnerable zone protects against damages and casualties and converts problem areas into community assets, with accompanying environmental benefits. Acquisition, followed by demolition and conversion of land to permanent open space, is the most appropriate strategy for those buildings that have experienced recurring flood damages and flood insurance claims. This method might also be considered for older buildings with finish floor elevations several feet below predicted flood elevation. Often buildings are too expensive to move or are dilapidated and not worth saving or protecting. Acquisition, like relocation, can be very expensive. Benefit-cost analysis must be used to be certain the damages avoided outweigh the acquisition costs. Less costly alternatives might also be investigated.
- *Building Elevations.* Elevating a flood-prone building above the base flood elevation is sometimes the best flood mitigation strategy. The building could be raised above the flood elevation to prevent interior water damage. This approach could be less costly than relocation or acquisition, and if properly designed the elevated buildings could be less disruptive than creating vacant lots as a result of relocations or acquisitions. Elevation is required by local flood plain regulations for new and substantially improved buildings in a floodplain, and is a commonly-practiced flood hazard prevention method.
- *Flood Proofing.* If a building cannot be elevated, it may be flood proofed. This approach works well in areas of low flood threat and with nonresidential buildings. Flood proofing can be accomplished through barriers to flooding, or by treatment to the structure itself.
 - ✓ *Dry flood proofing* seals a building against the water by coating the walls with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, etc. are closed. Sometimes, manual intervention may be required to implement dry flood proofing, such as installing removable flood shields at doorways.
 - ✓ *Wet flood proofing* is usually considered a last resort measure, since water is intentionally allowed into the building in order to minimize pressure on the structure. This is best applied to unfinished areas, such as warehouses and garages where contents are elevated.
 - ✓ *Barriers*, such as small levees, floodwalls, and berms can keep floodwaters from reaching a building. These are most useful in areas subject to shallow flooding.
 - ✓ *Other flood proofing approaches* range from moving valuable items to higher floors to rebuilding the floodable area. An advantage over other approaches is that simply by moving household goods out of the range of floodwaters, thousands of dollars can be saved in damages.
- *Building Retrofits.* Existing buildings can be retrofitted to safeguard against possible damages. In addition to flood proofing or elevating existing buildings in a flood plain, other retrofits could protect buildings against natural hazards. Retrofitting to add braces/ roof straps and remove overhangs protects against high winds. Storm shutters and applying Mylar to windows and glass surfaces

protects from shattering glass during hurricanes and severe storms. Tie downs of major appliances and other contents may reduce earthquake damage.

- *Building Relocations.* Moving structures out of vulnerable areas, such as high-risk flood plains, dam inundation areas, landslide zones, and land subsidence areas, is a sure way to protect against damage. Relocation is expensive, however, so this approach should not be used except in extreme circumstances, where there are no practical alternatives.
- *Critical Facilities Protection.* Protecting critical facilities is vital. Efforts should be made to retrofit or relocate existing facilities located in high-risk zones or construct new facilities for maximum protection from hazards. Protection of facilities includes not only buildings but also utilities, bridges, and other critical infrastructure.
- *Emergency Power Generation.* Maintaining power in the event of loss during severe storms and other natural hazards is vital for the continuing operation of critical facilities, especially, emergency services, hospitals, elderly housing, water distribution, sewer treatment, and other facilities. Power shut downs could cause major disruptions and consequential damages. Relatively low cost portable generations can supply temporary power to small critical facilities, households, and small businesses.
- *Sewer Backup Protection.* Storm water overloads can cause backup into basements through sanitary sewer lines. Houses that have any kind of connection to a sanitary sewer system - whether it is downspouts, footing drain tile, and/or sump pumps, can be flooded during a heavy rain event. To prevent this, there should be no such connections to the system, and all rain and ground water should be directed onto the ground, away from the building. Floor drain plugs and floor drain standpipes keep water from flowing out of the lowest opening in the house. Overhead sewer keeps water in the sewer line during a backup. Backup valves allow sewage to flow out while preventing backups from flowing into the house.

Public Education and Awareness. Public education and awareness methods educate and inform the public about the risks of hazards and the techniques available to reduce threats to life and property.

- *Community Hazard Mitigation Plan Distribution.* Internet downloads and CDs are some of the means for mass distribution of the mitigation plan to the public. A fold-out, poster-size summary document could be printed for mass mailings or a special summary document could be published in the Sunday edition of the local newspaper.
- *Flood Map Information.* Flood Insurance Rate Maps (FIRM) developed by FEMA outline the boundaries of the flood hazard areas and provide other valuable information on flooding conditions. These maps can be used by anyone interested in a particular property to determine if it is flood-prone. NFIP

communities can provide this information to the real estate agents, builders, developers and homeowners as a public service.

- *Outreach Projects.* Outreach projects are proactive; they give the public information even if they have not asked for it. Outreach projects are designed to encourage people to seek out more information and take steps to protect themselves and their properties. Outreach programs work, although awareness is not enough. People need to know what they can do about the hazards, so projects should include information on protection measures. Locally designed and run programs are often more effective than national advertising. The following are just a few of the examples of outreach activities:
 - ✓ City or county government newsletters with articles on hazard mitigation.
 - ✓ Notices directed to floodplain residents encouraging the purchase of flood insurance.
 - ✓ Displays in public buildings, malls, festivals, fairs, and other public assembly places, including colorful GIS maps, brochures, and information handouts.
 - ✓ Newspaper articles and special sections addressing hazards.
 - ✓ Radio and TV news releases and interviews shows.
 - ✓ A flood proofing video for cable TV programs and for loan to organizations.
 - ✓ A detailed property owner handbook tailored for local conditions.
 - ✓ Presentations at meetings of neighborhood groups.
- *Hazard Insurance Awareness.* Above and beyond standard property insurance, coverage may be available to property owners for protection against flood damages, if the property is in a community that participates in the National Flood Insurance Program. Any local insurance agent is able to sell flood insurance policies under rules and rates set by FEMA. Flood insurance may also be advisable for properties located in dam inundation areas. Flood insurance is also available for areas outside of mapped flood zones. Flood damage may still occur outside of a flood plain as a result of poor drainage or other causes. Property owners may also purchase additional insurance riders for specific hazard coverages, such as insurance riders for earthquake, landslides, or sinkhole damage.
- *Real Estate Disclosure.* Disclosure of information regarding flood-prone properties is important if potential buyers are to be in a position to mitigate damage. Federally regulated lending institutions are required to advise applicants that a property is in the floodplain. However, this requirement needs to be met only days prior to closing, and by that time, the applicant is typically committed to the purchase. State laws and local real estate practice can help by making this information available to prospective buyers early in the process.
- *Library.* Your local library can serve as a repository for pertinent information on hazards and methods of protection. Some libraries also maintain their own public information campaigns, augmenting the activities of the various governmental agencies involved in hazard mitigation.

- *Technical Assistance.* Certain types of technical assistance are available from the local technical and professional staff to advise on various mitigation alternatives to property owners. Community officials can also set up a service delivery program to provide one-on-one sessions with property owners. An example of technical assistance is the hazard audit, in which a specialist visits a property. The specialist advises the owner of alternative protection measures.
- *Education Programs.* Education can be a great mitigation tool. The earlier education begins the better. Education programs for children can be taught in the schools, park and recreation departments, conservation associations, or youth organizations. An activity can be as involved as course curriculum development or as simple as an explanatory sign near a river. Education programs do not have to be limited to children. Adults can benefit from knowledge of hazards and mitigation measures, and local officials, loaded with this knowledge, can make more informed decisions on mitigation actions.
- *Mass Media Relations.* Newspapers, radio, TV, cable access, internet blogs, podcasts, video sharing, and on-line social networking are some of the ever changing mass media tools available for increasing public awareness and distributing public information on hazard mitigation topics. Effective media relations are essential to a comprehensive outreach program.
- *NOAA Weather Radio Programs.* The use of inexpensive weather radios in homes and businesses are another means for advance warning and can be promoted as a public service. Some localities may choose to purchase these radios in bulk and distribute them to residents at little or no cost. A corporate sponsor can bear some or all of the costs.

