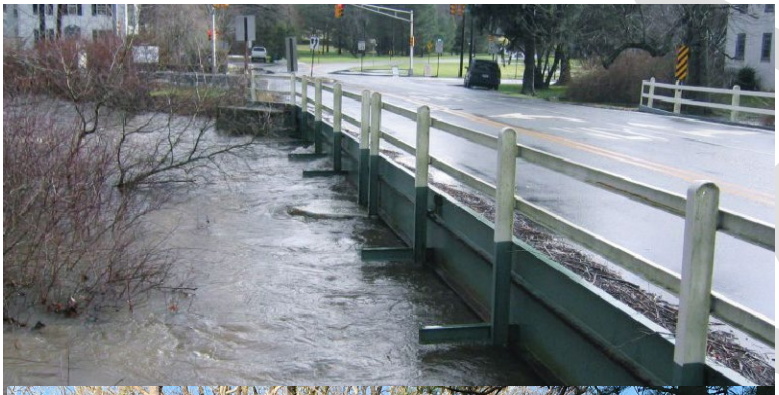
Baldwin County, Alabama

Flood Hazard Management Plan



Baldwin County
Flood Hazard Management Plan

Baldwin County Floodplain Management Planning Committee

Name	Representing
Staff Members	
Flowers, Corey	Baldwin County Building Inspection Department
Dandridge, Vernon	Baldwin County Emergency Management Agency
Newman, Josh	Baldwin County Planning and Zoning Department
Acreman, Mark	Baldwin County Highway Department
Community Members	
Summerville, Peggy	Citizen Member, Relator
Miller, Christian	Mobile Bay National Estuary Program
Joffe, Donald	Environmental Advisory Committee
Williams, Nick	Sustainability Coordinator, City of Foley

The purpose of flood hazard management planning is to reduce or eliminate risk to people and property from flood hazards. Baldwin County, Alabama, has prepared this *Flood Hazard Management Plan Update* to better protect the people and property of the unincorporated areas of the County from the effects of flood hazard events. Every community faces different hazards and every community has different resources to draw upon in combating problems along with different interests that influence the solutions to those problems. Because there are many ways to deal with flood hazards and many agencies that can help, there is no one solution for managing or mitigating their effects. Planning is one of the best ways to develop a customized program that will mitigate the impacts of flood hazards while taking into account the unique character of a community. The plan provides a framework for all interested parties to work together and reach consensus on how to move forward. A well-prepared Flood Hazard Management Plan will ensure that all possible activities are reviewed and implemented so that the problem is addressed by the most appropriate and efficient solutions. It can also ensure that activities are coordinated with each other and with other goals and activities, preventing conflicts and reducing the costs of implementing each individual activity.

Baldwin County followed the planning process prescribed by the Federal Emergency Management Agency (FEMA), and this plan was developed under the guidance of a Floodplain Management Planning Committee (FMPC) comprised of representatives of County Departments, citizens and other stakeholders. The FMPC conducted a risk assessment that identified and profiled flood hazards that pose a risk to unincorporated Baldwin County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The flood hazards profiled in this plan include:

- Flood: 100-/500-year
- Flood: Stormwater/Localized Flooding
- Hurricane and Tropical Storms (including storm surge)
- Coastal Bank Erosion
- Dam/Levee Failurecri
- Changing Future Conditions and Sea Level Rise

This plan identifies activities that can be undertaken to reduce safety hazards, health hazards, and property damage caused by floods. Based on the risk assessment developed for each of the flood hazards identified above, the FMPC identified goals for reducing the County's vulnerability to the hazards. The goals and objectives are summarized as follows:

- **Goal 1: Reduce the vulnerability of the people, property, environment, and economy of unincorporated Baldwin County to the impacts of flood hazards.**

- **Goal 2: Strengthen protection critical facilities and infrastructure from flood hazards to create a safer, more sustainable community.**
- **Goal 3: Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to respond.**
- **Goal 4: Maintain and enhance the County's ability to manage a comprehensive flood hazard program.**

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

The *Baldwin County Flood Hazard Management Plan Update* has been formally adopted by the associated County Commissions and will be updated within a five-year time frame.

Table I. Mitigation Action Matrix

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
Strictly administer existing flood hazard regulations (Flood Damage Prevention Ordinance) and review said regulations to determine their adequacy and whether revisions are needed.	High	1,2	X	X	X	Prevention
Provide annual notification of flood hazard determination service to lending institutions, insurance companies, real estate companies and title insurance companies.	High	3	X		X	Public Education and Awareness
Distribute outreach materials to floodplain residents at county offices and special events.	High	3	X		X	Public Education and Awareness
Develop Program for Public Information (PPI) to Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to protect their property. Coordinate and consolidate outreach measures identified in the local hazard mitigation plan.	High	3	X		X	Public Education and Awareness
In coordination with the Local Emergency Planning Committee (LEPC), prepare and adopt a local disaster recovery plan to aid in the recovery of flood hazard events.	High	1,2	X		X	Emergency Services
Continue to comply with the NPDES permitting requirements and insist on compliance by the development community.	Med	1,2		X	X	Prevention
Assure compliance with the existing stormwater and erosion control measures contained in the zoning and subdivision regulations.	Med	1		X	X	Prevention
Continue program to pave County dirt roads giving priority to dirt roads with known erosion problems.	Med	2	X	X	X	Structural
Research the feasibility of establishing and funding a stream maintenance and restoration program and pursue appropriate action.	Med	1	X	X	X	Natural Resource Protection

Continue participation in the CRS program to reduce flood hazards.	Med	1,2	X	X	X	Prevention

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
Continue to assist unincorporated areas to implement planning and zoning in accordance with the provisions of Act No. 91-719, as amended.	Med	1,2		X	X	Prevention
Assure compliance with the wetlands protection provisions contained in the zoning and subdivision regulations and utilize the ADID study findings in the land development review process.	Med	1		X	X	Prevention
Continue to review and comment upon ADEM and COE permit applications for dredge and fill.	Med	4	X	X	X	Prevention
Continue participation in the FEMA hazard mitigation program to purchase properties which repeatedly flood.	Med	1	X		X	Property Protection
Identify significant open space and wetland resources and pursue public and private grants for purchase as appropriate.	Med	1	X	X	X	Natural Resource Protection
Continue to coordinate flood hazard activities with state and federal environmental agencies including Health Department, ADCNR, ADEM, EPA, NRCS, FEMA, USFWS and COE.	Med	4	X	X	X	Prevention
Continue to coordinate flood hazard activities with municipal governments involved in flood hazard management.	Med	4	X	X	X	Prevention
Utilize the County's geographic information system (GIS) to identify and protect flood hazard areas.	Med	1,2	X	X	X	Prevention
Maintain an inventory of county-maintained roads and bridges which become partially or wholly submerged during rainfall events.	Med	2	X	X	X	Prevention
Research and evaluate the impact of a buyout only hazard mitigation program within the floodway and pursue appropriate action.	Med	1	X		X	Property Protection
Strengthen flood warning activities by developing programs including a flood threat recognition system, flood prediction models and a system to disseminate flood warnings to the public.	Med	1,3	X	X	X	Emergency Services

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP	Mitigation Category
Through continued coordination with US Fish and Wildlife and the Alabama Dept of Conservation & Natural Resources, Baldwin County will continue to examine the appropriate use of sediment-trapping vegetation, sediment mounds, etc., in addressing the impacts of coastal erosion.	Med	4	X	X	X	Natural Resource Protection
Coordinate with the Baldwin County Local Hazard Mitigation	Med	1,2,3,4	X	X	X	Prevention
Review location of repetitive loss properties, define repetitive loss areas (RL and neighboring properties), and develop repetitive loss area analyses to provide more specific guidance on how to reduce damage from repetitive flooding.	Low	1	X		X	Property Protection
Train local Baldwin staff with specific EMI retrofitting and floodproofing courses to provide technical assistance to homeowners, builders, and developers on flood protection alternatives. Advertise service on Baldwin County Website.	Low	4	X		X	Property Protection

The following table provides the 10-step CRS planning credit activity checklist and the section/page number within this plan that describes the completion of each planning step in more detail.

Table 2. CRS Planning Credit Activity Checklist

CRS Step	Section/Page
Step 1. Organize to Prepare the Plan	
a. Involvement of office responsible for community planning	Section 1.3.4, Pg.1.11-1.13
b. Planning committee of department staff	Section 1.3.4, Pg.1.11-1.13
c. Process formally created by the community's governing board	Section 1.3.4, Pg.1.11-1.13 Appendix B
Step 2. Involve the public	
a. Planning process conducted through a planning committee	Section 1.3.4, Pg.1.13-1.16
b. Public meetings held at the beginning of the planning process	Section 1.3.4, Pg.1.13-1.16
c. Public meeting held on draft plan	Section 1.3.4, Pg.1.13-1.16
d. Other public information activities to encourage input	Section 1.3.4, Pg.1.13-1.16 Appendix B
Step 3. Coordinate with Other Agencies	
a. Review of existing studies and plans	Section 1.3.4, Pg.1.16-1.19
b. Coordinating with communities and other agencies	Section 1.3.4, Pg.1.16-1.19
Step 4. Assess the hazard(s)	
a. Plan includes an assessment of the flood hazard with:	
(1) A map of known flood hazards	Figure 3.2, Pg. 3.14
(2) A description of known flood hazard	Section 3.2.1, Pg. 3.9-3.17
(3) A discussion of past floods	Section 3.2.1, Pg. 3.17-3.21
b. Plan includes assessment of less frequent floods	Sections 3.2.2 – 3.2.7
c. Plan includes assessment of areas likely to flood	Section 3.2.1, Pg. 3.22
d. The plan describes other natural hazards	N/A
Step 5. Assess the problem(s)	
a. Summary of each hazard identified in the hazard assessment and their community impact	Section 3.3.3, Pg. 3.60
b. Description of the impact of the hazards on:	
(1) Life, safety, health, procedures for warning and evacuation	Section 3.3.3, Pg. 3.60-3.66
(2) Public health including health hazards to floodwaters/mold	Section 3.3.3, Pg. 3.60-3.66
(3) Critical facilities and infrastructure	Section 3.3.3, Pg. 3.60-3.66
(4) The community's economy and tax base	Section 3.3.3, Pg. 3.60-3.66
(5) Number and type of affected buildings	Section 3.3.3, Pg. 3.60-3.66
c. Review of all damaged buildings/flood insurance claims	Section 3.3.3, Pg. 3.60-3.66
d. Areas that provide natural floodplain functions	Section 3.3.3, Pg. 3.60-3.66
e. Development/redevelopment/Population Trends	Section 3.3.3, Pg. 3.60-3.66
f. Impact of future flooding conditions outline in Step 4, item c	Section 3.3.3, Pg. 3.60-3.66
Step 6. Set goals	
	Section 4.1, Pg. 4.1
Step 7. Review possible activities	
a. Preventive activities	Section 4.2, Pg. 4.2; Table 4.3
b. Floodplain Management Regulatory/current & future conditions	Section 4.2, Pg. 4.2; Table 4.3
c. Property protection activities	Section 4.2, Pg. 4.2; Table 4.3
d. Natural resource protection activities	Section 4.2, Pg. 4.2; Table 4.3

CRS Step	Section/Page
e. Emergency services activities	Section 4.2, Pg. 4.2; Table 4.3
f. Structural projects	Section 4.2, Pg. 4.2; Table 4.3
g. Public information activities	Section 4.2, Pg. 4.2; Table 4.3
Step 8. Draft an action plan	
a. Actions must be prioritized	
(1) Recommendations for activities from 2 of the 6 categories	
(2) Recommendations for activities from 3 of the 6 categories	
(3) Recommendations for activities from 4 of the 6 categories	
(4) Recommendations for activities from 5 of the 6 categories	Section 4.3, Pg. 4.3-4.12
b. Post-disaster mitigation policies and procedures	Section 4.3, Pg. 4.3-4.12
c. Action items for mitigation of other hazards	N/A
Step 9. Adopt the plan	
	Section 1.3.7, Pg. 1.20 Appendix A
Step 10. Implement, evaluate, revise	
a. Procedures to monitor and recommend revisions	Chapter 5, Pg. 5.1-5.7
b. Same planning committee or successor committee that qualifies under Section 511.a.2 (a) does the evaluation	Section 5.2.1, Pg. 5.1-5.2

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Appendices

Acronyms and Abbreviations

ACS	American Community Survey	**EMA**	Emergency Management Agency
ADCNR	Alabama Department of Conservation & Natural Resources	**EMI**	Emergency Management Institute
ADEM	Alabama Department of Environmental Management	**EPA**	Environmental Protection Agency
ADID	Advanced Identification	**EOC**	Emergency Operations Center
AGCRP	Alabama Gulf Coast Recovery Program	**FEMA**	Federal Emergency Management Agency
ALDOT	Alabama Department of Transportation	**FHMP**	Flood Hazard Management Plan
ALERT	Automated Local Evaluation in Real Time	**FIRM**	Flood Insurance Rate Map
BCEGS	Building Code Effectiveness Grading Schedule	**FIS**	Flood Insurance Study
BMP	Best Management Practices	**FMA**	Flood Mitigation Assistance Program
BRATS	Baldwin Rural Area Transportation Service	**FMPC**	Floodplain Management Planning Committee
CBRA	Coastal Barrier Resources Administration	**FPM**	Flood Plain Management Plan
CERT	Community Emergency Response Team	**FPS**	Feet per second
CIP	Capital Improvements Plan	**GIS**	Geographic Information System
COE	Corps of Engineers	**HAZUS**	Hazards United States (FEMA software)
CRS	Community Rating System	**HMGP**	Hazard Mitigation Grant Program
DHS	Department of Human Services	**HUD**	U.S. Department of Housing and Urban Development
DMA	Disaster Mitigation Act	**ICC**	Increased Cost of Compliance
EDA	U.S. Economic Development Administration	**IPCC**	Intergovernmental Panel on Climate Change
EMA	Emergency Management Agency	**ISO**	Insurance Service Office
EMI	Emergency Management Institute	**LEPC**	Local Emergency Planning Committee
EPA	Environmental Protection Agency	**LID**	Low Impact Development
EOC	Emergency Operations	**LIDAR**	Light Intensity Distance and

	Center		Ranging
FEMA	Federal Emergency Management Agency	**MEOW**	Maximum Envelope of Water
FHMP	Flood Hazard Management Plan	**MIP**	Multiyear Implementation Plan
FIRM	Flood Insurance Rate Map	**MOM**	Maximum of Maximums
FIS	Flood Insurance Study	**MSL**	Mean Sea Level
FMA	Flood Mitigation Assistance Program	**N/A**	Non Applicable
FMPC	Floodplain Management Planning Committee	**NCEI**	National Centers for Environmental Information
FPM	Flood Plain Management Plan	**NEMO**	Nonpoint Education for Municipal Officials
FPS	Feet per second	**NFIP**	National Flood Insurance Program
GIS	Geographic Information System	**NGVD**	National Geodetic Vertical Datum
HAZUS	Hazards United States (FEMA software)	**NMI**	Nautical mile
HMGP	Hazard Mitigation Grant Program	**NOAA**	National Oceanic and Atmospheric Administration
HUD	U.S. Department of Housing and Urban Development	**NPDES**	National Pollutant Discharge Elimination Program
ICC	Increased Cost of Compliance	**NRCS**	Natural Resources Conservation Service
IPCC	Intergovernmental Panel on Climate Change	**NWS**	National Weather Service
ISO	Insurance Service Office	**OWR**	Office of Workforce Relations
LEPC	Local Emergency Planning Committee	**PDM**	Pre-Disaster Mitigation Program
LID	Low Impact Development	**PPI**	Program for Public Information
LIDAR	Light Intensity Distance and Ranging	**RL**	Repetitive Loss
MEOW	Maximum Envelope of Water	**RMW**	Radius of Maximum Winds
MIP	Multiyear Implementation Plan	**SBA**	Small Business Administration
MOM	Maximum of Maximums	**SFHA**	Special Flood Hazard Area
MSL	Mean Sea Level	**SHELDUS**	Special Hazard Events and Losses Database for the United States
N/A	Not Applicable	**SLOSH**	Sea, Lake and Overland

			Surges from Hurricanes
NCEI	National Centers for Environmental Information	**SLR**	Sea Level Rise
NEMO	Nonpoint Education for Municipal Officials	**SoVI**	Social Vulnerability Index
NFIP	National Flood Insurance Program	**SWMP**	Storm Water Management Program
NGVD	National Geodetic Vertical Datum	**TBD**	To be determined
NMI	Nautical mile	**USACE**	United States Army Corp of Engineers
NOAA	National Oceanic and Atmospheric Administration	**USDA**	United States Department of Agriculture
NPDES	National Pollutant Discharge Elimination Program	**USFWS**	United States Fish & Wildlife Service
NRCS	Natural Resources Conservation Service	**USGS**	United States Geological Survey
NWS	National Weather Service	**US/IFAS**	University of Florida/Institute of Food and Agricultural Sciences

1 INTRODUCTION AND PLANNING PROCESS

1.1 Purpose

Baldwin County prepared this flood hazard management plan update to guide flood hazard mitigation planning to better protect the people and property of the unincorporated areas of Baldwin County from the effects of flood hazard events. This plan update demonstrates the communities' commitment to reducing risks from flood hazards and serves as a tool to help decision makers direct mitigation activities and resources.