Natural Resources Protection Measures. Natural resources protection measures preserve and restore the beneficial functions of the natural environment to promote sustainable community development that balances the constraints of nature with the social and economic demands of the community.

- *Wetlands Protection.* Wetlands are capable of storing large amounts of floodwaters, slowing and reducing downstream flows, and filtering the water. Any development that is proposed in a wetland is regulated by either federal and/or state agencies. Depending on the location, the project might fall under the jurisdiction of the U.S. Army Corps of Engineers, which in turn, calls upon several other agencies to review the proposal. Communities may also have local wetland ordinances. Generally, the goal is to protect wetlands by preventing development that would adversely affect them. Mitigation techniques are often employed, which might consist of creating a wetland on another site to replace what would be lost through the development.
- *Open Space Easements and Acquisitions.* Acquiring easements and fee-simple ownership of environmentally beneficial lands, such as hillsides, flood plains, and wetlands, assures permanent protection. Acquisitions can be made by a land

trust or a public agency to benefit the public welfare. Often, property owners may be willing to dedicate lands and easements for tax advantages.

- *River/Stream Corridor Restoration and Protection.* Restoration and protection of stream or river banks and riparian zones help restore the natural and beneficial functions to manage floods and filter runoff. Streams should also be protected from dumping. Often, greenways or linear parks along these corridors provide amenities that are compatible with natural functions.
- *Urban Forestry Programs.* A number of cities nationwide have participated in formal urban forestry programs. Urban forestry programs which follow Tree City USA guidelines for public lands and rights-of-way help maintain healthy tree cover for multiple mitigation purposes. Protection and maintenance of the urban forest is especially helpful for the mitigation of wild fires, hillside erosion and landslides, and restoration of stream and river corridors. Combined with effective landscaping regulations, both private and public spaces can be addressed.
- *Water Resources Conservation Programs.* Protection of water quantity and quality through water conservation programs can help mitigate the effects of droughts.
- *Dune and Beach Restoration.* Dune and beach restoration and maintenance can alleviate flooding from hurricanes or severe storms in coastal areas. The dunes provide a natural barrier from the waves and wind which can travel inward causing flooding and major damage to structures.

Structural Projects Measures. Structural projects measures are engineering structural modifications to natural systems and public infrastructure to reduce the potentially damaging impacts of a hazard on a community.

- *Reservoirs.* Reservoirs control flooding by holding water behind dams or in storage basins. After a flood peaks, water is released or pumped out slowly at a rate the river downstream can handle. Reservoirs are suitable for protecting existing development, and they may be the only flood control measure that can protect development close to a watercourse. They are most efficient in deeper valleys or on smaller rivers where there is less water to store. Reservoirs might consist of man-made holes dug to hold the approximate amount of floodwaters, or even abandoned quarries. As with other structural projects, reservoirs projects have drawbacks, as follows:
 - expensive
 - occupy a lot of land
 - require periodic maintenance
 - may fail to prevent damage from floods that exceed design levels
 - may eliminate the natural and beneficial functions of the floodplain.

Reservoirs should only be used after a thorough watershed analysis that identifies the most appropriate location, and ensures that they would not cause flooding somewhere else. Because they are so expensive and usually involve

more than one community, they are typically implemented with the help of state or federal agencies, such as the Army Corps of Engineers.

- *Levees/Floodwalls.* A commonly known structural flood control measure is either a levee (a barrier of earth) or a floodwall made of steel or concrete erected between the watercourse and the land.
- *Diversions.* A diversion is simply a new channel that sends floodwater to a different location, thereby reducing flooding along an existing watercourse. Diversions can be surface channels, overflow weirs, or tunnels. During normal flows, the water stays in the old channel. During flood flows, the stream spills over the diversion channel or tunnel, which carries the excess water to the receiving water body.
- *Channel Modifications.* Channel modifications include making a channel wider, deeper, smoother, or straighter. These techniques will result in more water being carried away, but as with other structural techniques, it is important to ensure that the modifications do not create or increase a flooding problem downstream.
- *Dredging.* Dredging involves removal of sediment and other deposits in a river or stream bed to restore flood conveyance. It can be costly because the dredged material must be hauled away and disposed of in another location, and the stream or river bed could quickly fill back in with sediment.
- *Drainage Modifications.* These include man-made ditches and storm sewers that help drain areas where the surface drainage system is inadequate or where underground drainage ways may be safer or more attractive. These approaches are usually designed to carry the runoff from smaller, more frequent storms.
- *Storm Sewers.* Mitigation techniques for storm sewers include installing new sewers, enlarging small pipes, street improvements, and preventing back flow. Because drainage ditches and storm sewers convey water faster to other locations, improvements are only recommended for small local problems where the receiving body of water can absorb the increased flows without increased flooding. In many developments, streets are used as part of the drainage system, to carry or hold water from larger, less frequent storms. The streets collect runoff and convey it to a receiving sewer, ditch, or stream. Allowing water to stand in the streets and then draining it slowly can be a more effective and less expensive measure than enlarging sewers and ditches.
- *Drainage System Maintenance.* Ongoing maintenance of streams and drainage channels is necessary if these facilities are to function effectively and efficiently over time. Maintenance of channel growth within or near stream and river channels is important for bank stabilization and to prevent obstructions of drainage flows. Often sediment buildup can impede stream flow. Regular maintenance is necessary for public drainage systems, including constructed components, such as, ditches, culverts, and bridges and natural components, such as swales, intermittent and perennial streams, and stream and river overbank areas. Maintenance assures adequate conveyance of storm and flood

waters. Other maintenance programs to clear dead and dry brush and fallen trees can not only prevent obstructions to drainage but also mitigate wild fires.

- *Dam Modifications.* Unsafe dams can be removed or modified to lessen the risks of dam failure, such as spillway enlargements to lessen hydraulic loads.
- *Ground Stabilization.* Unstable areas susceptible landslides or sinkholes may be stabilized to lessen risk of failure.
- *Community Storm Shelter/Safe Room Construction.* Freestanding, single-purpose community storm shelters or safe rooms within a building used for other purposes can be constructed to provide temporary shelter from hurricanes, tornadoes, and severe storms.