The four goals of the *Baldwin County Flood Hazard Management Plan* are the following:

Goal 1: Reduce the vulnerability of the people, property, environment, and economy of unincorporated Baldwin County to the impacts of flood hazards.

Goal 2: Strengthen protection critical facilities and infrastructure from flood hazards to create a safer, more sustainable community.

Goal 3: Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to respond.

Goal 4: Maintain and enhance the County's ability to manage a comprehensive flood hazard program.

This Plan was developed in a joint and cooperative venture by members of a Floodplain Mitigation Planning Committee (FMPC) which included representatives of County departments, federal and state agencies, citizens and other stakeholders. This Plan will ensure Baldwin County's continued eligibility for federal disaster assistance including the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA). This Plan has been prepared in compliance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S. C. 5165, enacted under Section 104 of the Disaster Mitigation Act of 2000, (DMA 2000) Public Law 106-390 of October 30, 2000, as implemented at CFR 201.6 and 201.7 dated October 2007.

Baldwin County currently participants in the National Flood Insurance Program's (NFIP) Community Rating System (CRS) and, having more than 50 repetitive loss properties, are required to prepare and maintain a floodplain management plan (FPM). This flood hazard management plan addresses the flood hazard and was developed in accordance with the CRS FPM planning requirements.

The CRS program recognizes and encourages community floodplain management activities that exceed the minimum requirements of the NFIP. Under the CRS program,

flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community activities that (1) reduce flood losses, (2) facilitate accurate insurance ratings, and (3) promote the awareness of flood insurance.

Baldwin County entered the CRS program in 1995 and currently qualifies for a class 7 rating. With the class 7 rating, owners of property within the Special Flood Hazard Area (SFHA) of unincorporated Baldwin County receive a 15-percent discount on flood insurance premiums. In addition, homeowners in non-SFHA's receive a 5-percent discount of flood insurance premiums. Table 1.1 below presents the relationship of CRS class ratings and insurance premium discounts.

Table 1.1. CRS Classes, Credit Points, and Premium Discounts

CRS Class	Credit Points	Flood Insurance Premium Discount	
		In SFHA[1]	Outside SFHA
1	4,500+	45%	10%
2	4,000-4,499	40%	10%
3	3,500-3,999	35%	10%
4	3,000-3,499	30%	10%
5	2,500-2,999	25%	10%
6	2,000-2,499	20%	10%
7	1,500-1,999	15%	5%
8	1,000-1,499	10%	5%
9	500-999	5%	5%
10	0-499	0%	0%

1 – SFHA, Special Flood Hazard Area; the floodplain delineated on the FIRM as A Zones and V Zones

In addition to reduced flood insurance rates, citizens of unincorporated Baldwin County benefit from the CRS program through:

- Enhanced public safety, reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction in human suffering, and protection of the environment provided by the credited flood protection activities.
- Increased outreach activities focused on flood risk enabling citizens to evaluate their individual vulnerabilities, and take action to protect themselves, as well as their homes and businesses.
- Training and technical assistance for Baldwin County staff in designing and implementing credited flood protection activities.

1.2 Background and Scope

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "***any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event***." The National Institute of Building Sciences issued *Natural Hazard Mitigation Saves: 2019 Report*. The Institute's project team looked at the results of 23 years of federally funded mitigation grants provided by the Federal Emergency Management Agency (FEMA), U.S. Economic Development Administration (EDA) and U.S. Department of Housing and Urban Development (HUD) and found mitigation funding **can *save the nation $6 in future disaster costs, for every $1 spent*** on hazard mitigation; and ***save $7 in future riverine disaster costs, for every $1 spent*** on hazard mitigation

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Baldwin County's flood hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in the planning area.

The *Baldwin County Flood Hazard Management Plan* is a single-jurisdictional plan that geographically covers the unincorporated areas of Baldwin County (hereinafter referred to as the planning area).

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The planning area has been affected by hazards in the past and the participating jurisdictions are therefore committed to reducing future impacts from hazard events and becoming eligible for mitigation- related federal funding.

1.3 Planning Process

Requirements §201.6(d)(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.

The 2018 Flood Hazard Management Plan for Baldwin County Unincorporated Areas contained a risk assessment of identified hazards for the County and a mitigation strategy to address the risk and vulnerability from these hazards. Since adoption of the plan by the Baldwin County Commission, much progress has been made by the County on implementation of the mitigation strategy. This chapter includes an overview of the approach to updating the plan, identifies new analyses and information included in this plan update, and highlights key mitigation successes.

1.3.1 What's New in the Plan

This FHMP update involved a comprehensive review and update of each section of the 2018 plan and includes an assessment of the success of the County in evaluating, monitoring and implementing the mitigation strategy outlined in the previous plan. Only the information and data still valid from the 2018 plan was carried forward as applicable into this FHMP update.

Within Section 5.0, implementation and maintenance of this plan update identifies key requirements for updating future plans:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new action recommendations or changes in action prioritization.

These requirements and others as detailed throughout this plan were also addressed during this plan update process. New information and analyses contained in this plan update include the following:

- Increased flood risk analysis based on the new FIRM and the most recent Tax Assessor's Data.
- Increased discussion of hurricane, including a greater discussion of storm surge and its effects on the County.

- The Changing Future Conditions hazard, with a focus on sea level rise (SLR), was included as a separate hazard. An in-depth literature search was completed and the SLR impacts to the County were analyzed.
- GIS was used, to the extent data allowed, to analyze all priority hazards as part of the vulnerability assessment. This involved utilizing mapped hazard data, combined with the County parcel data.
- Populations at risk to identified hazards were identified utilizing GIS and 2010 Census data.
- Assets at risk were identified by property type, and values of properties included based on data from the County Tax Assessor's Database.
- The discussion on growth and development trends was enhanced utilizing 2010 Census data.
- Hazard impacts to future development were analyzed through the development of future development maps and tables by property type based on the County assessor's data.
- Critical facilities were analyzed for all mapped priority hazards. Maps of critical facilities at risk to identified hazards were included in this Update.
- Enhanced public outreach and agency coordination efforts were conducted throughout the plan update process in order to meet the more rigorous requirements of CRS.

1.3.2 2018 FHMP Mitigation Strategy Status and Successes

The 2018 mitigation strategy contained 34 separate mitigation actions. Of these 34 actions, 11 have been completed, 19 are ongoing, and 4 have not yet been started due to a variety of reasons such changes in priorities, lack of funding, or changes to the projects themselves. The 19 ongoing projects are still considered viable and will be carried forward in this plan. More detail on these projects can be found in Chapter 4. The status of the 2000 mitigation actions are shown in Table 1.2 below.

Table 1.2. 2018 Mitigation Actions and Status Summary

Action	Status			Progress
	Complete	Ongoing	Not Yet Started	
Provide annual notification of flood hazard determination service to lending institutions, insurance companies, real estate companies and title insurance companies.		X		Flood Insurance for Financial Protection brochure is emailed annually lending institutions, insurance companies, real estate companies and title insurance companies.
Distribute outreach materials to floodplain residents at county offices and special events.		X		Baldwin County continues to publish annually Flood Hazard Protection Newsletter and Stay Alert Baldwin County that is available online, at local county offices, and at special events
Develop Program for Public Information (PPI) to Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to protect their property. Coordinate and consolidate outreach measures identified in the local hazard mitigation plan.			X	The PPI has not yet been initiated, but it is scheduled for completion within the next year.
In coordination with the Local Emergency Planning Committee (LEPC), prepare and adopt a local disaster recovery plan to aid in the recovery of flood hazard events.		X		The LEPC Steering Committee meet monthly. The County is currently in the process of reinstating the disaster recovery plan to include as an annex to the Emergency Operations Plan.
Strengthen flood warning activities by developing programs including a flood threat recognition system, flood prediction models and a system to disseminate flood warnings to the public.	X			Baldwin County's Alert Baldwin Emergency Notification System provides critical information to citizens concerning various hazards and threats including flood warnings.
Strictly administer existing flood hazard regulations (Flood Damage Prevention Ordinance) and review said regulations to determine their adequacy and whether revisions are needed.		X		Baldwin County continues to administer the local flood damage prevention ordinance, as available here: https://baldwincountyal.gov/docs/default-source/building-inspection/building-codes/baldwin-county-floodplain-development-ordinance.pdf?sfvrsn=e23ab884_10
Continue to comply with the NPDES permitting requirements and insist on compliance by the development community	X			Applicants are required to obtain an NPDES permit, when required, and our environmental and permit engineering sections ensure compliance with requirements.
Assure compliance with the existing stormwater and erosion control measures contained in the zoning and subdivision regulations.	X			Zoning and Subdivision regulations are periodically reviewed and updated.
Continue participation in the CRS program to reduce flood hazards.		X		Baldwin County has voluntarily participated in the Community Rating System Program since 1994 and as a result has reduced flood insurance polices
Continue to assist unincorporated areas to implement planning and zoning in accordance with the provisions of Act No. 91-719, as amended.	X			Subdivision regulations and most flood hazard mitigations requirements are required in unincorporated areas as well.
Assure compliance with the wetlands protection provisions contained in the zoning and subdivision regulations and utilize the ADID study findings in the land development review process.	X			P&Z reviews residential and commercial developments for compliance with Baldwin County Wetland Protections.
Continue to review and comment upon ADEM and COE permit applications for dredge and fill.	X			P&Z reviews public notices and works with the USACE and ADEM regarding permit compliance
Continue to coordinate flood hazard activities with state and federal environmental agencies including Health Department, ADCNR, ADEM, EPA, NRCS, FEMA, USFWS and COE.		X		All agencies were contacted in the planning process for this Flood Hazard Management Plan update as stakeholders. Baldwin County will continue to coordinate with state and federal agencies for flood hazard activities.
Continue to coordinate flood hazard activities with municipal governments involved in flood hazard management.		X		Neighboring communities were contacted in the planning process for this Flood Hazard Management Plan update as stakeholders. Baldwin County will continue to coordinate with local agencies for flood hazard activities.

Action	Status			Progress
	Complete	Ongoing	Not Yet Started	
Utilize the County's geographic information system (GIS) to identify and protect flood hazard areas.	X			Baldwin County's Revenue and Map Viewer (public) and the Baldwin County Permitting App are both supported by the County's Geospatial section within the Highway Department.
Maintain an inventory of county-maintained roads and bridges which become partially or wholly submerged during rainfall events.		X		The Baldwin County Highway Department has developed an accounting system as well as a GIS layer that identifies the roadways that have been damaged during flooding events.
Coordinate with the Baldwin County Local Hazard Mitigation Planning Committee.		X		The Hazard Mitigation Planning Committee meet quarterly to discuss and update mitigation plans, discuss grant opportunities, and learn about various mitigation activities in the county and best practices to strengthen the Hazard Mitigation Plan.
Continue participation in the FEMA hazard mitigation program to purchase properties which repeatedly flood.	X			This mitigation action has been completed. Baldwin County will pursue funding in the future if applicable.
Research and evaluate the impact of a buyout only hazard mitigation program within the floodway and pursue appropriate action.	X			This mitigation action has been completed. Baldwin County will pursue funding in the future if applicable.
Review location of repetitive loss properties, define repetitive loss areas (RL and neighboring properties), and develop repetitive loss area analyses to provide more specific guidance on how to reduce damage from repetitive flooding.		X		RL analyses has been completed, letters are mailed to all repetitive loss properties with information on how to reduce future damages.
Train local Baldwin staff with specific EMI retrofitting and floodproofing courses to provide technical assistance to homeowners, builders, and developers on flood protection alternatives. Advertise service on Baldwin County Website.			X	This is an expensive and lengthy collaborative effort.
Research the feasibility of establishing and funding a stream maintenance and restoration program and pursue appropriate action		X		The stream restoration program is housed within the environmental department. More resources and staff are being added to the department to be able to focus on projects like this in the near future.
Identify significant open space and wetland resources and pursue public and private grants for purchase as appropriate.		X		The County has purchase several parcels Meadows, Magnolia River Parcels ask Frank….that will help mitigate flood damage.
Through continued coordination with US Fish and Wildlife and the Alabama Dept of Conservation & Natural Resources, Baldwin County will continue to examine the appropriate use of sediment-trapping vegetation, sediment mounds, etc., in addressing the impacts of coastal erosion.		X		Through continued coordination with state and federal agencies, Baldwin County will continue to pursue grants to assist in coastal erosion management measures.
Continue program to pave County dirt roads giving priority to dirt roads with known erosion problems.		X		The Baldwin County Highway Department prioritizes dirt road paving projects that are included in *The 25 Most Environmentally Damaging Dirt Roads of Baldwin County, Alabama* that was published by the Baldwin County Environmental Advisory Board.

1.3.3 2024 Plan Update Process

Baldwin County recognized the need and importance of the flood hazard management plan update and established a FHMP Committee to help facilitate this update.

- Support objectives under the National Flood Insurance Program's Community Rating System and the Flood Mitigation Assistance program,
- Facilitate the entire planning process;
- Identify the data requirements that FMPC participants could provide and conduct the research and documentation necessary to augment that data;
- Assist in facilitating the public input process; and
- Produce the draft and final plan documents.

The *Baldwin County Flood Hazard Management Plan Update* used the CRS planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1) Planning process,
2) Risk assessment,
3) Mitigation strategy, and
4) Plan maintenance.

Into this process, the more detailed 10-step planning process used for FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs was integrated. Thus, the modified 10-step process used for this plan meets the requirements of five major programs: FEMA's Hazard Mitigation Grant Program, Pre-Disaster Mitigation program,

Community Rating System, Flood Mitigation Assistance Program, and new flood control projects authorized by the U.S. Army Corps of Engineers.

Table 1.3 shows how the CRS 10-step process fits into FEMA's four-phase process.

Table 1.3. Mitigation Planning Processes Used to Update the Baldwin County *Flood Hazard Management Plan*

Community Rating System (CRS) Planning Steps (Activity 510)	FEMA Local Mitigation Planning Policy Guide Tasks (44 CFR Part 201)
Phase 1 – Planning Process	
Step 1. Organize to Prepare the Plan	Task 1: Determine the Planning Area and Resources
	Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2. Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(1)
Step 3. Coordinates	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Phase 2 – Risk Assessment	
Step 4. Assess the hazard(s)	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
Step 5. Assess the problem(s)	
Phase 3 – Mitigation Strategy	
Step 6. Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)
Step 7. Review possible activities	
Step 8. Draft an action plan	
Phase 4 – Plan Maintenance	
Step 9. Adopt the plan	Task 8: Review and Adopt the Plan
Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current
	Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Source: Local Mitigation Planning Policy Guide, FEMA, May 2023; NFIP CRS Coordinator's Manual, 2017

1.3.4 Phase 1: Planning Process

Planning Step 1: Organize to Prepare the Plan

With Baldwin County's commitment to participate in the CRS planning process, department and community representatives worked to establish the framework and organization for development of the plan. An initial meeting was held with representatives to discuss the organizational aspects of the plan development process.