Table F-1. Alternative Types of Mitigation Measures

TYPES OF MITIGATION MEASURES	Action or Project	Affects New or Existing Buildings and Infrastructure	Tornadoes	Flooding	Severe Storms	Winter Storms/Freezes	Hurricanes	Droughts/Heat Waves	Earthquakes	Wildfires	Dam/Levee Failures	Landslides	Sinkholes
PREVENTION MEASURES													
<i>Comprehensive Plans and Smart Growth</i>	Action	Both		X			X			X	X	X	X
<i>Capital Improvements Plans</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Zoning and Land Development Controls</i>	Action	Both		X			X			X	X	X	X
<i>Subdivision Regulations</i>	Action	Both		X			X			X	X	X	X
<i>Building & Technical Codes</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Flood Plain Management Programs</i>	Action	Both		X							X		
<i>Storm Water Management Regulations</i>	Action	Both		X	X								
<i>Dam Safety Management</i>	Action	Both		X							X		
<i>Coastal Zone Management Regulations</i>	Action	Both		X	X		X						
<i>Open Space Requirements</i>	Action	Both		X			X			X		X	X
<i>Open Burning Regulations</i>	Action	Both								X			
<i>Safe Room/Shelter Requirements</i>	Action	Both	X		X		X		X				
<i>Public Right-of-Way Maintenance Regulations</i>	Action	Both		X	X					X			
<i>Critical Facilities Assessments</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Geographic Information Systems</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Technology Programs</i>	Action	Both	X	X			X		X				
<i>Planning Studies</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X

APPENDICES

2014 Marshall County Multi-Hazard Mitigation Plan

TYPES OF MITIGATION MEASURES	Action or Project	Affects Existing or New Buildings and Infrastructure	Tornadoes	Flooding	Severe Storms	Winter Storms/Freezes	Hurricanes	Droughts/Heat Waves	Earthquakes	Wildfires	Dam/Levee Failures	Landslides	Sinkholes
PROPERTY PROTECTION MEASURES													
<i>Acquisitions Projects</i>	Project	Existing		X			X					X	X
<i>Building Elevations</i>	Project	Existing		X									
<i>Flood Proofing</i>	Project	Existing		X									
<i>Building Retrofits</i>	Project	Existing	X	X	X	X	X	X	X	X			
<i>Building Relocations</i>	Project	Existing		X			X					X	X
<i>Critical Facilities Protection</i>	Project	Existing	X	X	X	X	X	X	X	X			
<i>Emergency Power Generation</i>	Project	Both	X		X	X	X		X				
<i>Sewer Backup Protection</i>	Project	Both		X									
PUBLIC EDUCATION AND AWARENESS MEASURES													
<i>Community Hazard Mitigation Plan Distribution</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Flood Map Information</i>	Action	Both		X			X						
<i>Outreach Projects</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Hazard Insurance Awareness</i>	Action	Both	X	X			X		X	X		X	X
<i>Real Estate Disclosure</i>	Action	Both		X									
<i>Library</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Technical Assistance</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Education Programs</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>Mass Media Relations</i>	Action	Both	X	X	X	X	X	X	X	X	X	X	X
<i>NOAA Weather Radio Programs</i>	Action	Existing	X	X	X	X	X	X	X				

TYPES OF MITIGATION MEASURES	Action or Project	Affects New or Existing Buildings and Infrastructure	Tornadoes	Flooding	Severe Storms	Winter Storms/Freezes	Hurricanes	Droughts/Heat Waves	Earthquakes	Wildfires	Dam/Levee Failures	Landslides	Sinkholes
NATURAL RESOURCES PROTECTION MEASURES													
<i>Wetlands Protection</i>	Both	Both		X				X					X
<i>Open Space Easements and Acquisitions</i>	Both	Both		X			X			X		X	X
<i>River/Stream Corridor Restoration and Protection</i>	Both	Both		X									
<i>Urban Forestry Programs</i>	Both	Both								X			
<i>Water Resources Conservation Programs</i>	Action												
<i>Dune and Beach Restoration</i>	Project	Both		X			X						
STRUCTURAL MEASURES													
<i>Reservoirs</i>	Project	Both		X									
<i>Levees/Floodwalls</i>	Project	Both		X							X		
<i>Diversions</i>	Project	Both		X									
<i>Channel Modifications</i>	Project	Both		X									
<i>Dredging</i>	Project	Both		X									
<i>Drainage Modifications</i>	Project	Both		X									
<i>Storm Sewers</i>	Project	Both		X									
<i>Drainage System Maintenance</i>	Project	Both		X						X			
<i>Dam Modifications</i>	Project	Both		X							X		
<i>Ground Stabilization</i>	Project	Both										X	X
<i>Community Shelter/Safe Room Construction</i>	Project	Both	X		X		X						

Appendix G
Committee Meeting Documentation

App. G - Committee Meeting Documentation

- 1.0 Establishment of Hazard Mitigation Planning Committee
- 2.0 Committee Meetings
- 3.0 Meeting Agendas and Sign-in Sheets
- 4.0 Annual Meetings

1.0 Establishment of Hazard Mitigation Planning Committee

The Hazard Mitigation Planning Committee (HMPC) was first established to oversee the development of the 2004 plan and was reorganized for the 2009 and 2014 plan updates. It provided opportunities for direct involvement by participating jurisdictions and interested organizations and agencies in the planning process. The HMPC convened regularly throughout the drafting phase of the 2014 plan update. The HMPC meetings served as open public forums for discussing hazard risks to Marshall County communities and developing effective strategies to respond to those risks. All meetings were publicly announced and open to public participation. Each Marshall County jurisdiction participated in this multi-jurisdictional planning process (see Appendix I Multi-Jurisdictional Participation Activities). The Town of Union Grove passed a resolution allowing the Marshall County EMA to represent their town on the HMPC. This appendix documents the HMPC's meeting activities during the drafting phase of this plan, including who was involved in these meetings. Included here are the meeting agendas and sign-in sheets.

2.0 Committee Meetings

Prior to the plan update period, the HMPC met annually to review the mitigation plan in accordance with the maintenance guidelines established in Chapter 7 Plan Maintenance of the 2004 Marshall County, Alabama Natural Hazards Mitigation Plan and the 2009 plan update. (Records of these meeting are maintained by the Marshall County EMA). Following the award of FEMA HMGP planning funds in late 2013, the HMPC initiated a schedule for more frequent meetings to oversee the development of this 2014 update.

The Hazard Mitigation Planning Committee met on January 29, 2014 to begin the planning process. From January through July 2014, the HMPC convened to complete the updates to the 2009 Marshall County, Alabama, Multi-Hazard Mitigation Plan. The planning team led five of those meetings in January, March, May and July and the EMA director led two interim meetings between the team led meetings. During these interactive meetings, members completed written exercises related to the various

components of this plan update and discussed a range of issues, among other meeting activities. These activities and discussions addressed identifying hazards, profiling hazards, examining the locations of hazards, rating the probability and extents of each hazard, assessing risk and vulnerabilities of buildings and populations, updating goals, reviewing mitigation action alternatives, and updating each community's action program. The completed exercises and results of meeting discussions were used in the formation of this plan update. All of the completed exercises are maintained on file in the Marshall County EMA offices. The agendas and sign-in sheets are included in this appendix. For a more in-depth discussion of the composition and role of the HMPC, see Chapter 4 "Planning Process. "

3.0 Meeting Agendas and Sign-in Sheets

This section documents the HMPC's meeting activities during the drafting phase of this plan, including who was involved in these meetings. Included here are the meeting agendas and sign-in sheets.