Invitations to participate on the Floodplain Management Planning Committee (FMPC) were extended to County officials, citizens, and federal, state, and local stakeholders that might have an interest in participating in the planning process. The following is a list of departments and organizations represented on the FMPC:

Baldwin County

- Building Inspection
- Planning & Zoning
- Emergency Management Agency
- Highway Department

Local Stakeholder Representatives

- Local Citizens
- Mobile Bay National Estuary Program

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the FMPC;
- Detail areas within the planning area where the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For Baldwin County and the FMPC, "participation" meant the following:

- Attending and participating in the FMPC meetings;
- Providing requested data (as available);
- Reviewing and providing comments on plan drafts;
- Advertising, coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the governing boards.

The planning process officially began with a kick-off meeting on September 4, 2024, held at the Emergency Operations Center in Robertsdale. The meeting covered the scope of work and an introduction to the CRS planning requirements. The FMPC continued to communicate during the planning process with a combination of face-to-face meetings, phone interviews and email correspondence. The meeting schedule and topics are listed in Table 1.4 and FMPC participation is presented in Table 1.5. The sign-in sheets and agenda for each of the meetings are included in Appendix B.

Table 1.4. Schedule of FMPC Meetings

Meeting	Topic	Date
Coordination	Baldwin County staff to prepare for project kick-off and identify FMPC members.	September 4, 2024
FMPC #1	Review of the hazard mitigation planning process and hazard identification	October 8, 2024
FMPC #2	Coordination Meeting with Baldwin County to prepare for risk assessment meeting.	November 4th, 2024
FMPC #3	Review of previous risk assessment; discussion of risk assessment and data needs for plan update; and review of plan goals and objectives	December 2, 2024
FMPC #4	Update mitigation actions and prioritization	January 6, 2025
FMPC # 5	Discussion of process to monitor, evaluate, and review final draft	January 21, 2025

Table 1.5. FMPC Meeting Attendance

FMPC MEETING ATTENDANCE

Member Name	7-Aug	4-Sep	8-Oct	4-Nov	2-Dec	6-Jan	21-Jan
Flowers, Corey	X	X	X	X	X	X	
Vernon Dandridge	X	X	X	X	X	X	
Newman, Josh			X	X	X	X	
Acreman, Mark			X	X	X	X	

Summerville, Peggy	X	X	X	X	
Miller, Christian			X		
Joffe, Donald			X	X	
Williams, Nick			X	X	

Unincorporated Baldwin County, Alabama
Draft Flood Hazard Management Plan
January 9, 2025

Based on the area of expertise of each jurisdictional representative participating on the FMPC, Table 1.6 demonstrates each member's expertise in the six mitigation categories (Prevention, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects and Public Information). The Planning & Zoning Department is responsible for community land use and comprehensive planning and was an active participant on the FMPC and provided data and information to support the development of the plan.

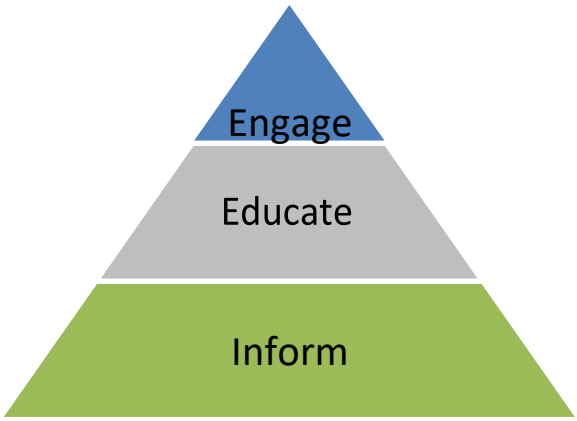
Table 1.6 – FMPC Capability with Six Mitigation Categories

Community Department/Office	Prevention	Property Protection	Natural Resource Protection	Emergency Services	Structural Flood Control Projects	Public Information
Baldwin County						
Building inspection	✓	✓	✓			✓
Planning & Zoning	✓	✓	✓	✓	✓	✓
Emergency Management Agency	✓	✓		✓		✓
Highway Department	✓	✓	✓	✓	✓	✓

Step 2: Plan for Public Involvement

At the kick-off meeting, the FMPC discussed options for public involvement. A public outreach strategy was prepared to capture the input of the FMPC and identify tools and activities to engage, educate, and inform the citizens of Baldwin County of flood hazard mitigation planning efforts for each of the major phases of the mitigation planning process. This outreach includes:

- **Engage** the public and other stakeholders through interactive dialogue including such forums as planning committee meetings, public meetings, workshops and open house events;
- **Educate** the public and other stakeholders through a listen and learn process such as information booths, presentations, and briefings to elected officials; and
- **Inform** the public and other stakeholders through one-way communication such as written outreach materials, websites, and news media.



ENGAGE

- **Public Meetings -** Threepublic meetings were held at key points in the project timeline to obtain public input on flood hazards, problems, and possible solutions. The public meetings were held during the draft-plan development and prior to finalizing the plan. Where appropriate, stakeholder and public comments were incorporated into the final plan, including the sections that address mitigation goals and strategies. Meeting dates included:

  – An update on the flood hazard management planning process was held to get input from the public and stakeholders on potential mitigation actions:
  1pm Monday, December 2, 2024
  Baldwin County Foley Satellite Courthouse - Large Meeting Room201 E. Section Ave. Foley, AL 36535

  - An update on the hazard mitigation planning process was held to review strategies, allowing stakeholders and the public to provide input.
  1pm Monday, January 6, 2025
  Baldwin County Foley Satellite Courthouse - Large Meeting Room
  201 E. Section Ave. Foley, AL 36535
  - An update on the hazard mitigation planning process was held to review the final draft allowing stakeholders and the public to provide input and ensure the plan reflects community needs and priorities
  1pm Monday, January 21, 2025
  Baldwin County Foley Satellite Courthouse - Large Meeting Room
  201 E. Section Ave. Foley, AL 36535

- **Public Hearing –** One public hearing was held prior to the final draft meeting and approval by the County Commission. This meeting was held during the regular meeting of the Baldwin County Planning and Zoning Commission on Thursday, January 9, 2025, at 4:00 p.m. The sign in sheet for this meeting and slide presentation are included in the appendix.

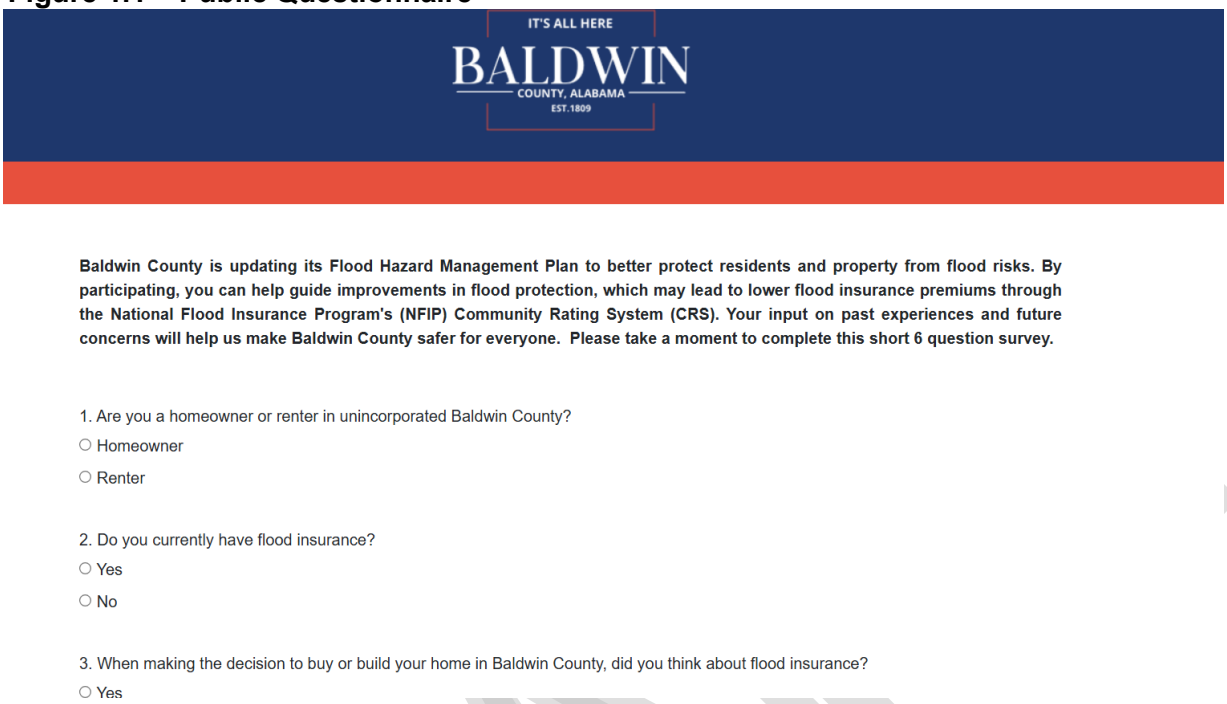
EDUCATE

- **Presentations/Information Distribution for Stakeholder Groups –** Staff from Baldwin County coordinated additional flood hazard mitigation presentations and/or information distribution to various stakeholder groups to explain the planning process and encourage input to the FMPC.

- **Briefings to Elected Officials –** Staff from Baldwin County provided yearly progress report including updates on the flood hazard mitigation planning process to the Elected Officials in October 2024. A draft of the updated plan was provided to the County Commissioners prior to the February 18, 2025, County Commission meeting to allow for review of the plan.

Questionnaire - A public participation questionnaire was prepared by The FHMP Committee through the county website, see Figure 1.1. The purpose of this questionnaire was to solicit input from the public and stakeholders in the planning area regarding hazards of concern, areas of mitigation interest, and related preparedness. The online survey gave individuals that were unable to attend the in-person meetings the opportunity to participate in the planning process. The questionnaire was made available through web links posted on community websites, public flyers, and social media outlets.

Figure 1.1 – Public Questionnaire



IT'S ALL HERE
BALDWIN
COUNTY, ALABAMA
EST. 1809

Baldwin County is updating its Flood Hazard Management Plan to better protect residents and property from flood risks. By participating, you can help guide improvements in flood protection, which may lead to lower flood insurance premiums through the National Flood Insurance Program's (NFIP) Community Rating System (CRS). Your input on past experiences and future concerns will help us make Baldwin County safer for everyone. Please take a moment to complete this short 6 question survey.

1. Are you a homeowner or renter in unincorporated Baldwin County?
○ Homeowner
○ Renter

2. Do you currently have flood insurance?
○ Yes
○ No

3. When making the decision to buy or build your home in Baldwin County, did you think about flood insurance?
○ Yes

INFORM

- **Website and Social Media -** Project information websites were prepared and hosted Baldwin County for the duration of the planning process with the primary purpose to share information relevant to the *Baldwin County Flood Hazard Management Plan Update*. Specific resources to be included on this site include:
  - Meeting schedule, agendas, presentations, and minutes;
  - Project information flyers for introduction, risk assessment, and notification of draft document;
  - Link to online questionnaire
  - Draft Flood Hazard Management Plan Update for review/comment; and

- Reference documents and links to planning resources.

The website address is:

- http://baldwincountyal.gov/departments/building-inspection

Additionally, the community social media pages were utilized to inform the community about the planning process, the questionnaire, and upcoming meetings. The social media sites include:

- X: Baldwin County EMA @BaldwinEMA
- Facebook: Baldwin County Emergency Management Agency

- **Project Information Flyers –** Project information flyers were developed and distributed throughout the planning process to provide information on the hazard mitigation planning and opportunities for public involvement. This resource was available on the project information website as well as distributed to local libraries and at public meetings identified in the 'educate' process. Specific information to be provided in the flyers includes:
  - What is a Hazard Mitigation Plan?
  - Why is it important to me?
  - What can I do to participate?
  - Planning Status
  - Mitigation Success Stories

- **Social Media –** Baldwin County's social media outlets on X and Facebook were utilized to publish information regarding public meetings, the online questionnaire, and general hazard mitigation planning information.

Documentation of all public outreach activities is included in Appendix B.

Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the FMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting state and federal agencies and organizations to participate in the process. A detailed list of agency coordination is provided above under Planning Step 1: Organize to Prepare the Plan.

In addition, the FMPC reached out to agencies and organizations outside of Baldwin County. The following agencies and organizations were contacted, initially by formal letter, requesting data or information related to flood hazards in the planning area and offer the opportunity to participate in the planning process and on the FMPC:

- ACE Hardware Support

- ADCNR - State Lands
- ADEM - Field Ops Division
- AL EMA
- AL Historical Commission
- AL Soil & Water Conservation
- ALDOT - SW Region - BC
- Alabama Forestry
- Ascend Performance
- Baldwin County Board of Ed, Public Schools
- Baldwin County Sewer
- Bon Secour Fisheries
- Central Baldwin Chamber of Commerce
- Clarke County EMA
- Collins Aerospace Systems
- Eastern Shore Chamber of Commerce
- Escambia County EMA
- Escambia County EMA - BC
- International Paper
- Mobile County EMA
- National Weather Service
- NFIP Coordinator
- North Baldwin Chamber of Commerce
- Novelis, Inc.
- NRCS - Auburn University
- Quality Filters
- Quincy Compressor
- SARPC
- Segers Aerospace
- South Baldwin Chamber of Commerce
- Town of Elberta
- Town of Magnolia Springs
- Town of Perdido Beach
- US Corp of Engineers
- US Fish and Wildlife Services
- USA-Safety & Compliance

The agencies and organizations were contacted a second time, by formal letter, requesting

review and comment on the Draft Flood Hazard Management Plan Update. The letter templates and list of addresses to which the letters were mailed can be found in Appendix B along with response documents received from stakeholders. Copies of letters sent will be provided upon request.

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Baldwin County used a variety of comprehensive planning mechanisms, such as general plans and ordinances, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other community programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

Table 1.7 – Incorporation of Data from Existing Plans

Plan	Incorporation into 2025 Flood Hazard Management Plan
Alabama State Hazard Mitigation Plan (2023)	• Chapter 3 - Flood Risk Assessment Hazard Identification and Profiles
Baldwin County Flood Hazard Management Plan (2023)	• Chapter 4.0 Mitigation Strategy Review of Goals and Mitigation Actions
Baldwin County Local Hazard Mitigation Plan (2021)	• Chapter 3 - Flood Risk Assessment Hazard Identification and Profiles • Chapter 4.0 Mitigation Strategy Review of Goals and Mitigation Actions
National Flood Insurance Program Policy and Loss Statistics	• Chapter 3 - Risk Assessment Vulnerability Assessment
Flood Insurance Administration, Repetitive/Severe Repetitive Loss Property Data	• Chapter 3 - Risk Assessment Vulnerability Assessment
Flood Insurance Rate Maps and Flood Risk Map for Baldwin County	• Chapter 3 - Risk Assessment Hazard Profiles • Chapter 3 - Risk Assessment Vulnerability Assessment
National Inventory of Dams	• Chapter 3 - Risk Assessment Hazard Identification and Profiles
US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics	• Chapter 3 - Risk Assessment Hazard Identification and Profiles
Various local plans such as Comprehensive Plans, Economic Development Plans, Capital Improvement Plans, etc	• Chapter 2 – Planning Area Profile and Capabilities Mitigation Capabilities • Chapter 3.0 Flood Risk Assessment Hazard Identification and Profiles • Chapter 4.0 Mitigation Strategy Review of Goals and Mitigation Actions

These and other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. Data from these plans and ordinances were incorporated into the risk assessment and hazard vulnerability sections of the plan as appropriate. The data was also used in determining the capability of

the community in being able to implement certain mitigation strategies. The Capability Assessment can be found in Chapter 2.

1.3.5 Phase 2: Risk Assessment

Planning Steps 4 and 5: Assess the Hazard(s) and Assess the Problem(s)

The FHMP Committee identified and documented hazards affecting the planning area and used GIS to analyze and map vulnerabilities. A capability assessment reviewed existing programs, policies, and plans to evaluate the area's capacity to mitigate risks. Details of the risk assessment process and results are in Chapter 3: Risk Assessment.

1.3.6 Phase 3: Mitigation Strategy

Planning Steps 6 and 7: Set Goals and Review Possible Activities

The FHMP Committee led sessions with the FMPC to outline the purpose, process, and criteria for developing goals, objectives, mitigation alternatives, and recommended actions. Details are in Chapter 4: Mitigation Strategy, with additional documentation in Appendix C: Mitigation Alternatives and Prioritization.