Kick-off Meeting
2014 Marshall County Multi-Hazard Mitigation Plan Update

January 28, 2014

1. Call to Order
2. Welcome and Opening Remarks
3. HMPC Appointments
4. Introduction of Consultant Team
5. Scope of Updates
6. Reorganization of Plan
 - a. Three Volumes:
 - i. Comprehensive Plan
 - ii. Community Action Programs
 - iii. Appendices and Supporting Documentation
 - b. Hazard Descriptions moved to Appendix D
7. Review Draft Updates
 - a. Introduction - Chapter 1 and App. A
 - b. Prerequisites - Chapter 2 and App. J
 - c. Plan Maintenance - Chapter 7
8. Meeting Dates and Topics
9. Internet Access: Website, Facebook, Twitter, and e-mail
10. Questions and Answers
11. Other Business
12. Adjourn

MARSHALL COUNTY EMERGENCY MANAGEMENT AGENCY
Training, MGT 341

Planning Meeting – 2014 Multi Hazard Mitigation Plan Update

January 28

Please Print Legibly

Sign-in Sheet

[illegible]



MARSHALL COUNTY EMERGENCY MANAGEMENT AGENCY
Training, MGT 341
Planning Meeting – 2014 Multi Hazard Mitigation Plan Update
 January 29, 2014
Sign-in Sheet
 Please Print Legibly

First Name	Last Name	Agency	Phone Number	E-Mail Address
Timmy	Hanson	City of Anniston	256-586-5968	timmy.hanson@anniston.org
Jeremy	Grieco	City of Anniston	256-586-5968	jeremy.grieco@anniston.org
Alicia	McBarnett	McBarnett	256-586-5968	alicia.mcBarnett@anniston.org
Carolyn	Garnett	Town of Douglas	256-586-5968	carolyn.garnett@anniston.org
Geoffrey	Marshall	McGraw	256-586-5968	geoffrey.marshall@anniston.org
Celeste	Balderson	Little Pl.	256-586-5968	celeste.balderson@anniston.org
Tom	Thompson	McGraw	256-586-5968	tom.thompson@anniston.org
Pattin	Miller	City of Anniston	256-586-5968	pattin.miller@anniston.org
Cindy	McBarnett	Advertiser-Gleaner	256-586-5968	cindy@advertiser-gleaner.com

MARSHALL COUNTY EMERGENCY MANAGEMENT AGENCY

Interim Working Group Meeting
2014 Marshall County Multi-Hazard Mitigation Plan Update

February 27, 2014

1. Call to Order
2. Welcome and Opening Remarks
3. HMPC Appointments
4. Scope of Updates
5. Review Draft Updates
6. Next Meeting
 - March 18th, 2014
 - 1:00 PM Marshall County EMA/EOC
 - 3550 Creek Path Road, Guntersville
7. Questions and Answers
8. Other Business

Marshall County Hazard Mitigation Planning Committee Meeting

February 27, 2014

Name	Jurisdiction/Organization	Email Address	Phone Number
Michelle Patterson	Buzz City	adm@cityofbuzz.com	206-264-5147
Tommy Hendon	Buzz	jimmy.hendon@cityofbuzz.com	206-260-5453
Jeremy Adams	ASAB	None	586-5966
Bethany King	Grant	SAB	252-728-2027
Lindy McInerney	Ad-Colum	SAB	SAB
Carolyn Garrett	Douglas	SAB	SAB
Gary Nunnally	Albertville	mun@cityofalbertville.com	201-622-2
Ernie McLendon	Albertville City	LMcLendon@albertville.org	256-264-5004
Paula McInerney	Albertville City	mcin@albertville.org	SAB

SAB = Same as Bureau

Marshall County HMPC Meeting
2014 Marshall County Multi-Hazard Mitigation Plan Update

March 18, 2014

1. Call to Order
2. Welcome and Opening Remarks
3. <http://marshall.hazardmitigationplan.com> Updates
4. Review Draft Plan Updates
 - a. Community Profiles – Chapter 3
 - b. Risk Assessment Part A – Chapter 5A (sections 5.1-5.5)
 - c. Appendix D Hazard Ratings and Descriptions
 - d. Appendix E Hazard Profile Data
5. HMPC Exercise – Hazard Identification and Ratings
6. Integration of Table 5-17 “Summary of Hazards and Community Impacts” into THIRA
7. Questions and Answers
8. Next Meeting Dates and Topics
9. Other Business
10. Adjourn

Marshall County
Hazard Mitigation Planning Committee Meeting
March 18, 2014

Name	Jurisdiction/Organization	Email Address	Phone Number
Jeremy Gries	City of ARAB	291.995@ARAB.CITY.ORG	506-5968
Jimmy Hanson	City of Boaz	Jimmy.hanson@cityofboaz.org	256-460-9453
Jessica Patterson	City of Boaz	admin@cityofboaz.org	256-264-5147
Patty Weigs	City of Bowersville	patty.weigseguetersville.org	256-571-7560
Carolyn Garrett	Town of Douglas	carolrtd@douglasga.org	256-593-6531
George Halverson	MC EMA	CHalverson@MARSHALLCO.ORG	256-571-7329
Angie McInerney	MC EMA	angie.burgett@marshallco.org	256-571-7529

Marshall County HMPC Meeting
2014 Marshall County Multi-Hazard Mitigation Plan Update

May 27, 2014

1. Call to Order
2. Welcome and Opening Remarks
3. <http://marshall.hazardmitigationplan.com> Updates
4. Review Draft Plan Updates
 - a. Risk Assessment Part B – Chapter 5B (sections 5.5 - 5.10)
 - b. Chapter 6 Mitigation Strategies
 - c. Appendix B Community Mitigation Capabilities
 - d. Appendix C 2009 Plan Implementation Status
5. HMPC Exercise – Hazard Mitigation Project Selection, Parts 1 and 2
6. Questions and Answers
7. Next Meeting Dates and Topics
8. Community Event
9. Other Business
10. Adjourn

Marshall County

Hazard Mitigation Planning Committee Meeting

May 27th, 2014

Name	Jurisdiction/Organization	Email Address	Phone Number
Tom Tidmore	Marshall County EMT	ttidmore@marshallcounty.org	256-256-2565
Katherine King	Marshall County EMT	katherineking@marshallcounty.org	256-256-2567
Carolyn Gaudet	Marshall County EMT	carolyn@marshallcounty.org	256-593-9531
Jimmy Henson	City of Boone	jimmy.henson@cityofboone.org	256-960-9453
Patty Neigis	City of Guntersville	patty.neigis@guntersvilleal.org	256-571-7564
Jeff G. Hays	Guntersville BOC	jeff.g.hays@cityofguntersville.org	256-300-1357
Anna McQuinn	Marshall County EMT	anna.mcquinn@marshallcounty.org	256-571-7529
Carol Ann McQuinn	Marshall County EMT	carolann.mcquinn@marshallcounty.org	256-571-7529
Celeste Boydston	Marshall County EMT	celeste.boydston@marshallcounty.org	256-571-7529
Jim Lebe	Marshall County EMT	jim.lebe@marshallcounty.org	256-571-7529

Marshall County HMPC Meeting
2014 Marshall County Multi-Hazard Mitigation Plan Update

July 23, 2014

1. Call to Order
2. Welcome and Opening Remarks
3. <http://marshall.hazardmitigationplan.com> Updates
4. Review Draft Plan Updates
 - a. Community Action Programs
 - b. Appendix F Alternative Mitigation Measures
 - c. Chapter 4 Planning Process
 - d. Appendix G Committee Meeting Documentation
 - e. Appendix H Community Involvement Documentation
 - f. Appendix I Multi-Jurisdictional Participation
 - g. THIRA integration
5. Final plan documents with revisions
6. AEMA/FEMA review and approval subject to adoption
7. Plan adoption
8. Annual review
9. Questions & Answers
10. Other business
11. Adjourn

Marshall County Hazard Mitigation Planning Committee Meeting July 23, 2014

Name	Jurisdiction/Organization	Email Address	Phone Number
GeoFace Harbison	MC CMA	CMA@mcclerk.com	256-571-7329
Jeff Gibbs	Franklin City Schools	jeff.gibbs@fcps.net	256-300-1357
Patty Meigs	City of Evansville	patty.meigs@evansville.org	256-591-7500
Tim Tidmore	Evansville City 804	ttidmore@evansville.org	256-891-1183
Carlynn Garrett	Douglas	carlynn@douglasal.com	256-593-9531
Debbie King	Grant	debbieking@grantalabama.com	256-225-2001
Celeste Boydston	Leche Planning	celesteboydston@gmail.com	256-891-1024
Jim Leche	" "	jleche@lecheplanning.com	256-578-3623

4.0 Annual Meetings

This section documents the HMPC's annual meeting activities after adoption of the 2009 plan. Included here are the meeting minutes from 2010 through 2013.

MARSHALL COUNTY LOCAL EMERGENCY PLANNING COMMITTEE
MITIGATION PLAN REVIEW AND WINTER WEATHER WORKSHOP

January 14th, 2010
Marshall County EOC 1:30PM
MINUTES

- 1.) Meeting called to order at 1:30PM by Anita McBurnett, Director-Marshall Co. EMA
- 2.) Introductions
- 3.) Members Present at the Meeting;
 - a. Marshall County EMA Anita McBurnett-Lee Rosser-Sahra Lyons-Elain Garrison
 - b. Town of Grant Bethany King
 - c. DHR Kathleen Rice
 - d. City of Guntersville Ed Crabtree-Mayor Hembree, Police Chief, Fire Chief
 - e. Town of Douglas Mayor Paula Phillips
 - f. City of Albertville Jeremy Griggs, Mayor Lyons, Police Chief, Fire Chief
 - g. City of Arab Mayor Beam, Police Chief, Fire Chief, Becky Hawkins
 - h. City of Boaz Mayor Tim Walker, City Clerk, Fire Chief, Police Chief
 - i. Town of Union Grove Fire Chief
 - j. Marshall Co. Board of Ed. Mr. Ferguson
 - k. Marshall Co. Commission Chairman Fleming, Bill Stricklend, James Maze,
Richard Kilgore, Nancy Wilson, Engineer Bob Pirando
- l. Marshall County 911 Cheryl King, Jason Nix
- 4.) Review outline of Meeting
- 5.) Conduct Winter Weather Workshop – show relationship between Winter Weather Planning and Mitigation Plan Action Items.
- 6.) *Discussed need for Infrastructure evaluations in support of Winter Weather and Tornado Events*
- 7.) Discussed the need for Debris Management Plans in all Municipalities.
- 8.) Discussed Flooding issues from Winter Weather Run Off and Spring Rains/Tornadoes
- 9.) Discussed Need for more Outdoor Warning Sirens and Community Storm/Tornado Shelters.
- 10.) Conducted Resources/Equipments shortages.
- 11.) Mitigation Plan updates are due to Anita by February 4, 2010.

MARSHALL COUNTY MITIGATION REVIEW
IA/PA MEETING
JUNE 3, 2011- 9:30 AM
GUNTERSVILLE HIGH SCHOOL AUDITORIUM
MINUTES

- 1.) Meeting called to order at 9:30 AM by Kelli Alexander, Alabama EMA
- 2.) Introductions - AEMA
- 3.) Members Present at the Meeting;

Mitigation Planning Team Members

- a. All Municipalities-Representatives from Various Disciplines
 - b. County Commission Officials
 - c. Utility Company Representatives
 - d. Marshall County VOAD Member Agencies
 - e. Media
 - f. School Boards
 - g. Alabama DHR
 - h. Alabama EMA Representatives
- 4.) Review of Mitigation Measures: Following April 27, 2011 Tornado Outbreak
 - a. Eligible Applicants
 - b. Application Process
 - c. Different types of Mitigation
 - 5.) Question and Answer Session
 - 6.) Ad-Hoc Meeting held with Mitigation Planning Team Members on the side. Discussed review of current Mitigation Plan and updates to Mitigation Measures.
 - 7.) Recovery Efforts in full swing from Tornado Outbreak. Debris management/Operation Clean Sweep/IA-Case management and DRC Operations reviewed.
 - 8.) Anita reminded the committee members as they go through the recovery process to review and provide any updates to their section of the Mitigation Plan by August 3rd, 2011.

MARSHALL COUNTY MITIGATION REVIEW
IA/PA MEETING
MAY 20, 2012- 8:00 AM
MARSHALL COUNTY EMA – EOC
CREEK PATH ROAD, GUNTERSVILLE ALABAMA
MINUTES

- 1.) Meeting called to order at 8:00 AM by Anita McBurnett-Marshall County EMA
- 2.) Introductions – AEMA – Chris Newton
- 3.) Members Present at the Meeting;

Mitigation Planning Team Members
All Municipalities
Marshall County-EMA-Engineer
DHR-Red Cross
Marshall County VOAD President
- 4.) AEMA provided and overview of IA/PA and answered questions from the committee members.
- 5.) Discussed drainage projects and updating mitigation plan
- 6.) Discussed work ongoing with Comprehensive Plans
- 7.) Discussed changes to FEMA FIRMS and Mapping
- 8.) Discussed updates to the Outdoor Warning Siren Systems, Individual/Community Tornado Shelters HMGP applications and activities – on going.
- 9.) Discussed need to involve city councils and commissioners in being more involved in the Mitigation Process.
- 10.) Discussed lack of participation by Industry and Business in the Mitigation Process.
- 11.) Discussed "Whole Community Involvement" in pre-disaster and post-disaster sheltering.
- 12.) Discussed Animals in Disaster and provisions for Pets in Post-Disaster Shelter Operations.
- 13.) Discussed Guntersville Dam and when TVA will do another Dam Exercise.
- 14.) Discussed On-Going Case Management work for Tornado Recovery Efforts.
- 15.) Anita requested any updates to be submitted by July 10th, 2012.
- 16.) Reminded everyone that the Mitigation Plan will need to be updated by January 2015.

MARSHALL COUNTY MITIGATION REVIEW
IA/PA MEETING
April 4, 2013- 8:00 AM
MARSHALL COUNTY EMA – EOC
CREEK PATH ROAD, GUNTERSVILLE ALABAMA
MINUTES

- 1.) Meeting called to order at 8:00 AM by Anita McBurnett-Marshall County EMA
- 2.) Introductions – AEMA – Yearly IA/PA Review
- 3.) Members Present at the Meeting;

Mitigation Planning Team Members

Marshall County-EMA Representatives-Engineer
Town of Grant and Douglas
City of Guntersville, City of Boaz, City of Arab
DHR
Salvation Army
Red Cross
Marshall County VOAD President

- 4.) AEMA provided and overview of IA/PA and answered questions from the committee members.
- 5.) Discussed continued lack of funding for mitigation measures (large projects) due to economy
- 6.) Discussed changes in personnel on city councils and county commission and education of new elected officials in the mitigation process and goals and objectives. Key issue in maintaining continuity in mitigation measures and priorities with new administrations.
- 7.) Discussed the need for utility lines to be buried and the fact that Electrical Co-operatives will not even consider due to cost.
- 8.) Discussed updating Emergency Operations Plans, SOG's and SOP's as a result of the April 27th, 2011 Tornado Outbreak.
- 9.) Discussed the need for Back up Generators needed in School Gyms and Recreation Facilities in the municipalities to be utilized as back-up shelters and DRC's and Recover Coordination Centers. No funding to fund for these facilities. Focus is on City Halls and Fire Departments and Police Departments.
- 10.) Stressed the need for Pre-Event Debris Contracts.
- 11.) Discussed updating the Mitigation Plan and new Mitigation Plan Committee members needed (due to attrition and desires of new Mayors).
- 12.) Anita to work with leaders in appointment of new members, mitigation plan update, need to have building officials more involved in the mitigation planning along with the Economic Development Council.
- 13.) Submit any changes that you may have to Anita by September 10, 2013. The compiled list of updates will be utilized in the plan update beginning in 2014.
- 14.) Discussed funding needed for mitigation plan update and if AEMA would be providing