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Planning Step 8: Draft an Action Plan

Table 1.8. Planning Deliverables

Deliverable	Date
Kickoff Preparation	September 4, 2024
Introduction for FMPC	September 4, 2024
FMPC #1- Agenda	October 8, 2024
Public Outreach Strategy	October 11, 2024
FMPC #2- Agenda	November 4th, 2024
Public Information Flyer #1	November 6th, 2024
FMPC #3- Agenda	December 2, 2024
Public Information Flyer #2	December 10, 2024
FMPC #4- Agenda	January 6, 2025
Draft Flood Hazard Management Plan for Public Review – Planning Commission Meeting	January 9, 2025
FHMP #5 Agenda	January 21, 2025

1.3.7 Phase 4: Plan Maintenance

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the plan, the plan was adopted by each participating jurisdiction on the date included in the adoption resolution in Appendix A: Adoption Resolution.

Planning Step 10: Implement, Evaluate, and Revise the Plan

The effectiveness of a mitigation plan is measured by its successful implementation. So far, the FMPC has focused on data analysis, gathering input from stakeholders, and developing targeted mitigation actions. Chapter 5: Plan Implementation and Maintenance outlines the implementation strategy, along with a schedule for updates, maintenance, and ongoing public engagement.

Collaboration with various organizations in the planning area, whose goals align with hazard mitigation, is vital. As highlighted in Planning Step 3, this coordination is crucial to the plan's success in Baldwin County and is further detailed in Chapter 5.

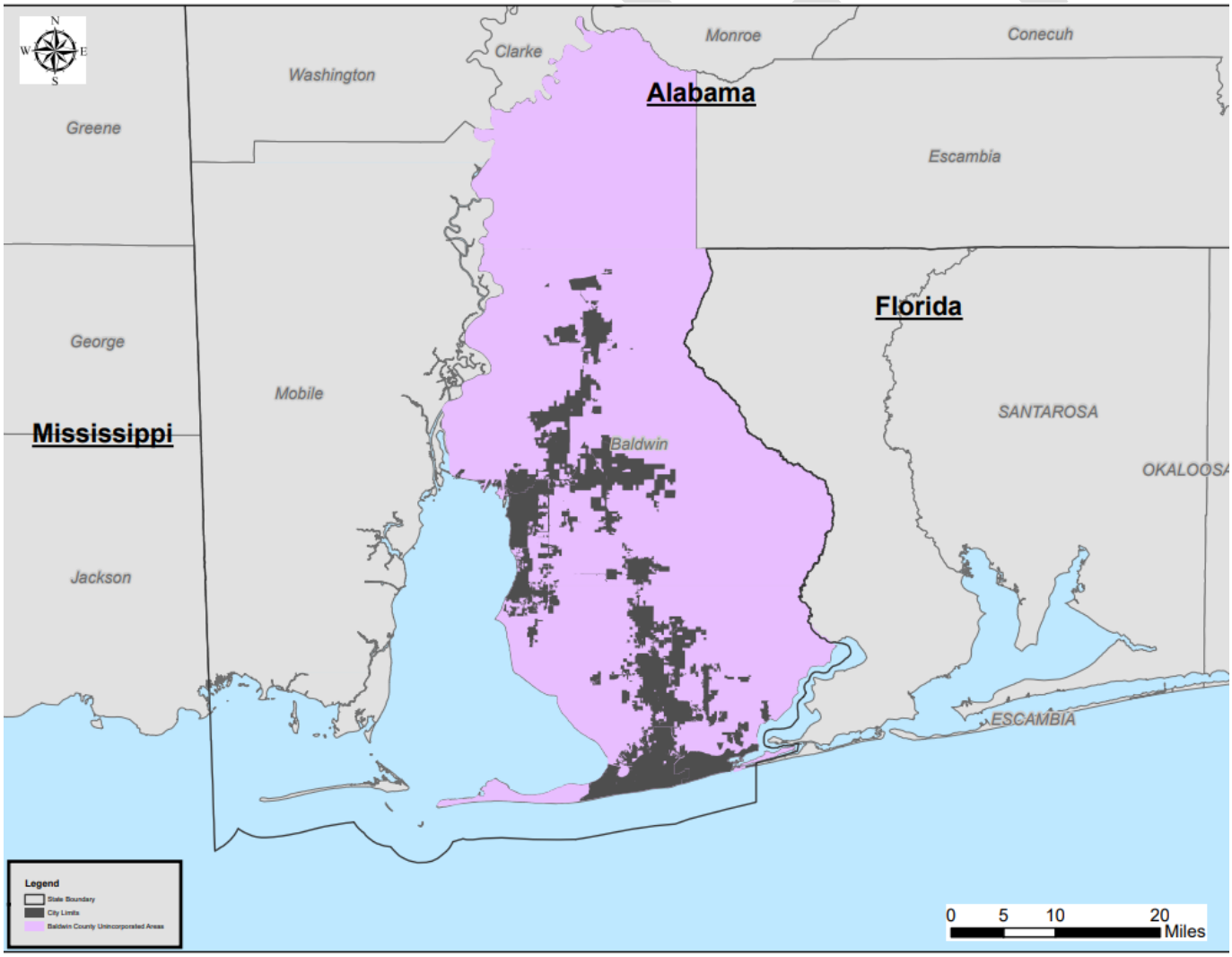
2 Planning Area Profile and Capabilities

Chapter 2 provides a general profile of Baldwin County, as well as, details on existing capabilities, plans, and programs that enhance their ability to implement flood mitigation strategies.

2.1 Baldwin County Planning Area Profile

Figure 2.1 provides a map of the Baldwin County planning area. The planning area includes only the unincorporated areas of Baldwin County, Alabama.

Figure 2.1 Baldwin County Planning Area



2.1.1 History

Baldwin County was first organized as a county in 1809 and found itself situated within the confines of the Mississippi Treaty until December 10, 1817, when the State of Mississippi entered the United States as the 20th State in the Federal Union. Thereafter, Baldwin County was absorbed into the Alabama Territory until December 14, 1819, when the State of Alabama entered the United States as the 22nd State in the Federal Union.

Early on, the Town of McIntosh Bluff (now in Mobile County, Alabama, West of Baldwin County) on the Tombigbee River was the County Seat. After being transferred to the Town of Blakeley in 1810, the County Seat was later moved to the City of Daphne in 1868. In 1900, by an Act of the Legislature of Alabama, the County Seat was authorized for relocation to the City of Bay Minette. The County is governed by a four-member county commission with all four members elected by a vote of the entire county, one of which, its chairman, serves as the presiding officer. Further, the county commission employs a county administrator who serves as its chief administrative officer in order to effect the policies adopted by the county commission.

Today, Baldwin County remains one of the fastest growing counties in Alabama In 1990, 98,290 citizens resided in Baldwin County; by 2000, the population had grown to 140,415; and the 2010 Census counted 182,265 citizens. As of the 2020 Census, Baldwin County's population reached 231,767. Baldwin County's rich history and diverse cultures have created a place welcome to all, for its strength is not only found among the plethora of abundant natural resources, healthy economy or beautiful beaches, but with the people who have carved out a place to live, prosper & continuously grow.

This brief historical compilation was provided by Baldwin County and can be found on the community website: https://baldwincountyal.gov/community/about-baldwin-county/history-of-baldwin-county.

2.1.2 Geography and Topography

Baldwin County is located in the southwest corner of the State of Alabama. It is bordered by Mobile, Clarke, and Washington Counties on the west; Clarke and Monroe Counties on the north; Escambia County, Florida and Escambia County, Alabama on the east; and the Gulf of Mexico on the south. Baldwin County, the largest county in Alabama, comprises about 1600 square miles. Much of its land area is bordered by large, open bodies of water, including the 43 miles of Gulf of Mexico shoreline; 57 miles of Mobile and Bon Secour Bay shoreline to the southwest; and 60 miles of Perdido Bay shoreline to the southeast. Other than these bodies of water, several other water features define the county's borders. These include the Perdido River on the east; Tombigbee, Mobile, and Middle Rivers on the west; and the Alabama River Cutoff, the Alabama River and the Little River on the north. Also, numerous bays and shallow estuaries characterize the southernmost portion of the county interconnecting Mobile/Bon Secour Bay and Perdido

Bay. These bays and estuaries include: Oyster Bay, and artificial Gulf Intracoastal

Waterway cut, Wolf Bay, Bay La Launch, Arnica Bay, and Bayou St. John. Other water bodies include Weeks Bay, Cotton Bayou, Terry Cove, the Old River, and a series of narrow lagoons, including Little Lagoon, Shelby Lake, Middle Lake, and Little Lake.

Also, within the county lie three tidal inlets, including Main Channel (Mobile Bay entrance), Little Lagoon entrance, and Perdido Pass (Perdido Bay entrance). These three inlets, particularly Main Channel and Perdido Pass, serve as the major passages through which the Gulf of Mexico tides and hurricane surges propagate in the county's estuaries.

While swampy, mildly sloping terrain fringes much of the county, particularly along the Tensaw/Mobile River system, Bon Secour Bay, upper Perdido Bay, and coastal areas, moderately sloping terrain with well-defined waterways generally characterizes most of Baldwin County topography. Ground elevation generally ranges from sea level in the southern and western extremes of the county to +200 to +300 ft NGVD (USGS, Pensacola, 1978; Bay Minette, 1981) in the central and northern portions. Wide, gently sloping beaches with low dunes characterize the Gulf of Mexico shoreline. The Mobile Bay shoreline ranges from low-lying marsh (along Bon Secour Bay) to steep bluffs in the northeast. Along Wolf Bay and Perdido Bay, moderately sloping terrain characterizes most of the shoreline with some low-lying marsh particularly at the northern end of the bays. The soil associations are generally well-drained and consist of the following types: NorfolfKleij-Goldsboro, Bowie-Lakeland-Cuthbert, Marlboro-Faceville-Greenville, Bowie-Tiftin-Sunweet, and Lakeland-Plummer (U.S. Dept. of Agriculture, 1963). Soils in the county's lower central region, the area drained by the three restudy streams; primarily consist of the latter three soil associations.

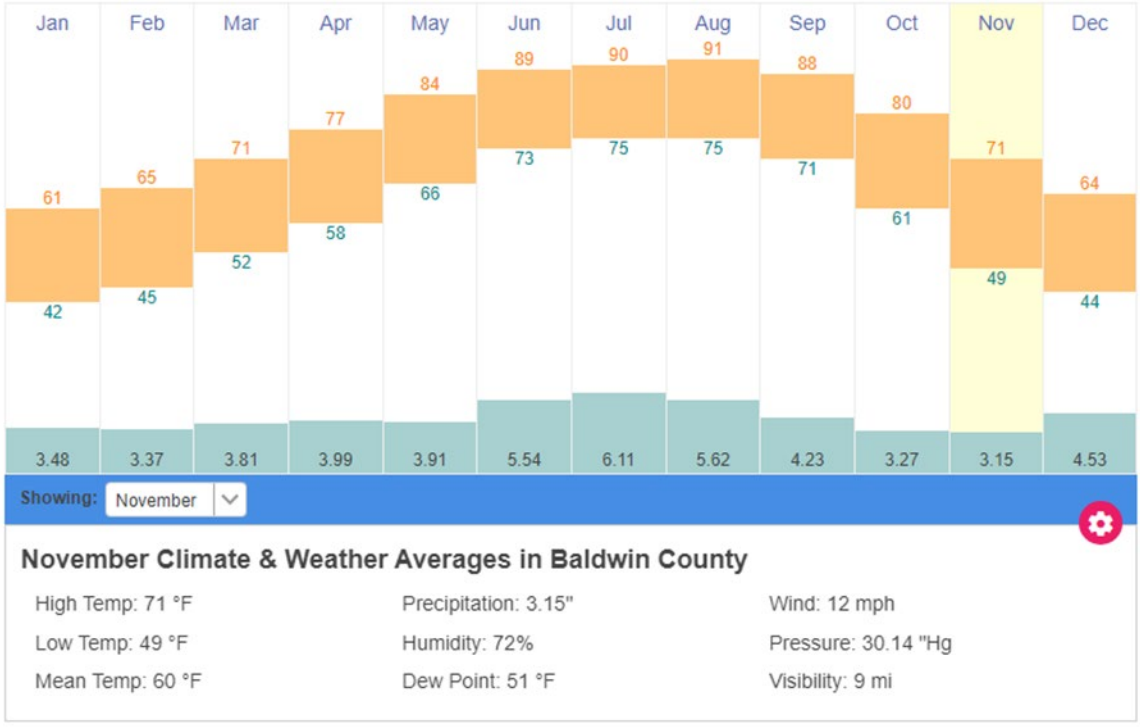
Geographic and topographic information were obtained from the 2019 Flood Insurance Study (FIS) Report for Baldwin County.

2.1.3 Climate

Summers are the warmest time of year in Baldwin County, with the daily average temperature in August at 83°F and an average of 20.5 days per year with temperatures reaching 90°F. Winters are generally much cooler and less stable. January has a daily average temperature of 51.0°F, although in most years there is at least one day (average 9.9) where the high remains at or below freezing. The record high for the NWS station in Robertsdale is 104°F August 5, 1947 while the record low is 3°F on January 22, 1985.
Annual precipitation averages 51.01 inches and normal seasonal snowfall is 0.2 inches occurring in January and February. Figure 2.2 presents the Annual Weather Averages for Baldwin County 1992-2021.

ht2.2 Baldwin County Annual Weather Averages and climate information

Based on weather reports collected during 1992–2021.



November Climate & Weather Averages in Baldwin County

High Temp: 71 °F	Precipitation: 3.15"	Wind: 12 mph
Low Temp: 49 °F	Humidity: 72%	Pressure: 30.14 "Hg
Mean Temp: 60 °F	Dew Point: 51 °F	Visibility: 9 mi

Quick Climate Info

Hottest Month	August (83 °F avg)
Coldest Month	January (51 °F avg)
Wettest Month	July (6.11" avg)
Windiest Month	April (13 mph avg)
Annual precip.	51.01" (per year)

Weather by CustomWeather, © 2024

Changing Future Conditions

The Third National Climate Assessment: *Climate Change Impacts in the United States* was published in 2014 by the National Science and Technology Council and the U.S. Global Change Research Program. The report assesses the science of climate change and its impacts across the United States, now and throughout this century. It documents climate change related impacts and responses for various sectors and regions, with the goal of better informing public and private decision-making at all levels.

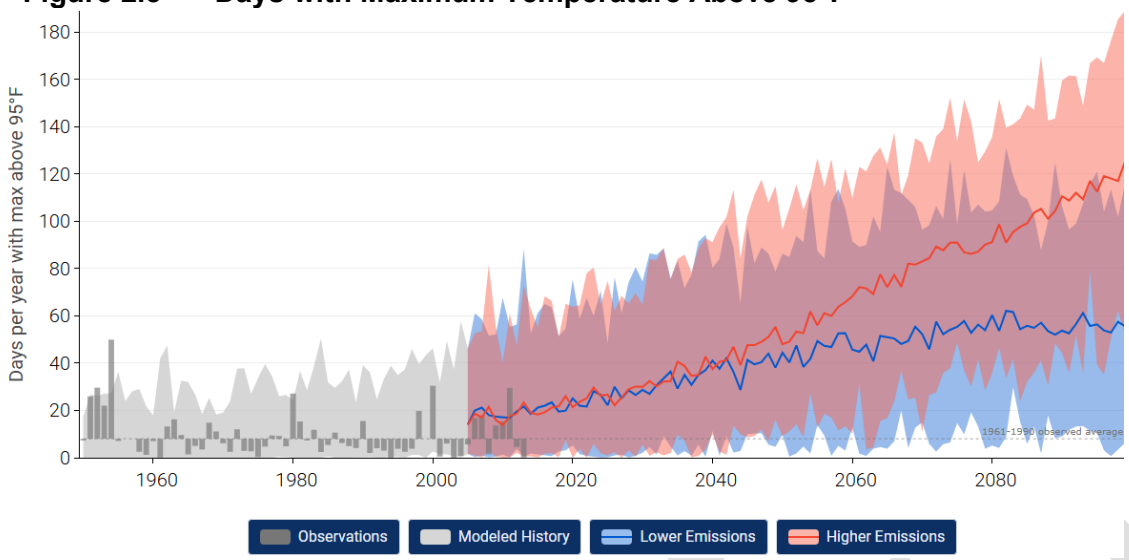
According to the report, average temperatures across the Southeast have increased by an average of 2°F from 1970 to the present, with the most recent decade (2001-2010) being the warmest on record. The number of extreme hot days in the Southeast has tended to decrease or remain the same, while the number of warm summer nights has increased. The number of extreme cold days has decreased across the region. Temperatures across the Southeast are expected to continue to increase during this century, with shorter-term fluctuations over time due to natural climate variability.