Appendix H

Community Involvement Documentation

App. H - Community Involvement Documentation

- 1.0 Community Involvement Opportunities
- 2.0 Documentation

1.0 Community Involvement Opportunities

This Appendix includes additional documentation of the community involvement opportunities in the planning process for the Marshall County 2014 plan update. (See Chapter 4 "The Planning Process" for a complete discussion of community involvement in the planning process). The following are a list of ways in which the communities were able to participate in the planning process:

1. The Marshall County Hazard Mitigation Planning Committee (HMPC). This Committee, which was first established in 2004 to oversee the original plan, was reorganized in 2008 to oversee the 2009 update, and then in January 2014 to prepare the 2014 update. Its primary purposes are to oversee all hazard mitigation planning activities and ensure the plan's ongoing monitoring and implementation. The HMPC represents all Marshall County jurisdictions, as well as interested stakeholder organizations, and meets at least annually. Its seven meetings during the drafting phase of the 2014 plan update were publicly announced and open to the public. (For complete documentation of HMPC meetings, refer to Appendix G "Committee Meeting Documentation", and for a more detailed discussion of the HMPC, refer to Chapter 4 "The Planning Process").
2. The 2014 Marshall County Multi-Hazard Mitigation Plan Website. The website marshall.hazardmitigationplan.com was active during the drafting phase of the 2014 update. The website was created to encourage "the public, government agencies, colleges and universities, neighboring jurisdictions, businesses and industries and others concerned with hazard mitigation to become involved in the process of updating the 2014 Marshall County Multi-Hazard Mitigation Plan. The website contained the most recent draft sections of the plan, all meeting materials including presentation materials, and encouraged public comments through a dedicated email account at marshall@hazardmitigationplan.com. The public could also contact the planning team through Facebook and Twitter. The website provided public information on the HMPC membership, meeting announcements, and contact information for the Marshall County EMA and the consulting team. The most recently adopted plan is maintained on the Marshall County EMA website at <http://www.marshallcoema.org>.
3. Media Relations. Complete coverage of the HMPC meetings and other activities were reported by local TV, radio, and news organizations, including

news reports published by the Sand Mountain Reporter and the Gadsden Times. The Marshall County EMA kept local media apprised of all activities throughout the drafting stage.

4. Community Meetings. Community meetings were held independently by each jurisdiction.
5. Interagency Involvement. Invitations to review the plan update on the website were sent to agencies and organizations representing neighboring counties, Federal and State governmental agencies, businesses, educational institutions and school boards, and other interested private and non-profit stakeholders in the hazard mitigation planning process.
6. Public Hearings Prior to Adoption. A final opportunity for public comment was afforded immediately before adoption by each local governing body. Following the close for public comments, the plan was adopted by the governing bodies of each jurisdiction.
7. Marshall County EMA Community Relations. The Director and staff of the Marshall County EMA has a longstanding record of strong and effective community relations, which further facilitated community interest and involvement in the 2014 plan update.

2.0 Documentation

This Appendix includes the following documentation of community involvement activities and opportunities:

- An image of the 2014 Marshall County Multi-Hazard Mitigation Plan update website at marshall.hazardmitigationplan.com.
- The email to media and others telling them about the plan and the website.
- A transcript from television station WHNT interviewing the EMA Director, Anita McBurnett, about the plan and the planned county wide community meeting.
- A copy of the notice for the media to announce the community meeting on August 13, 2014.
- The email invitation to interested agencies, organizations, and stakeholders to review the plan and provide feedback.
- A copy of the sign in sheet from the Community Meeting held August 13, 2014.

- A copy of the community survey which was available on the website for community members to express their concerns about the different hazards.
- The sign in sheet and 2 notices for a public hearing for the Town of Grant for the review of the draft plan by the citizens.

Image of the 2014 Marshall County Multi-Hazard Mitigation Plan update website
at marshall.hazardmitigationplan.com

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HOME ABOUT SERVICES CONTACT

Hazard Mitigation Planning

2014 Marshall County Multi-Hazard Mitigation Plan

The Marshall County Hazard Mitigation Planning Committee encourages the public, government agencies, colleges and universities, neighboring jurisdictions, businesses and industries, and others concerned with hazard mitigation to become involved in the process of updating the 2014 Marshall County, Alabama, Multi-Hazard Mitigation Plan. Please review the information presented here and contribute your ideas and recommendations for planning to make Marshall County communities safer communities.

What is the 2014 plan update?

The 2014 Plan is a multi-jurisdictional guide for all Marshall County communities. Participating jurisdictions include the cities of Ulenville, Irish, Scott, and Gurneeville, the towns of Bain, Douglas, and Union Grove, and the boards of education for Marshall County, Ulenville, Irish, Scott, and Gurneeville. It fulfills the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000) as administered by the Alabama Emergency Management Agency (AEMA) and the Federal Emergency Management Agency (FEMA) Region IV.

The planning process began in January 2004 with the appointment of the Hazard Mitigation Planning Committee (HMPC) by the Local Emergency Planning Committee of the Marshall County Emergency Management Agency (EMA). The committee first convened in January 2004. In July 2004, the Natural Hazards Mitigation Plan plan was approved and adopted by the county and all participating municipalities. The HMPC reconvened in January 2009 to update the 2004 plan as the 2009 Marshall County Multi-Hazard Mitigation Plan, which addresses man-made hazards in addition to natural hazards. The HMPC has again reconvened for the 2014 update. The 2014 planning process continues the unified approach among all Marshall County communities to guide their ongoing efforts to mitigate vulnerability.

The Marshall County Hazard Mitigation Planning Committee

The Hazard Mitigation Planning Committee convenes regularly to discuss the drafting of the 2014 plan update. Meetings are held in the offices of the Marshall County EMA and are open to the public and all interested agencies. A community meeting, to be held during the final drafting stage of the plan, will provide additional opportunities for public review and comments. Committee representatives participate in plan exercises and other activities throughout the planning process. In the end, the Hazard Mitigation Planning Committee will approve the final draft plan and recommend its adoption to all participating jurisdictions.

HMPC Meeting Schedule

Tuesday, January 20, 2014 (delayed until 1:00 due to snow storm) [click here for agenda and slide presentation](#)
 Tuesday, March 18, 2014 at 1 PM: [click here for agenda, slide presentation, Community Impact Summary Handout, and HMPC Hazard Identification and Ratings](#)
 Tuesday, May 27, 2014 at 1 PM: [click here for agenda and slide presentation](#)
 Wednesday, July 23, 2014 at 1 PM: [click here for agenda, slide presentation, and updated THRS](#)

[Click here for Community Survey](#)

The 2014 Marshall County Multi-Hazard Mitigation Plan (DRAFT Elements)

The plan elements listed below, with a hyperlink, are presented here for public review and comment, as they are completed. Please review the plan as it is drafted and email your comments and suggestions to us at marshall@marshallhazardmitigationplan.com.

Cover, Title Page, and Contents	Cover and Contents
Chapter 1 Introduction	Appendix A Federal Requirements for Local Mitigation Plans
Chapter 2 Premitigation	Appendix B Community Mitigation Capabilities
Chapter 3 Community Profiles	Appendix C 2000 Plan Implementation Status
Chapter 4 Planning Process	Appendix D Hazard Ratings and Descriptions
Chapter 5 Risk Assessment	Appendix E Hazard Profile Data
Chapter 6 Risk Assessment	Appendix F Alternative Mitigation Measures
Chapter 6 Mitigation Strategies	Appendix G Committee Meeting Documentation
Chapter 7 Plan Maintenance Process	Appendix H Community Involvement Documentation

Email to area agencies from the planning team about the ability to review the plan online and to submit comments:

From: Kay Jones
Sent: Monday, August 11, 2014 8:44 AM
To:
Subject: 2014 Marshall County Multi-Hazard Mitigation Plan Update Review

To all concerned:

We have concluded the drafting of the update to the 2014 Marshall County Multi-Hazard Mitigation Plan and would like to invite you to review the plan and provide any additional information or comments you may have pertinent to the mitigation measures set forth in the plan.

The Marshall County Hazard Mitigation Planning Committee met from January through July 2014 to update the 2009 plan and is ready to submit it to the state EMA office for their review and approval.

You can find the entire plan at marshall.hazardmitigationplan.com and may provide any feedback you have to us at marshall@hazardmitigationplan.com.

We appreciate your participation in this planning process.

Kay Jones
Project Administrator

Lehe Planning, LLC
300 Century Park South, Ste. 216
Birmingham, AL 35226-3924

**Email to the media from the EMA Director
about the ability to review the plan online:**

From: Anita McBurnett
Date: Mon, Jul 28, 2014 at 10:35 AM
Subject: Community Review of the 2014 All-Hazard Mitigation Plan
To:

Good Monday All,

Marshall County EMA in cooperation with the Municipalities and others, have been in the process of updating the All-Hazards Mitigation Plan for Marshall County. This is a 5-Year update required by the Disaster Mitigation Act of 2000.

The Draft update is ready for review and inputs. Please click this link: <http://marshall.hazardmitigationplan.com/> to review the plan in its entirety. If you have any inputs to the plan please email those to marshall@hazardmitigationplan.com

Your feedback and comments are important to us!

Best Regards,
Anita McBurnett

MARSHALL COUNTY EMA
Anita McBurnett-ALEM, CLEM
Director - MCEMA
HS-POC Marshall County
3550 Creek Path Road
Guntersville, Alabama 35976

Transcript from WHNT news reporting the upcoming community meeting:

WHNT (CBS) - Huntsville, AL
WHNT News 19 at 6

WHNT 8/6/2014 6:05:12 PM: ...explains, marshall county is ready to present it's new hazard mitigation plan to the public. [a21]mr hazard mitigation plan pkg locator @ :00-:05 if you just sit around and wait for the next disaster to strike, it's just going to be that much harder to recover. that's why the marshall county emergency **Management** agency has prepared a brand new hazard mitigation plan. anita mcburnett/marshall county ema director @ : "what we are addressing are issues in which we can lesson effects and impacts of disasters upon our citizens, our natural resources, our industries, our businesses." ema director anita mcburnett says hazards come in all shapes and sizes, not just what we normally growth." the county's new mitigation plan is very comprehensive and covers a hazard mcburnett says most people don't consider to be a problem in alabama. anita: " i think sinkholes. a lot of people don't think about sinkholes. we do have some sinkhole areas here in marshall county. we do have earthen dams. we look at those." marshall county is one of the most disaster prone counties in alabama, with 15 tornadoes alone back on april 27th, 2011. that's why a new plan is so important. in marshall county, carson clark, whnt news 19. if you'd like to look at the new hazard mitigation plan, there is a public hearing next wednesday, august 13 at 11 a-m in the marshall county commission chambers.

Email to media requesting posting about upcoming community meeting:

From: **Anita McBurnett** <amcburnett@marshallco.org>
Date: Wed, Aug 6, 2014 at 8:48 AM
Subject: 2014 Mitigation Plan Review: Public Notice
To:

Media Please Post:

Marshall County residents who want to review the 2014 Marshall County Multi-Hazard Mitigation Plan can do so Wednesday August 13th at 11:00 am in the Commission Chambers of the Marshall County Courthouse. The public is invited to make comments or suggestions, and agency officials will be present to answer questions.

The Mitigation process is designed to reduce the loss of life and property during severe weather and other hazardous events.

The Marshall County Hazard Mitigation Planning Committee encourages the public, government agencies, colleges and universities, neighboring jurisdictions, businesses and industries, and others concerned with hazard mitigation to become involved in the process of updating the 2014 Marshall County, Alabama, Multi-Hazard Mitigation Plan. Please review the information presented here and contribute your ideas and recommendations for planning to make Marshall County communities safer communities.

Residents may also go On-Line to <http://marshall.hazardmitigationplan.com> to review the plan and make comments if they are unable to attend the meeting on August 13th.

The 2014 Plan is a multi-jurisdictional guide for all Marshall County communities. Participating jurisdictions include the cities of Albertville, Arab, Boaz, and Guntersville, the towns of Grant, Douglas, and Union Grove, and the boards of education for Marshall County, Albertville, Arab, Boaz, and Guntersville. It fulfills the requirements of the Federal Disaster Mitigation Act of 2000 (DMA 2000) as administered by the Alabama Emergency Management Agency (AEMA) and the Federal Emergency Management Agency (FEMA) Region IV.

If anyone has any questions, please do not hesitate to contact me.

Thank You!
Anita McBurnett

MARSHALL COUNTY EMA
Anita McBurnett-ALEM,CLEM
Director - MCEMA
HS-POC Marshall County
3550 Creek Path Road
Guntersville, Alabama 35976

APPENDICES

2014 Marshall County Multi-Hazard Mitigation Plan

Sign-in sheet from the Community Meeting held August 13, 2014.



MITIGATION PUBLIC HEARING

AUGUST 13, 2014

	Name (Please Print)	Signature	AREA
1	Clint Maze	Clint Maze	Arab
2	Beverly Lemons	Beverly Lemons	Arab
3	Michael Knop	Michael Knop	Guntersville
4	Helen Young	Helen Young	Wakefield
5	Bob Priano	Bob Priano	Mar. Co.
6	Norma Parker	Norma Parker	
7	Norma Parker	Norma Parker	Boon
8	Susan Owens	Susan Owens	Guntersville, AL
9	Robbie Ayers	Robbie Ayers	Albertville, AL
10	Jennifer Lewis	Jennifer Lewis	Guntersville, AL
11	Doris Inertter	Doris Inertter	Guntersville, AL
12	William Stickleb	William Stickleb	Arab
13	R. E. Martin	R. E. Martin	Grant
14	David Kelley	David Kelley	Decatur Grove
15	James Hutchinson	James Hutchinson	co.
16	Christy Kelley	Christy Kelley	Guntersville
17	Christy Kelley	Christy Kelley	Guntersville, AL
18	Mary Malone	Mary Malone	Onville
19	Brian Black	Brian Black	Guntersville
20	Greg Alford	Greg Alford	Albertville
21	Stewart Moore	Stewart Moore	Albertville
22	RICHARD DUBBERSTEIN	RICHARD DUBBERSTEIN	GRANT AL
23	Candace Adkins	Candace Adkins	Guntersville
24	Michael Tyler	Michael Tyler	Guntersville
25	Brian Patterson	Brian Patterson	Albertville
26	Audra Ford	Audra Ford	Guntersville



MITIGATION PUBLIC HEARING

AUGUST 13, 2014

	Name (Please Print)	Signature	AREA
1	Jerry Parker	[Signature]	Albertville
2	Tammy Godwin	[Signature]	Boaz
3	Renee Overton	[Signature]	Marshall County
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2014 Marshall County Multi-Hazard Mitigation Plan
Public Survey

Name of your community: _____

Of the following hazards, circle the ones that are of most concern to you.