Major consequences to Baldwin County of this regional warming include significant increases in the number of hot days (95°F or above) and decreases in freezing events. Analysis specific to Baldwin County suggests a clear increase in the number of days on which maximum temperature exceeds 95°F, with an average of 40-120 more days above 95°F by 2100 when compared to a 1950-2010 reference baseline (see Figure 2.3). Similarly, analysis indicates a decrease in the number of days on which minimum temperatures fall below 32°F, with an average of approximately 10-15 fewer days reaching below 32°F by 2100 when compared to a 1950-2010 reference baseline (see Figure 2.4).

The *Climate Change Impacts in the United States* Report also notes that daily and five-day rainfall intensities have increased in the Southeast. Projections of future precipitation patterns are less certain than projections for temperature increases. Because the Southeast is located in the transition zone between projected wetter conditions to the north and drier conditions to the southwest, many of the model projections show only small changes relative to natural variations. However, many models do project drier conditions in the far southwest of the region and wetter conditions in the far northeast of the region, consistent with the larger continental-scale pattern of wetness and dryness.

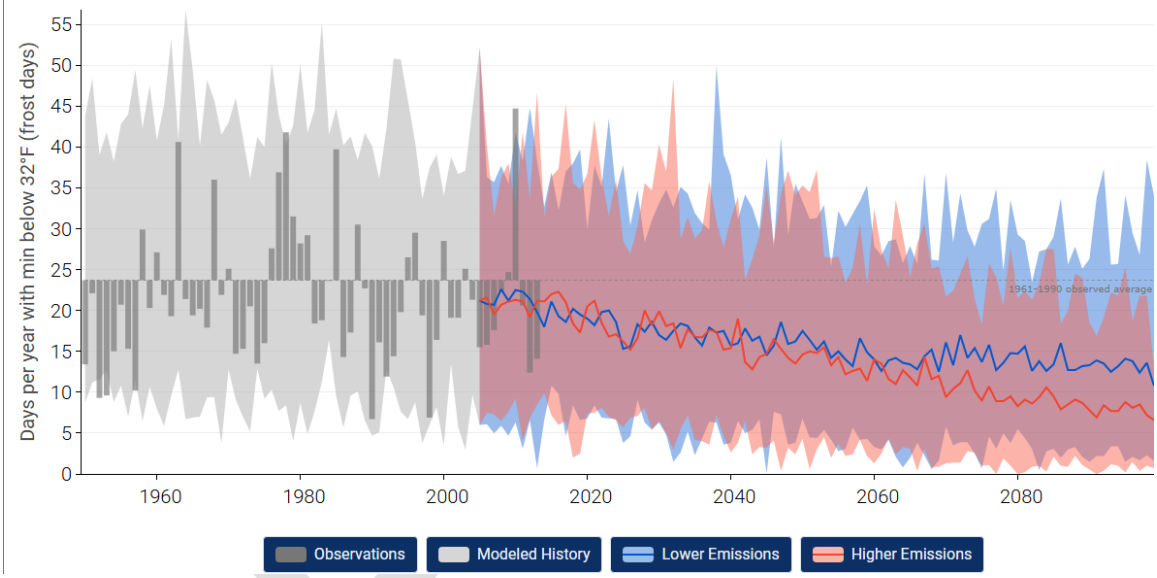
Along the northern Gulf Coast, precipitation has increased annually and in summer. For the Southeast region as a whole, long-term trends in precipitation are statistically significant (at the 95% confidence level) for fall, which shows an upward trend, and summer, which shows a slight downward trend. A move toward more extreme, variable conditions can affect the profile of rain-related hazards in the region, including drought and flooding.

Figure 2.3 Days with Maximum Temperature Above 95°F



Source: National Climate Explorer; https://crt-climate-explorer.nemac.org/climate_graphs/?city=Baldwin%2BCounty%2C+AL&county=Baldwin%2BCounty&area-id=01003&fips=01003&zoom=7&lat=30.6010744&lon=-87.77633329999999&id=days_tmin_lt_32f

Figure 2.4 Days with Minimum Temperature Below 32°F



Source: National Climate Explorer; https://crt-climate-explorer.nemac.org/climate_graphs/?city=Baldwin%2BCounty%2C+AL&county=Baldwin%2BCounty&area-id=01003&fips=01003&zoom=7&lat=30.6010744&lon=-87.77633329999999&id=days_tmin_lt_32f

2.1.4 Population/Demographics

According to the U.S. Census, the 2020 population in unincorporated Baldwin County was 103,662. In 2023, the population is estimated as 143,920, representing a 5.7-percent increase. Table 2.2 provides the populations for Baldwin County for 2020 and 2023, as well as, population statistics for 2023. Statistics for unincorporated Baldwin County are calculated from the total values for Baldwin County less the values for the incorporated communities.

Table 2.2 Baldwin County Population 2020-2023

Jurisdiction	2020 Population	2023 Population	Percent Change 2020-2023	2023 Estimates		
				Under 5	Over 65	Housing Units
Baldwin County, AL	231,768	253,507	9.4%	12,914	55,847	135,669
Bay Minette, City of	8101	8,371	3.3%	435	1565	3,116
Daphne, Town of	27,463	30,321	10.4%	2,728	5,308	11,329
Elberta, Town of	2,006	2,109	1.7%	169	421	1,147
Fairhope, City of	22,464	24,974	11.2%	1,124	6,398	9,956
Foley, City of	20,486	24,873	21.4%	645	7,900	10,990
Gulf Shores, City of	15,140	16,850	11.3%	252	4,464	14,331
Loxley, Town of	3,641	4,623	8.3%	554	739	1,479
Magnolia Springs, Town of	810	844	1.4%	8	464	600
Orange Beach, City of	8,095	8,534	5.4%	179	2431	14,777
Perdido Beach, Town of	553	578	1.8%	40	260	368
Robertsdale, City of	6,705	7,421	10.7%	304	1110	3741
Silverhill, Town of	795	1,923	40.8%	135	328	369
Spanish Fort, City of	10,062	10,923	8.6%	819	1954	4223
Summerdale, Town of	1,485	1,576	1.9%	110	410	617
Unincorporated Baldwin County	**103,662**	**143,920**	**38.76%**	**5,412**	**22,095**	**58,625**

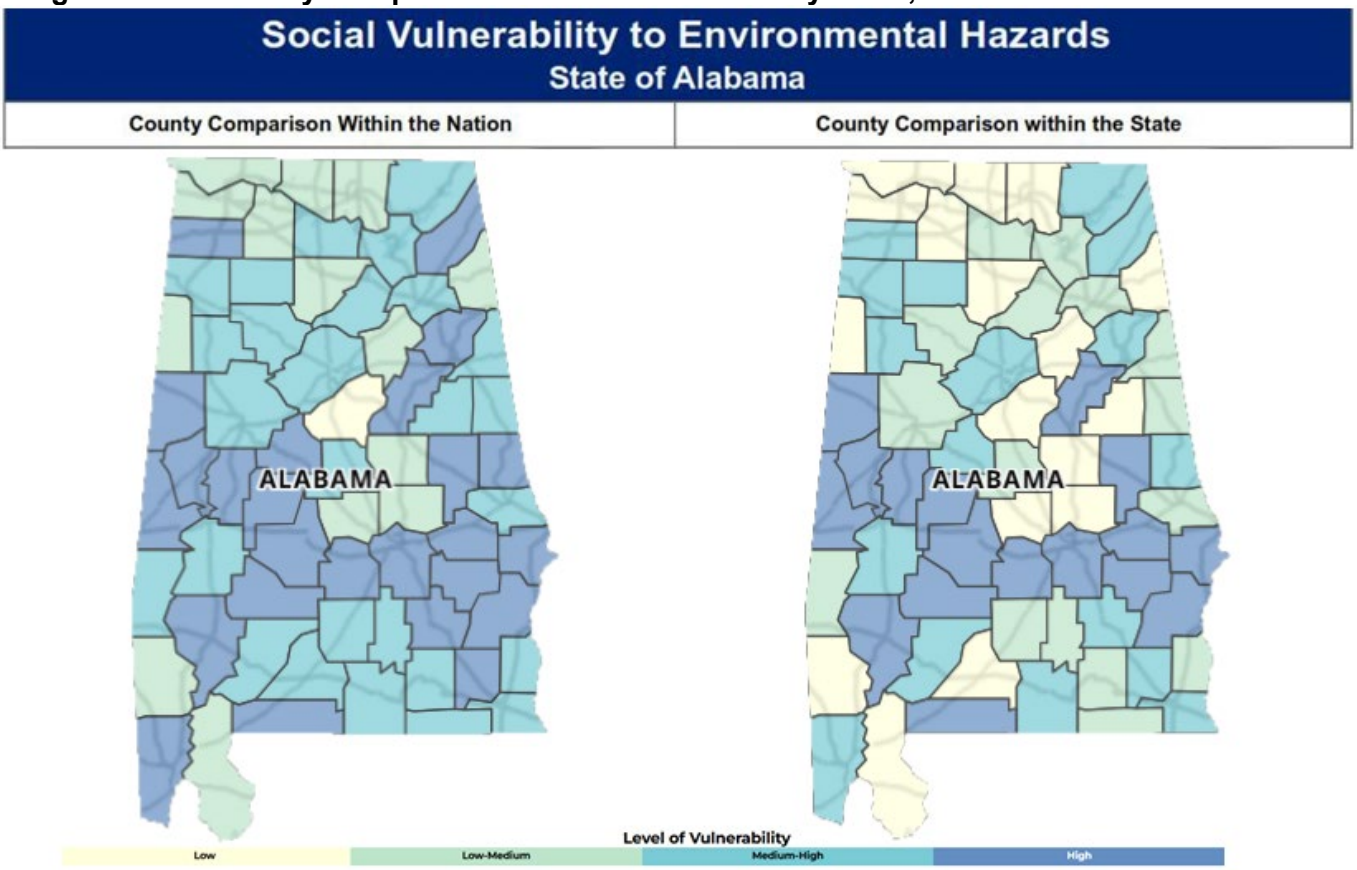
Source: U.S. Census Bureau: 2020 Decennial Census, 2023 American Community Survey (ACS) 1-year Estimates

According to the 2016 American Community Survey (ACS) estimates, 3.8 percent of the population is under age 5 and 15.35 percent of the population is over age 65 in unincorporated Baldwin County. There were 58,625 households with an average household size of 2.53 people.

The Hazards and Vulnerability Research Institute at the University of South Carolina developed the Social Vulnerability Index (SoVI ®) to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 30 socioeconomic variables, which the research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI ® data sources include primarily those from the United States Census Bureau.

Figure 2.5 compares the social vulnerability of Baldwin County with counties in Alabama, as well as, the United States. To visually compare the SoVI® scores at a national level, they are mapped using quantiles. Scores in the top 20% of the United States are more vulnerable counties (dark blue) and scores in the bottom 20% of the United States indicate the least vulnerable counties (yellow). Baldwin County is shown as having a Medium Social Vulnerability Index The Medium index indicates that Baldwin County is generally able to cope and recover from disasters.

Figure 2.5 County Comparison for Social Vulnerability Index, 2022



poluationSource: Hazards and Vulnerability Research Institute; file:///N:/6376171035_Baldwin/05_Reference/AL_1014.pdf

Table 2.3 provides additional demographic and economic indicators for Baldwin County. Statistics for unincorporated Baldwin County are calculated from the total values for Baldwin County less the values for the incorporated communities.

Table 2.3 Unemployment, Income, and Poverty Demographics, Baldwin County, AL, 2016

Jurisdiction	Civilian Labor Force 16 Years and Over	Median Household Income	Persons Below Poverty Level
Baldwin County, AL	149,569	$72,915	24,403
Bay Minette, City of	4069	$39,737	2067
Daphne, Town of	19,162	$86,479	1,622
Elberta, Town of	1070	$57,996	486
Fairhope, City of	13,236	$86,509	2,218
Foley, City of	11,940	$67,346	2,602
Gulf Shores, City of	10,194	$73,873	1,789
Loxley, Town of	1,840	$85,250	600
Magnolia Springs, Town of	606	$93,000	154
Orange Beach, City of	5206	$89,034	456
Perdido Beach, Town of	194	$71,429	40
Robertsdale, City of	4,527	$55,707	481
Silverhill, Town of	441	$58,510	23
Spanish Fort, City of	6,774	$101,574	649

Summerdale, Town of	731	$70,500	86
Unincorporated Baldwin County	**75579**	**$51,365[1]**	**11,130**

Source: U.S. Census, 2016 ACS, 5-year Estimates; 1 – Values assumed to be the same as Baldwin County

2.1.5 Economy/Industry

Tables 2.4 and 2.5 present the top employers and top manufacturing employers in Baldwin County. Table 2.6 presents occupational statistics for Baldwin County. Statistics for unincorporated Baldwin County are calculated from the total values for Baldwin County less the values for the incorporated communities.

Table 2.4 Top Employers in Baldwin County

Company	Industry	Employees
Baldwin County Board of Education	Education	3,900
Wal-Mart	Retail	1,700
Infirmary Health	Medical Care	1,490
Collins Aerospace	Thrust Reversers, Cawlings, and Nacelle Components	1026
Columbia Southern University	Education	1050
Baldwin Health	Medical Care	860
Publix	Retail	830
Baldwin County Commission	Government	670
Marriott Grand Hotel	Hotel & Country Club	530
Brett/Robinson Gulf Corp.	Vacation Rental Management	520
S OWA	Entertainment & Retail	400
S.H. Enterprises	Vacation Rental Management	375
Ace Hardware Support Center	Hardware Distribution Support Center	380
Vulcan, Inc.	Aluminum & Steel Products	236

Source: Baldwin County Economic Development Alliance; https://baldwineda.com/data/top-employers/

Table 2.5 Top Manufacturing Employers in Baldwin County

Company	Industry	Employees
Collins Aerospace	Thrust Reversers, Cawlings, and Nacelle Components	1026
Ace Hardware Support Center	Hardware Distribution Support Center	380
Vulcan, Inc.	Aluminum & Steel Products	236
Quincy Compressors	Air Compressors	210
Segers Aerospace	Aerospace and Defense MRO	185
Bon Secour Fisheries	Seafood Processing	150
International Paper	Paper Products	135
Quality Filters	Air Filters	130
Ecovery	Metals Processing	130
Ascend Performance Materials	Medical Instruments	114

Source: Baldwin County Economic Development Alliance; https://baldwineda.com/data/top-employers/

Table 2.6 Occupational Statistics, Baldwin County, 2016- To be updated prior to 2025 adoption

Jurisdiction	Civilian employed population 16 years and over	Management, business, science, and arts occupations		Service occupations		Sales and office occupations		Natural resources, construction, and maintenance occupations		Production, transportation, and material moving occupations	
Baldwin County, AL	87,753	34.2%	30,012	17.1%	15,006	26.8%	23,518	10.5%	9,214	11.4%	10,004
Bay Minette, City of	3,077	24.4%	751	21.8%	671	24.1%	742	10.9%	335	18.8%	578
Daphne, Town of	12,148	41.8%	5,078	15.4%	1,871	27.0%	3,280	6.1%	741	9.7%	1,178
Elberta, Town of	553	17.0%	94	20.6%	114	41.0%	227	9.4%	52	11.9%	66
Fairhope, City of	7,153	46.6%	3,333	16.6%	1,187	24.8%	1,774	4.9%	350	7.0%	501
Foley, City of	6535	33.4%	2183	16.8%	1098	28.4%	1856	12.3%	804	9.0%	588
Gulf Shores, City of	4,961	35.5%	1,761	18.1%	898	28.6%	1,419	6.5%	322	11.2%	556
Loxley, Town of	849	31.6%	268	17.0%	144	29.3%	249	10.6%	90	11.5%	98
Magnolia Springs, Town of	261	42.1%	110	8.8%	23	20.3%	53	8.4%	22	20.3%	53
Orange Beach, City of	2,832	40.7%	1,153	19.5%	552	18.4%	521	11.2%	317	10.3%	292
Perdido Beach, Town of	240	37.9%	91	21.3%	51	23.8%	57	3.8%	9	13.3%	32
Robertsdale, City of	2,472	21.6%	534	15.9%	393	26.4%	653	22.9%	566	13.1%	324
Silverhill, Town of	333	22.5%	75	25.8%	86	25.8%	86	16.8%	56	9.0%	30
Spanish Fort, City of	4,010	50.1%	2,009	10.8%	433	26.9%	1,079	6.0%	241	6.1%	245
Summerdale, Town of	344	25.9%	89	25.6%	88	20.6%	71	7.3%	25	20.6%	71
Unincorporated Baldwin County	**41,985**	**29.7%**	**12,483**	**17.6%**	**7,397**	**27.3%**	**11,451**	**12.6%**	**5,284**	**12.8%**	**5,392**

Source: U.S. Census, 2016 American Community Survey, 5-year Estimates

2.1.6 Agriculture

According to the USDA Census of Agriculture, the area of agriculture land is increasing in Baldwin County, as well as, the market value of crops. Table 2.7 below compares number of farms and land in farms (acres) as reported in the 2012, 2017, and 2022 US Agricultural census.