Tornadoes	Hurricanes
Severe Storms	Sinkholes
Floods	Landslides
Droughts/Heat Waves	Wildfires
Winter Storms/Freezes	Earthquakes
Dam/Levee Failures	Manmade & Technological Hazards

Do you have any specific concerns for any of the above hazards?

Do you have any recommendations on how to mitigate (lessen the effects of) one or more of the above hazards?

Thank you for your comments.

Sign-in Sheet for Public Hearing on June 16, 2014

June 16, 2014

Mitigation Plan Update Public Hearing

Name Please Print

Josh Grimes

Mark Rice (Mark Rice)

Jimmy Bradshaw (Jimmy Bradshaw)

Joe Frazier (Joe Frazier)

Larry Walker (Larry Walker)

Franklin Bevel (Franklin Bevel)

Carolyn May

George Harwell

Bethany King

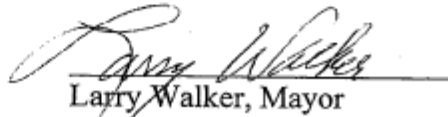
PUBLIC HEARING NOTICE

A public hearing will be held by the Town Council of the Town of Grant, Alabama immediately following the council meeting of **June 16, 2014** which convenes at **6:30 p.m.**

The purpose of the hearing is for public review and comment of the Town's Mitigation Plan Draft in accordance with The Disaster Mitigation Act of 2000.

The Mitigation Plan Draft is available for review at Grant Town Hall, 4766 Main Street, Grant, Alabama or online at <http://marshall.hazardmitigationplan.com>.

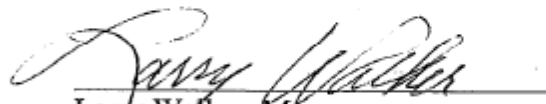
The hearing is open to all citizens.


Larry Walker, Mayor

NOTICE AND CALL OF SPECIAL MEETING
TO CONDUCT A PUBLIC HEARING

In my opinion the public interest requires that a special meeting of the Mayor and Town Council of the Town of Grant, Alabama be called to conduct a public hearing and I hereby call such special meeting to be held at the town hall in said town on **June 16, 2014 immediately following the town council meeting which convenes at 6:30 p.m. on said date.**

The purpose of the hearing is for public review and comment of the Town's Mitigation Plan Draft in accordance with The Disaster Mitigation Act of 2000.


Larry Walker, Mayor

Appendix I
Multi-Jurisdictional Participation Activities

App. I -Multi-Jurisdictional Participation Activities

- 1.0 Participation Requirements
- 2.0 Participation Documentation

1.0 Participation Requirements

According to 44 CFR Section 201.6(a)4, “Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process...” The table in this Appendix illustrates each jurisdiction’s participation within Marshall County in the plan update; qualifying it as a Multi-Jurisdictional Plan.

Each jurisdiction was given the opportunity to participate in every step of the plan update, from the kick-off meeting on January 28, 2014 to the signing and adoption of the resolutions. Whenever a jurisdiction’s representative was unable to attend a meeting, meeting materials were forwarded to that representative so they would have every opportunity to participate.

2.0 Participation Documentation

Table I-1 included in this Appendix lists each jurisdiction within Marshall County that participated in the planning process and the various meetings and activities that each jurisdiction could participate in. An X indicates the events in which the jurisdiction chose to participate. Examples and conclusions of the activities are shown in Appendices B through F, and information on the meetings is included in Appendices G and H.

APPENDICES2014Marshall County Multi-Hazard Mitigation Plan

Table I-1. Multi-Jurisdictional Participation Activities

Multi-Jurisdictional Participation Activities Marshall County 2014 Plan Update	Marshall Co.	Albertville	Arab	Boaz	Douglas	Grant	Guntersville	(1)Union Grove
HMPC Kick-off Meeting - January 28, 29, 2014	X	X	X	X	X	X	X	X
Interim Meeting 1 - February 27, 2014	X	X	X	X	X	X	X	X
HMPC Meeting 2 - March 18, 2014	X	X	X	X	X	X	X	X
Hazard Identification and Ratings	X	X	X	X	X	X	X	X
Interim Meeting 2 - April 17, 2014								
HMPC Meeting 3 - May 27, 2014	X	X	X	X	X	X	X	X
2009 Plan Implementation Status	X	X	X	X	X	X	X	X
HMPC Meeting 4 - July 23, 2014	X	X			X	X	X	X
Mitigation Measures Evaluation	X	X	X	X	X	X	X	X

- (1) Union Grove was represented by the Marshall County EMA through an authorized representation resolution passed by the Town Council of Union Grove.

X Denotes participation in activity

Appendix J

Adopting Resolution

App. J – Adopting Resolution

- 1.0 Purpose
- 2.0 Sample Adopting Resolution

1.0 Purpose

The sample resolution presented here serves as a model for the governing bodies of the participating jurisdictions to adopt the 2014 plan update following a public hearing. Each jurisdiction may modify the sample to fit their particular legal form.

2.0 Sample Adopting Resolution

RESOLUTION OF THE (GOVERNING BODY)**A RESOLUTION ADOPTING THE 2014 MARSHALL COUNTY MULTI-HAZARD MITIGATION PLAN, IN FULFILLMENT OF THE FEDERAL DISASTER MITIGATION ACT OF 2000 AND THE LOCAL MITIGATION PLAN REQUIREMENTS OF 44 C.F.R. SECTION 201.6 AND FEMA LOCAL MULTI-HAZARD MITIGATION PLANNING GUIDANCE**

WHEREAS, The Federal Disaster Mitigation Act of 2000 (DMA 2000), as administered by the Alabama Emergency Management Agency (AEMA) and the Federal Emergency Management Agency (FEMA) provides Federal assistance to local governments to alleviate suffering and damage from disasters, and broadens existing relief programs to encourage disaster preparedness plans and programs, coordination and responsiveness, insurance coverage, and hazard mitigation measures; and,

WHEREAS, the DMA 2000 requirements for local mitigation plans are set forth in 44 C.F.R. Section 201.6 and the Local Mitigation Planning Handbook, FEMA, March 2013; and,

WHEREAS, as a prerequisite for each Marshall County jurisdiction to continue to qualify for FEMA mitigation grant assistance programs, the DMA 2000 requires the five year update of the 2009 Marshall County Multi-Hazard Mitigation Plan, which was completed on July 12, 2009, and approved by FEMA on August 19, 2009; and,

WHEREAS, the AEMA had awarded a \$20,625.00 planning grant funded through the FEMA Hazard Mitigation Grant Program (HMGP) to the Marshall County Commission to fund 75% of the total cost of the five year plan update for all jurisdictions within Marshall County; and,

WHEREAS, the 2014 Marshall County Multi-Hazard Mitigation Plan has been prepared in accordance with DMA 2000 requirements under the direction of the Marshall County Hazard Mitigation Planning Committee with the support of the Marshall County EMA, on behalf of all of the jurisdictions within Marshall County; and,

WHEREAS, said mitigation plan addresses all natural and man-made hazards deemed to threaten property and persons within the unincorporated and incorporated areas of Marshall County; and,

WHEREAS, the Federal planning criteria require formal adoption of the FEMA-approved plan update by each participating jurisdiction.

NOW THEREFORE, BE IT RESOLVED that the 2014 Marshall County Multi-Hazard Mitigation Plan is hereby adopted and immediately made effective.

ADOPTED this the _____ day of _____, 2014.

APPROVED: _____

ITS: _____

ATTEST: _____

ITS: _____