Table 2.7 Baldwin County Agricultural Census Comparisons, 2002, 2007, and 2012

Commodity	2012	2017	2022	Percent Change 2012-2022
Farms (number)	989	842	853	-13.75%
Land in farms (acres)	192,320	174,803	180,784	-6%
Market Value – Crops ($1,000)	$115,652	$101,620	$123,196	6.52%
Market Value – Livestock ($1,000)	$19,910	$18763	$20,489	2.91%

Source: USDA Census of Agriculture, 2012, 2017, and 2022; https://www.agcensus.usda.gov/

Table 2.8 below shows the production quantity and thestate rank, among the 67 counties, for agricultural products in Baldwin County.

Table 2.8 Baldwin County Agricultural Commodity Groups, 2022

Commodity	Quantity ($)	State Rank
Grains, oilseeds, dry beans, & dry peas	15,344	9
Tobacco	0	-
Cotton and cottonseed	5,974	20
Vegetables, melons, potatoes, & sweet potatoes	7,454	4
Fruits, tree nuts, & berries	(D)	2
Nursery, greenhouse, floriculture, & sod	71,816	2
Cut Christmas trees and short rotation woody crops	(D)	2
Other crops and hay	20,537	2
Poultry and eggs	(D)	40
Cattle and calves	6,670	30
Milk from cows	-	-
Hogs and pigs	27	21
Sheep, goats, wool, mohair, and milk	136	18
Horses, ponies, mules, burros, and donkeys	174	14
Aquaculture	(D)	10
Other animals and other animal products	249	9

Source: U.S. Department of Agriculture, 201 census of agriculture, Baldwin County, AL Profile.
(D) Withheld to avoid disclosing data for individual operations.

2.2 Mitigation Capabilities

This mitigation capability profile of unincorporated Baldwin includes an overview of the jurisdiction and its organizational structure; a description of staff, fiscal, and technical resources; and information regarding existing hazard mitigation capabilities such as adopted plans policies and regulations. The descriptions and capabilities assessments are based on available and applicable data, including information provided by Baldwin County collected during the planning process.

2.2.1 Baldwin County, Unincorporated Areas

Overview

Baldwin County has a four-member elected commission, as well as, the following elected officers of: County Coroner, District Attorney, Probate Judge, Revenue Commissioner, Sheriff, and District Court Judge, and County Board of Education. The Baldwin County government includes the following departments:

- County Administration
- Animal Shelter
- Archives and History
- Baldwin Rural Area Transportation System (BRATS Public Bus)
- Budget
- Building Inspection
- Communications and Information Systems (CIS)
- Council on Aging
- Emergency Management Agency
- Finance and Accounting
- Grants
- Highway Department
- Juvenile Detention
- Personnel Department
- Planning and Zoning
- Purchasing
- Sales and Use Tax / License Inspection

Technical and Fiscal Resources

The table below outlines Baldwin County personnel resources in 2025.

Table 2.9 Baldwin County Administrative and Technical Resources, 2025

Personnel Resources	Yes/No	Department/Position
Planner/Engineer with knowledge of land development/land management practices	YES	• Planning & Zoning Department
Engineer/Professional trained in construction practices related to buildings and/or infrastructure	YES	• Building Inspection Department • Highway Department
Planner/Engineer/Scientist with an understanding of natural hazards	YES	• Planning & Zoning Department • Building Inspection Department
Personnel skilled in GIS	YES	• Communications and Information Systems (CIS) Department
Full time building official	YES	• Building Inspection Department
Floodplain Manager	YES	• Building Inspection Department
Emergency Manager	YES	• Emergency Management Agency
Grant writer	YES	• Emergency Management Agency
Natural Resource Planner	YES	• Planning & Zoning Department

Source: Baldwin County's Data Collection Guide completed 2025.

Fiscal tools or resources that the County could potentially use to help fund mitigation activities include the following:

- Community Development Block Grants;
- DHS and FEMA Grant Resources;
- Capital improvements project funding;
- Authority to levy taxes for specific purposes;
- Incur debt through general obligation bonds;
- Incur debt through special tax bonds; and
- Incur debt through private activities.

Existing Plans and Policies

Baldwin County joined the regular phase of the National Flood Insurance Program on January 12, 1973 and also participates in the Community Rating System as a Class 7. They maintain elevation certificates on properties in the floodplain. Additional regulatory tools are presented in the table below:

Table 2.10 Baldwin County Regulatory Tools, 2018

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Master Plan	YES	Our Vision: A Citizen's Guide to Growth in the zoned areas of Baldwin County Our Vision - A Citizen's Guide to Growth (as approved July 18, 2023)
Zoning ordinance	YES	Zoning Ordinance (as amended November 21, 2023)
Growth management	NO	No separate plan for growth management. Zoning guides growth and development.
Subdivision ordinance	YES	Subdivision Regulations (as amended September 19th, 2023)
Drainage Ordinance	YES	Zoning Ordinance, Article 13, Section 13.11 and 12 Subdivision Regulations, Article 5, Section 5.11
Historical Preservation Ordinance	YES	Zoning Ordinance, Article 11 Zoning Ordinance, Article 10, Section 10.3
Landscape Ordinance	YES	Zoning Ordinance, Article 17 Zoning Ordinance (as amended November 21, 2023)
Floodplain ordinance Flood Land Disturbance Ordinance	YES	baldwin-county-floodplain-development-ordinance.pdf land-disturbance-ordinance-for-flood-prone-areas-or-territories.pdf
Flood insurance study or other engineering study for streams	YES	Current Effective April 19, 2019
Elevation certificates	YES	Building Inspection Department ELEVATION CERTIFICATES - AVAILABLE TO PUBLIC - OneDrive
Building code	YES	Adoption of 2018 International Code Councils Building Codes
BCEGS Rating	YES	4-Commercial & Industrial Buildings 4-One & Two-Family Dwellings

Fire department ISO rating	YES	3/3X
Stormwater Management Program (Urban Areas)	YES	Stormwater Management Program (SWMP) Plan, 2021-2026 MS4

Regulatory Tool (ordinances, codes, plans)	Y/N	Comments
Erosion or sediment control program	YES	Zoning Ordinance, Article 13, Section 13.12 Zoning Ordinance (as amended November 21, 2023) Subdivision Regulations, Article 5, Section 5.13 Subdivision Regulations (as amended September 19th, 2023)
Wetlands and Riparian Areas Conservation	YES	Zoning Ordinance, Article 11 Zoning Ordinance, Article 10, Section 10.4
Site plan review requirements	YES	Zoning Ordinance (as amended November 21, 2023)
Capital improvements plan	NO	
Economic development plan	NO	Baldwin County Economic Development Alliance https://baldwineda.com/
Local emergency operations plan	YES	EOP, 2023 eop_final_combined.pdf

Other Mitigation Activities

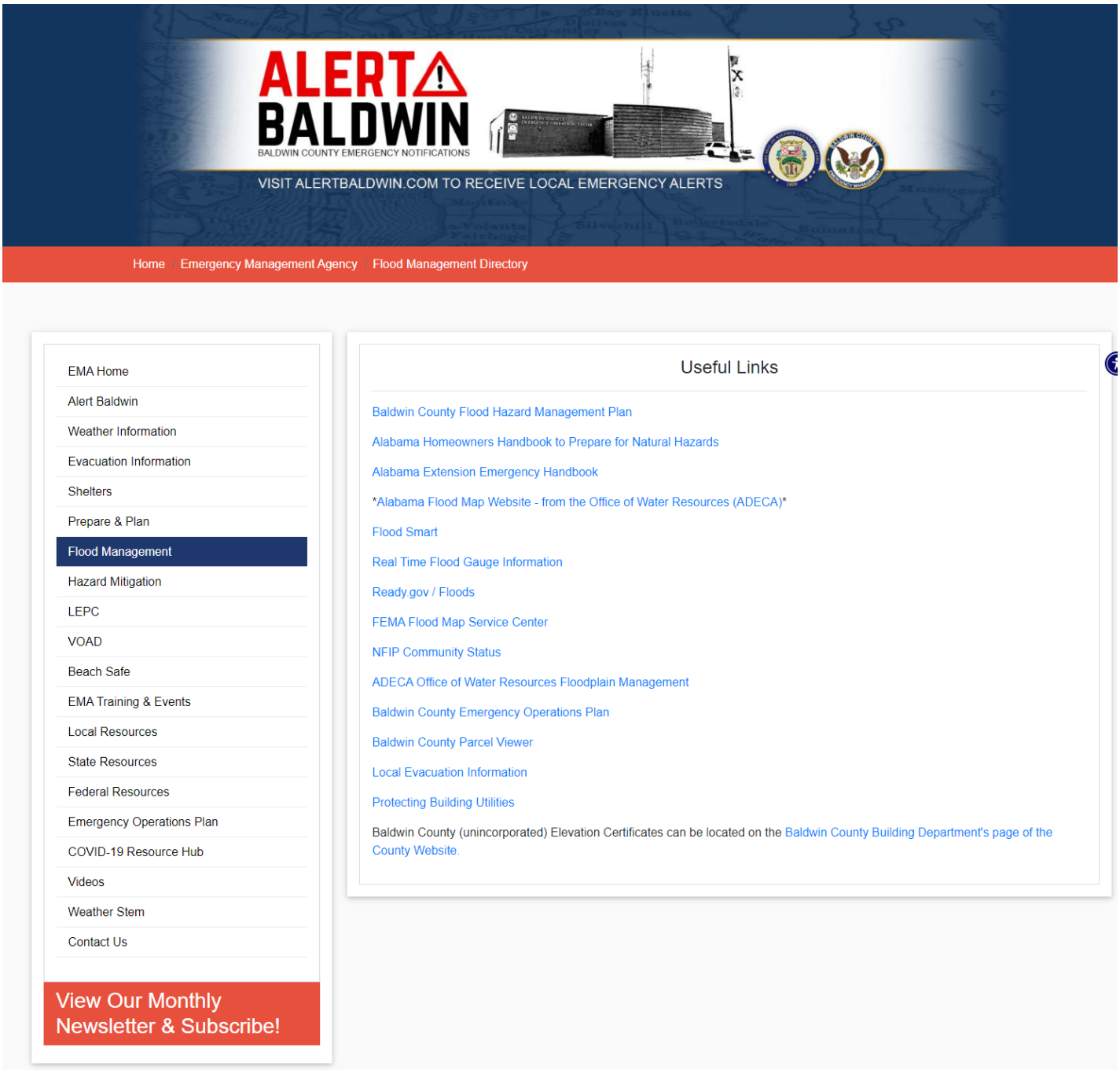
Baldwin County has several mitigation type programs already established. Thefollowing are highlights from some of the departments:

Emergency Management Agency

- **Emergency Planning -** EMA researches, revises, prints and distributes hazard information, including a flood management directory (Figure 2.6).
- **Training to Emergency Responders and Public Organizations -** EMA will host/present training classes and/or presentations to response agencies, doctors, nurses and public organizations on topics such as Assisting Children in Disasters, Structural Collapse, Incident Command, Weather Spotter and CERT.
- **StormReady Certification**
- **Citizen Preparedness Information -** EMA is the administrator for the Baldwin County Local Emergency Planning Committee and hosts the website: https://baldwincountyal.gov/departments/emergency-management-agency https://baldwincountyal.gov/departments/emergency-management-agency
- **Participate in Emergency Exercises -** EMA participate in numerous emergency exercises every year.
- **Provide and Maintain EOC Facilities -** The 9-1-1/KEMA facility houses the EOC - Emergency Operations Center. This is the central meeting point for the City and County Mayors, Police, Fire, Emergency Medical Services, American Red Cross and others to coordinate response and recovery efforts following a disaster.
- **Grant Administration -** EMA administers several State and Federal Grants which provide emergency planning, training and equipment to emergency responders, hospitals and volunteers.

- **Duty Officer -** A duty officer is on call 24 hours a day, 7 days a week.

Figure 2.6 Flood Management Directory, Baldwin County Website



Floodplain Management

Baldwin County's Floodplain Administrator also provides the following public education and outreach services:

- Flood Insurance Program
  - Flood Hazard Brochure 2025

  -
  - Coastal Barrier Resources System CBRA
  -
  - Flood Hazard Protection Newsletter 2024
  -
  - Mandatory Purchase of Flood Insurance
  -
    NOAA | Coastal County Snapshots

  - Baldwin_County_CRS_Statistics_2020
  -
- CRS Mailouts
  - Repetitive Loss Properties
  -
  - Real Estate & Insurance Companies
  -
  - Hurricane Tabloid

–

Stormwater

Baldwin County's Storm Water Management Program (SWMP) Plan summarizes the County's efforts to maintain compliance with the requirements of NPDES Permit ALR040042. The plan includes the following mitigation type efforts:

- Local Partnerships for educational and outreach programs:
  - Alabama Department of Environmental Management;
  - Alabama Clean Water Partnership;
  - Alabama Cooperative Extension System;
  - City of Daphne;
  - City of Fairhope;
  - City of Spanish Fort;
  - City of Foley;
  - City of Robertsdale;
  - Town of Magnolia Springs;
  - Town of Silverhill;
  - Town of Summerdale;
  - Town of Loxley;
  - Town of Perdido Beach;
  - Weeks Bay Preserve;
  - Weeks Bay Watershed Project;
  - Mobile Bay National Estuary Program;
  - Wolf Bay Watershed Watch;
  - Perdido Bay Watershed Planning;
  - Baldwin County Environmental Advisory Board;
  - Alabama Coastal Foundation; and,
  - People Against a Littered State.
- Workshops:
  - Nonpoint Education for Municipal Officials (NEMO) - Mobile Bay National Estuary Program Video "Understanding the MS4 Process" is available.
  - Erosion and Sediment Control - The County may evaluate and identify workshops that will be beneficial to city staff, professionals and development community.
  - Low Impact Development - The workshops that will be beneficial development community.
- Public Engagement Activities:
  - Baldwin County Water Festival is to educate students about all aspects of surface water and groundwater and other related natural resources

– Earth Day is an annual celebration during which worldwide events are held for the purpose of demonstrating support for environmental protection.

3 RISK ASSESSMENT

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

The risk assessment process identifies and profiles relevant flood hazards and assesses the exposure of lives, property, and infrastructure to these flood hazards. The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a flood hazard event. The risk assessment process allows the community to better understand their potential risk to flood hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future flood hazard events.

A Flood Hazard Management Plan was adopted in 2018. This risk assessment is an update to the risk assessment previously prepared. Updates to the risk assessment include the following:

- Identified hazards were re-evaluated and profiles were refined;
- Hazus 4.0, Alabama State Dataset was utilized to determine loss estimates;
- Hazus 4.0, results assessed vulnerability and loss estimates for flooding; and
- Critical facilities were updated with FMPC input.

The risk assessment followed the methodology described in the 2023 FEMA Local Mitigation Planning Policy Guide, which includes a five-step process:

- Step 1 -Identify Hazards
- Step 2 – Describe Hazards
- Step 3 - Identify Community Assets
- Step 4 - Analyze Risk
- Step 5 - Summarize Vulnerability

This chapter is divided into four parts: hazard identification, hazard profiles, vulnerability assessment, and Summary of Key Issues.

- **Section 3.1 Hazard Identification** identifies the flood hazards that threaten the planning area and describes why some flood hazards have been omitted from further consideration.
- **Section 3.2 Hazard Description** discusses the threat to the planning area and

describes location, extent, previous occurrences of flood hazard events and the probability of future occurrence.

- **Section 3.3 Vulnerability Assessment** assesses the planning area's total exposure to flood hazards, considering critical facilities and other community assets at risk, and assessing growth and development trends. Flood hazards that vary

geographically across the planning area are addressed in greater detail. This section includes steps 2 and 3 from above.

- **Section 3.4 Summary of Key Issues** provides a summary of the key issues or problems identified in the Risk Assessment.

3.1 Hazard Identification

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

3.1.1 Review of State Hazard Mitigation Plan

The Floodplain Management Planning Committee (FMPC) reviewed data and discussed the impacts of each of the hazards of prime concern that were included and profiled in the 2023 update to the State of Alabama Hazard Mitigation Plan. The six flood-related hazards that were included in the State Plan are listed alphabetically below:

- Dam Failure;
- Flooding (riverine flooding, storm surge, flash floods);
- High Winds (hurricanes, tornadoes, windstorms);
- Sea Level Rise and Coastal Land Change;
- Sinkholes and Land Subsidence; and
- Tsunamis.

Data on the past impacts and future probability of flood hazards in the Baldwin County planning area were collected from the following sources:

- Alabama State Hazard Mitigation Plan (2023)
- Information on past hazard events from the Spatial Hazard Events and Losses Database for the United States (SHELDUS), a component of the University of South Carolina Hazards & Vulnerability and Research Institute
- Information on past extreme weather and climate events and projected trends from the National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information
- Disaster declaration history from the Federal Emergency Management Agency (FEMA), the Public Entity Risk Institute, and the USDA Farm Service Agency Disaster Declarations
- Information provided by members of the Floodplain Management Planning Committee
- Various articles and publications available on the internet (sources are indicated where data is cited)

3.1.2 Disaster Declaration History

One method used by the FMPC to identify hazards was to examine events that triggered federal and/or state disaster declarations. Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration. FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damages and institutions or industrial sectors affected.

Table 3.1 lists federal disaster and emergency declarations received by Baldwin County. Each of the disaster events affected multiple counties. Hurricanes/Tropical Storms and flooding were the most prevalent disasters.

Table 3.1 Flood-Related Disaster Declaration History in Baldwin County, 1969-Present

DR #	Declaration Date	Disaster Description
Disaster Declarations		
280	1969-11-07	HURRICANE CAMILLE
369	1973-03-27	TORNADOES & FLOODING
563	1978-08-09	SEVERE STORMS & FLOODING
598	1979-09-13	HURRICANE FREDERIC
742	1985-09-07	HURRICANE ELENA
861	1990-03-21	SEVERE STORMS, TORNADOES & FLOODING
1070	1995-10-04	HURRICANE OPAL
1185	1997-07-25	SEVERE STORMS, FLOODING, HIGH WINDS, ASSOC WITH HURR DANNY
1250	1998-09-30	HURRICANE GEORGES - 18 SEP 98
1438	2002-10-09	TROPICAL STORM ISIDORE
1466	2003-05-12	SEVERE STORMS, TORNADOES, AND FLOODING
1549	2004-09-15	HURRICANE IVAN
1593	2005-07-10	HURRICANE DENNIS
1605	2005-08-29	HURRICANE KATRINA
1789	2008-09-10	HURRICANE GUSTAV
1797	2008-09-26	SEVERE STORMS AND FLOODING ASSOCIATED WITH HURRICANE IKE

DR #	Declaration Date	Disaster Description
Disaster Declarations		
1835	2009-04-28	SEVERE STORMS, FLOODING, TORNADOES & STRAIGHT-LINE
1866	2009-12-22	TROPICAL STORM IDA
1971	2011-04-28	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING
4082	2012-09-21	HURRICANE ISAAC
4176	2014-05-02	SEVERE STORMS, TORNADOES, STRAIGHT-LINE WINDS, AND FLOODING
4349	2017-11-16	HURRICANE NATE
4563	2020-09-20	HURRICANE SALLY
Emergency Declarations		
3074	1979-03-17	FLOODING
3133	1998-09-28	HURRICANE GEORGES
3214	2005-08-28	HURRICANE KATRINA
3237	2005-09-10	HURRICANE KATRINA EVACUATION
3292	2008-08-30	HURRICANE GUSTAV
3319	2011-04-27	SEVERE STORMS, TORNADOES, AND STRAIGHT-LINE WINDS
3389	2017-09-11	HURRICANE IRMA
3394	2017-10-08	HURRICANE NATE
3407	2018-10-12	HURRICANE MICHAEL
3545	2020-09-14	HURRICANE SALLY
3618	2024-09-26	HURRICANE HELENE

Source: FEMA Open Datasets, https://www.fema.gov/openfema-dataset-disaster-declarations-summaries-v1

It is also important to note that the federal government may issue a disaster declaration through the U.S. Department of Agriculture and/or the Small Business Administration, as well as through FEMA. The quantity and types of damage are the factors that determine whether such declarations are issued.

The U.S. Department of Agriculture (USDA) provides assistance to farmers and other rural residents, as the result of natural disasters. Agricultural-related disasters are quite common. One-half to two-thirds of the counties in the United States have been designated as disaster areas in each of the past several years. Agricultural producers may apply for low-interest emergency loans in counties named as primary or contiguous in a disaster designation.

USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, or by an Indian Tribal Council leader. Primary and contiguous counties designations for Baldwin County for 2014 through 2024 were as follows:

- 2014 – Contiguous County – 04/04/2014-05/02/2014, Excessive rain
- 2015 – Contiguous County – 09/01/2015-11/202015, Excessive rain, wind, flooding

- 2016 – No flood-related designation, 3 drought events noted for Baldwin County
- 2017 – Primary County – 05/01/2017-06/30/2017, Excessive rainfall, winds, flooding, flash flooding, and Tropical Storm Cindy
- 2018 – Contiguous County – 9/3/2018- 9/6/2018, Significant rainfall, wind, and flooding due to Tropical Storm Gordon
- 2020 – Primary County – 04/14/2020- N/A, One drought event reported
- 2020 – Contiguous County – 06/07/2020- 06/10/2020, Excessive rainfall and flash flooding due to Tropical Storm Cristobal
- 2020 – Primary County – 09/15/2020-09/16/2020 Excessive wind, flash flooding, and excessive rainfall caused by Hurricane Sally
- 2020 – Contiguous County – 10/28/2020- 10/29/2020 Significant rainfall, wind, and flooding Hurricane Zeta
- 2021 – Primary County – 08/29/2021- 8/30/2021 Excessive rainfall and flooding caused by Tropical Storm Ida
- 2023 – Primary County – 03/18/2023- 03/20/2023 One freezing temperature event reported
- 2023 – Primary County – 09/12/2023- N/A One drought event reported
- 2024 – Contiguous County – 12/01/2023- N/A One drought event reported

The Small Business Administration provides disaster assistance to families and businesses through their Disaster Assistance Program. The mission of this program is to offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster. By offering low-interest loans, the SBA is committed to long-term recovery efforts. SBA is also committed to mitigation and has additional loan programs to help reduce future losses.

An SBA declaration may be requested by the State Governor. When the Governor's request for assistance is received, a survey of the damaged area(s) is conducted with State and local officials, and the results are submitted to the Administrator for a decision. When the Administrator of SBA declares an area, both primary and adjacent counties are eligible for the same assistance.

3.1.3 Hazards Identified

After review of the hazards in the Alabama State Hazard Mitigation Plan, the local Baldwin County Hazard Mitigation Plan, the previous Flood Hazard Management Plan, and the disaster declaration history, the FMPC identified six flood hazards that significantly affect the planning area. These hazards are listed below in Table 3.2, the "X" indicates if the hazard was included in the planning document. Each of these hazards is profiled in further detail in the next section.

Table 3.2 Hazards Identified for Each Participating Jurisdiction

Hazard	Baldwin County Flood Hazard Management Plan 2025	Alabama State Hazard Mitigation Plan 2023	Baldwin County Hazard Mitigation Plan 2021	Baldwin County Flood Hazard Management Plan 2018
Flood: 100-/500-Year	X	X	X	X
Flood: Stormwater/Localized	X	X	X	X
Hurricane and Tropical Storms (including storm surge)	X	X	X	X
Coastal Bank Erosion	X	Included as a component of Flooding		X
Dam/Levee Failure	X	X	X	X
Changing Future Conditions and Sea Level Rise	X	X		X
Tsunami	X	X	X	X

3.2 Hazard Description

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

Methodology

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

The sources used to collect information for these profiles include those mentioned in Section 3.1.1 as well as those cited individually in each hazard section.

Detailed profiles for each of the identified hazards include information categorizedas follows:

Hazard Description

This section consists of a general description of the hazard and the types of impacts it may have on a community.

Geographic Location

This section describes the geographic location of the hazard in the planning area. Where available, the extent, or potential “size” of the hazard is discussed in this section. Where available, maps are utilized to indicate the specific locations within the planning area that are vulnerable to the subject hazard.

- ***Community Wide (3):*** 50-100% of planning area
- ***Partial (2):*** 10-50% of planning area
- ***Minimal (1):*** Less than 10% of planning area

Previous Occurrences

This section includes information on historic incidents and their impacts based upon the sources described in Section 3.1 Hazard Identification and the information provided by the FMPC.

Probability of Future Occurrence

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

- ***Very High (5):*** Occurs annually, 100% probability in next year
- ***High (4):*** Occurs every 2-3 years; Between 30 and 100% probability in next year or at least one chance in ten years
- ***Moderate (3):*** Occurs every 3-10 years; Between 10 and 30% probability in next year or at least one chance in next 100 years
- ***Low (2):*** Occurs every 10 years; Between 1% and 10% probability in next 100 years
- ***Very Low (1):*** Rare; less than 1% probability

Magnitude/Severity

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

- ***Devastating (4):***
  - Devastating casualties, business losses and structure damage
  - Complete shutdown of facilities for 30 or more days, more than 50 percent of property is severely damaged
- ***Significant (3):***
  - Potential for some casualties and significant, but less than devastating, business losses and structure damage
  - Complete shutdown of critical facilities for at least two weeks, 25–50 percent of property is severely damaged
- ***Moderate (2):***
  - Moderate potential for economic losses and structure damage
  - Complete shutdown of critical facilities for more than one week, 10–25 percent of property is severely damaged
- ***Slight (1):***
  - Slight or minimal potential for economic losses and structure damage
  - Shutdown of critical facilities and services for 24 hours or less, less than 10 percent of property is severely damaged

Changing Future Conditions

This section presents potential changes to each hazard that are expected to occur due to variations in environment and climate. Predictions about the changes are contingent upon available research; therefore, some hazards have limited or unknown information. It is difficult to predict the scope, severity, and pace of changing future conditions and the impacts posed by more intense storms, frequent heavy participation, heat waves, drought, and extreme flooding; none-the-less, according to the FEMA Climate Change Adaptation Policy Statement, they can significantly change the probabilities and magnitudes of hazards faced by communities.

Hazard Summary

At the conclusion of each hazard profile, a hazard summary table is provided which includes the following elements: probability of future occurrence, potential magnitude, and spatial extent. The ratings of these elements were then used to calculate a planning significance rating. The assigned value, ratings, and defined parameters are provided below.

Planning Significance

Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage.

Based on the above methodology, Table 3.3 provides the ratings and planning significance for the flood hazards analyzed in this plan.

Table 3.3 Planning Significance Scores

Hazard	Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Flood: 100-/500-Year	Partial	Very High	Significant	High
Hurricane and Tropical Storms (including storm surge)	Community-Wide	Moderate	Significant	High
Flood: Stormwater/Localized	TBD	TBD	TBD	Moderate
Coastal Bank Erosion	Minimal	Very High	Moderate	Moderate
Changing Future Conditions and Sea Level Rise	Minimal	High	Slight	Moderate
Dam/Levee Failure	Minimal	Very Low	Slight	Low
Tsunami	Minimal	Very Low	Slight	Low

3.2.1 Flooding

Description

Flooding is defined by the rising and overflowing of a body of water onto normally dry land. Flooding can result from an overflow of inland or tidal waters or an unusual accumulation or runoff of surface waters from any source.

Certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself.

Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where farm animals are kept, or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as E.coli and other disease-causing agents.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If the County water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one‘s home damaged and personal belongings destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Sources and Types of Flooding

Flooding within Baldwin County can be attributed to three sources: 1) tidal flooding resulting from hurricanes and tropical storms; 2) riverine flooding resulting from heavy and prolonged rainfall over a given watershed which causes the capacity of the main channel to be exceeded; and 3) flash flooding resulting from heavy rainfall that overburdens the drainage system within the community.

- ***Coastal (Tidal) Flooding:*** All lands bordering the coast are prone to tidal flooding. Coastal land such as sand bars, barrier islands and deltas provide a buffer zone to help protect human life and real property relative to the sea much as flood plains provide a buffer zone along rivers and other bodies of water. Coastal floods usually occur as a result of abnormally high tides or tidal waves, storm surge and heavy rains in combination with high tides, tropical storms and hurricanes.

  The primary factors contributing to coastal flooding in Baldwin County are its location in a hurricane prone area, its openness to Gulf of Mexico storm surges and unfavorable, shallow bathymetry extending far offshore. Many of the large streams and sounds near the coast have wide mouths and are bordered by extensive areas of low marsh. In addition, the terrain at the coast is generally too low to provide an effective barrier. The offshore ocean depths are shallow for great distances, capable of generating extremely high storm surges with potential devastating impact in Baldwin County, particularly if driven at times of high tide.

- ***Riverine Flooding:*** Riverine flooding is defined as an event when a watercourse exceeds its "bank-full" capacity. Riverine floods result from precipitation over large areas. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include many independent river basins. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with soils already saturated from previous rain events. The duration of riverine floods may vary from a few hours to many days.

  Factors that directly affect the amount of flood runoff include precipitation, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snowdepth, and water-resistance of the surface areas due to urbanization.

  The area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to flooding is defined as the floodplain. The area inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year is defined as the special flood hazard area (SFHA). The SHFA or 1-percent annual flood is the national standard to which communities regulate their floodplains through the National Flood Insurance Program.

- ***Flash or Rapid Flooding:*** Flash flooding is the result of heavy, localized rainfall, possibly from slow-moving intense thunderstorms that cause small streams and

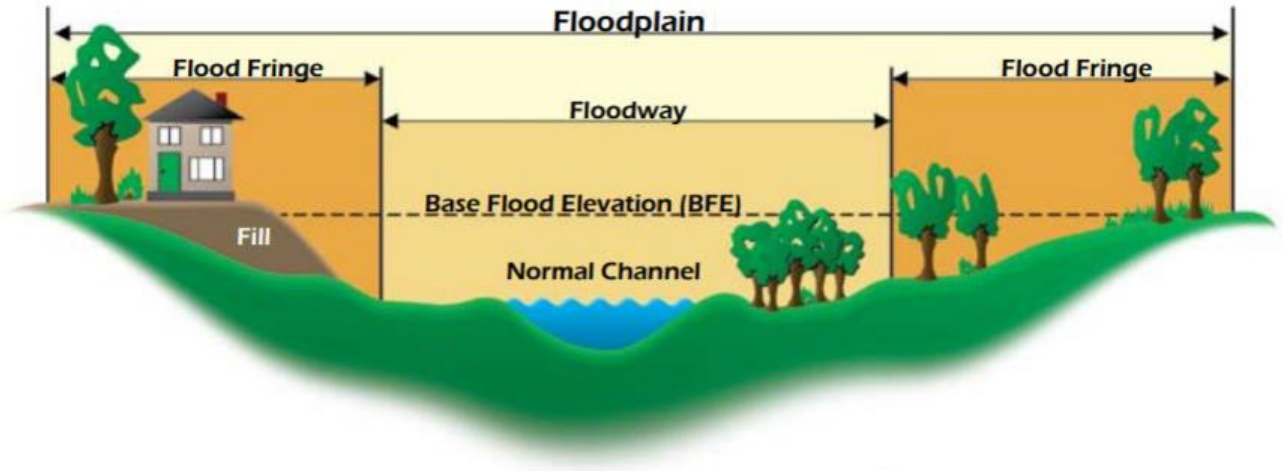
drainage systems to overflow. Flash flood hazards caused by surface water runoff

are most common in urbanized cities, where greater population density generally increases the amount of impervious surface (e.g., pavement and buildings) which increases the amount of surface water generated. Flooding can occur when the capacity of the stormwater system is exceeded or if conveyance is obstructed by debris, sediment and other materials that limit the volume of drainage.

Flooding and Floodplains

The area adjacent to a channel is the floodplain, as shown in Figure 3.1. A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. Floodplains are made when floodwaters exceed the capacity of the main channel or escape the channel by eroding its banks. When this occurs, sediments (including rocks and debris) are deposited that gradually build up over time to create the floor of the floodplain. Floodplains generally contain unconsolidated sediments, often extending below the bed of the stream.

Figure 3.1 Characteristics of a Floodplain



Source: NFIP Guidebook, 2009

In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a 1% chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of

natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

The 100-year flood, which is the minimum standard used by most federal and state agencies, is used by the NFIP as the standard for floodplain management and to determine the need for flood insurance. Participation in the NFIP requires adoption and enforcement of a local floodplain management ordinance which is intended to prevent unsafe development in the floodplain, thereby reducing future flood damages. Participation in the NFIP allows for the federal government to make flood insurance available within the community as a financial protection against flood losses. Since floods have an annual probability of occurrence, have a known magnitude, depth and velocity for each event, and in most cases, have a map indicating where they will occur, they are in many ways often the most predictable and manageable hazard.

Regulated floodplains are illustrated on inundation maps called Flood Insurance Rate Maps (FIRMs). It is the official map for a community on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. SFHAs represent the areas subject to inundation by the 100-year flood event. Structures located within the SFHA have a 26-percent chance of flooding during the life of a standard 30-year mortgage. Flood prone areas were identified within Baldwin County using the most current Flood Insurance Study (FIS) and associated FIRMs developed by FEMA preliminary on July 31, 2017. Table 3.4 summarizes the types flood insurance zones.

Table 3.4 Mapped Flood Insurance Zones

Zone	Description
VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
AE	Base Flood Elevations determined.
A	No Base Flood Elevations determined.
AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevation determined.
AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

Zone	Description
A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
X (shaded)	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
X (unshaded)	Areas determined to be outside the 0.2% annual chance floodplain.
D	Areas in which flood hazards are undetermined, but possible.

Source: Baldwin County, Alabama FIS and FIRM, July 31, 2017

Geographic Location

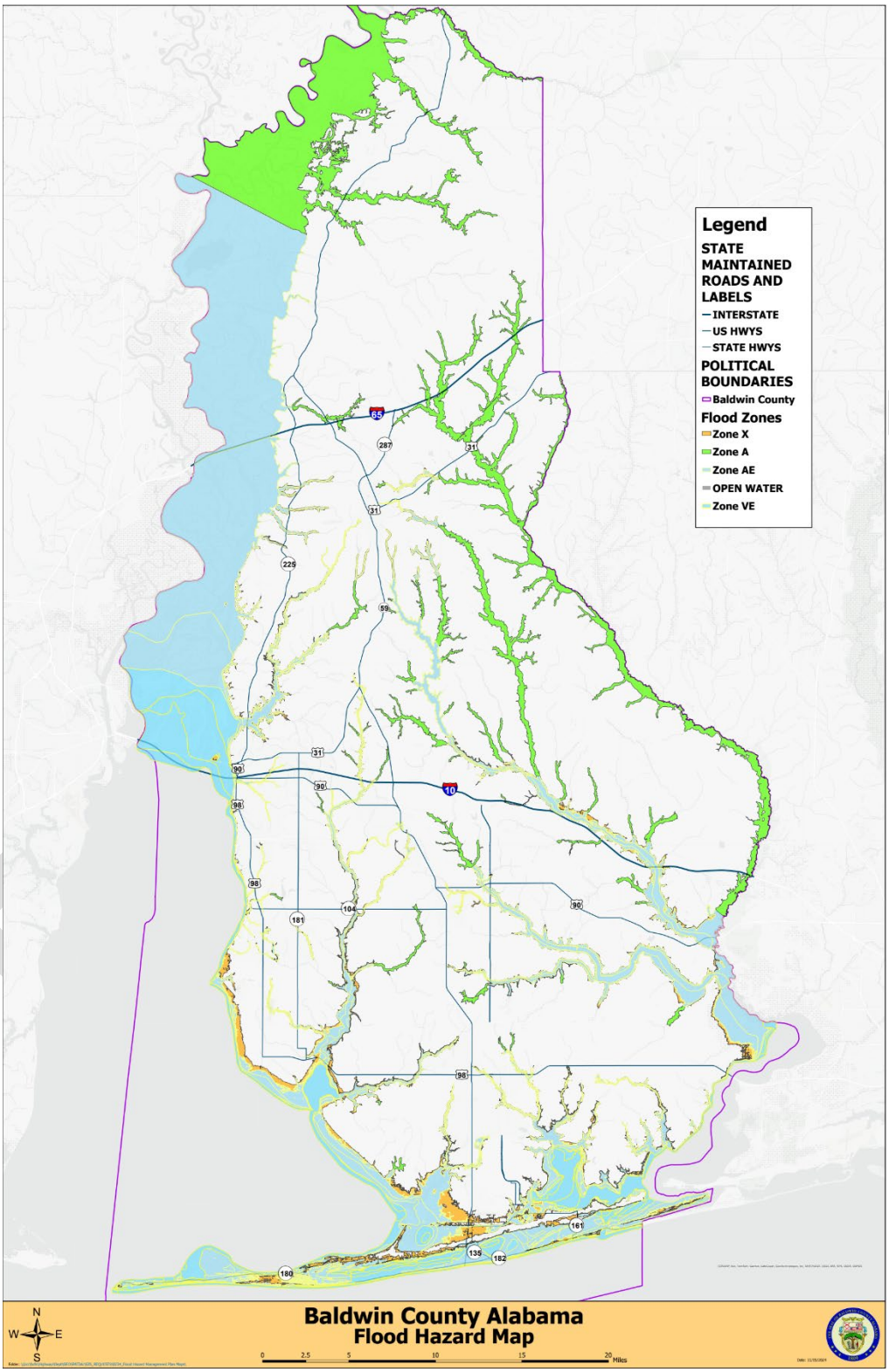
Partial - The mapped flood insurance zones for Baldwin County are presented in Figure 3.2. This area includes:

- SFHA - 353.6 square miles
- Floodway – 20.3 square miles
- Coastal High Hazard Area – 10.4 square miles

Figure 3.3 reflects the effective FIRM panel scheme for Baldwin County.

The total land area of Baldwin County is 1503.24 square miles. The total area identified as a flood hazard area (384.3 sq. mi.) is 25.5-percent of the total land area. The FMPC determined the spatial extent to be partial, 10 to 50-percent of the planning area.

Figure 3.2 Baldwin County FIRM Flood Zones



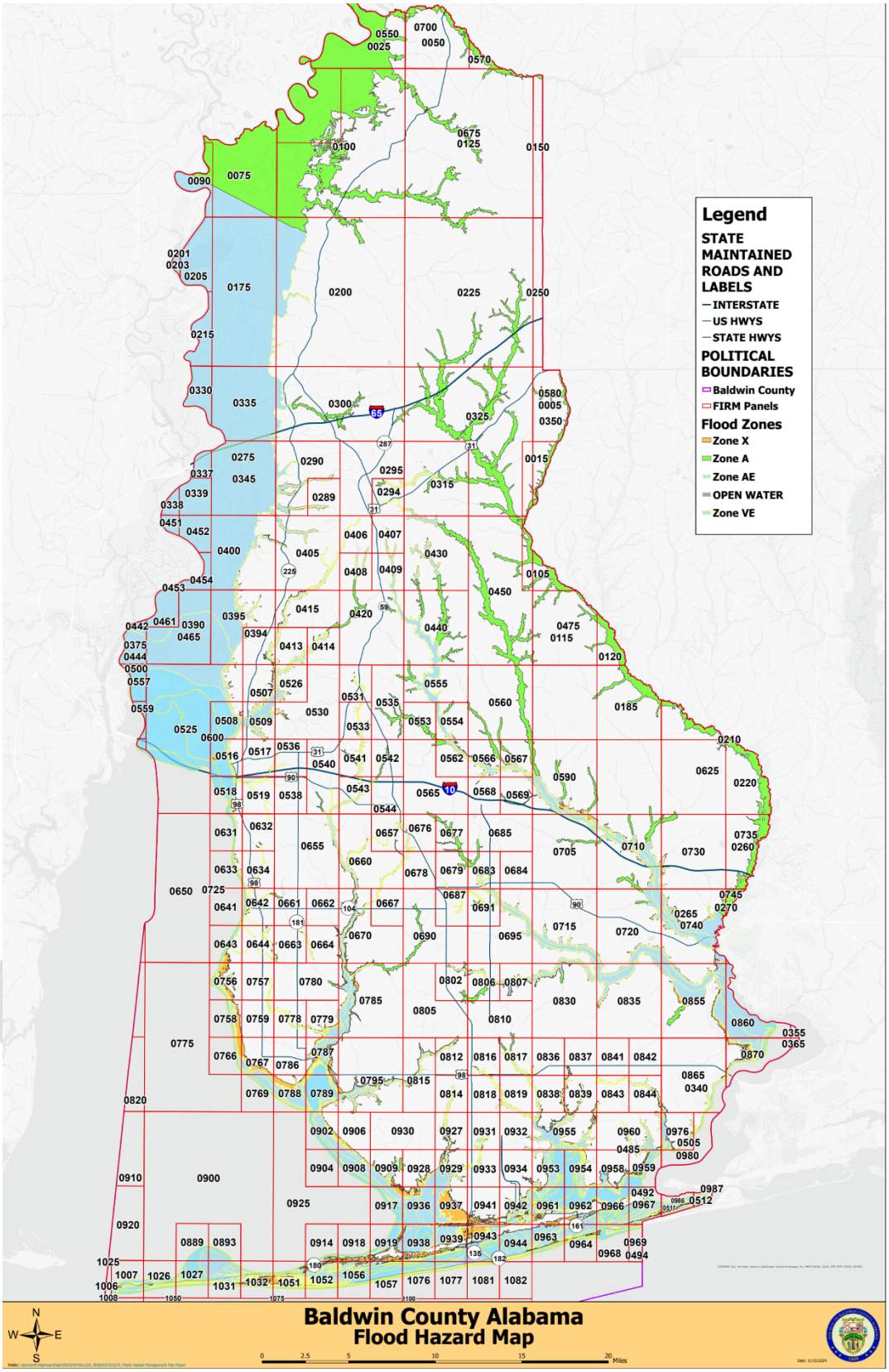
All streams within Baldwin County, as previously identified, are subject to flooding and backwater flooding. Backwater flooding is defined as upstream flooding caused by downstream conditions such as channel restriction and/ or high flow in a downstream confluence stream. The primary effect of flooding on these streams appears to be inundation, although velocities will become significant to persons and structures under more extreme flooding situations. Calculated floodplain velocities range from 0.2 to 6.5 feet per second (fps). Velocities greater than 5.0 fps which is considered to be of dangerous magnitude. Table 3.5 outlines the critical depths and velocities that will harm residents and structures during a flood event.

Table 3.5 Critical Flood Depths and Velocities

Depth (threat to life)	In stagnant backwater areas (zero velocity), depths in excess of about 1m (3.3ft) are sufficient to float young children, and depths above 1.4m (4.6ft) are sufficient to float teenage children and many adults.
Velocity (threat to life)	In shallow areas, velocities in excess of 1.8m/s (5.9 ft/s) pose a threat to the stability of many individuals.
Depth and Velocity (threat to life)	The hazards of depth and velocity are closely linked as they combine to effect instability through an upward buoyant force and a lateral force. A product of less than or equal to 0.4m2/s (43 ft2/s) defines a low hazard provided the depth does not exceed 0.8m (2.6ft) and the velocity does not exceed 1.7m/s (5.6 ft/s).
Vehicular access (emergency access)	Most automobiles will be halted by flood depths above 0.3-0.5m (1.0-1.7ft). A maximum flood velocity of 3m/s (9.8 ft/s) would be permissible, providing that flood depths are less than 0.3m (1.0ft). A depth of 0.9-1.2m (2.9-3.9 ft) is the maximum depth for rapid access of large emergency vehicles.
Structural Integrity (structures above ground)	A depth of 0.8m (2.6ft) is the safe upper limit for the above ground/super structure of conventional brick veneer, and certain types of concrete block buildings. The structural integrity of elevated structures is more a function of flood velocities (e.g. Erosion of foundations, footings or fill) than depth. The maximum velocity to maintain structural stability depends on soil type, vegetation cover, and slope but ranges between 0.8-1.5m/s (2.6-4.9 ft/s)
Fill (stability)	In general, fill may become susceptible to erosion/instability at depths of 1.8-2.4m (5.9-7.9ft).

Source: Technical Guide - River and Stream Systems: Flooding Hazard Limit, Ontario Ministry of Natural Resources, 2002

Figure 3.3 Baldwin County FIRM Panel Scheme


Legend
STATE MAINTAINED ROADS AND LABELS
INTERSTATE
US HWYS
STATE HWYS
POLITICAL BOUNDARIES
Baldwin County
FIRM Panels
Flood Zones
Zone X
Zone A
Zone AE
OPEN WATER
Zone VE
Baldwin County Alabama
Flood Hazard Map
N
W
E
S
0 2.5 5 10 15 20 Miles

The NFIP utilizes the 100-year flood as a basis for floodplain management. The FIS defines the probability of flooding as flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 100-year period (recurrence intervals). Or considered another way, properties within a 100-year flood zone have a one percent probability of being equaled or exceeded during any given year. Mortgage lenders require that owners of properties with federally-backed mortgages located within SFHAs purchase and maintain flood insurance policies on their properties. Consequently, newer and recently purchased properties in the community are insured against flooding. Due to the risk of flooding from hurricanes, all property owners within Baldwin County, even if the property is not located in a SFHA, should be encouraged to purchase and maintain flood insurance policies.

Previous Occurrences

Table 3.6 shows flood events from causes other than hurricanes reported by the NCEI since 1950 for Baldwin County.

Table 3.6 Previous Flood Events, 2014-2024

Location	Date	Event Type	Injuries / Deaths	Property Damage	Crop Damage
POINT CLEAR	3/28/2014	Flood	0/0	0	0
TAYLORS CAMP	4/14/2014	Flash Flood	0/0	100,000	0
TAYLORS CAMP	4/14/2014	Flash Flood	0/0	25,000	0
LILLIAN	5/2/2014	Flood	0/1	0	0
ROMAR BEACH	2/23/2016	Flash Flood	0/0	0	0
BON SECOUR	8/12/2016	Flood	0/0	0	0
BELFOREST	1/2/2017	Flash Flood	0/0	600,000	0
ELSANOR	6/7/2017	Flash Flood	0/0	0	0
MARLOW	10/22/2017	Flash Flood	0/0	50,000	0
OAK	10/28/2017	Flash Flood	0/0	0	0
TURKEY BRANCH	9/5/2018	Flash Flood	0/0	0	0
ELSANOR	9/5/2018	Flash Flood	0/0	0	0
MALBIS	9/5/2018	Flash Flood	0/0	0	0
SEMINOLE	9/5/2018	Flood	0/0	0	0
LILLIAN	12/1/2018	Flash Flood	0/0	0	0
BALDWIN COASTAL	7/12/2019	Coastal Flood	0/0	0	0
FT MORGAN	9/16/2020	Flash Flood	0/0	0	0
BARNWELL	9/16/2020	Flash Flood	0/0	0	0
MIFLIN	5/5/2021	Flash Flood	0/0	0	0
ORANGE BEACH	7/6/2021	Flash Flood	0/0	0	0
FOLEY	7/16/2021	Flash Flood	0/0	0	0
FOLEY	7/16/2021	Flash Flood	0/0	0	0
GULF SHORES	7/16/2021	Flash Flood	0/0	0	0

Location	Date	Event Type	Injuries / Deaths	Property Damage	Crop Damage
JOSEPHINE	9/15/2021	Flash Flood	0/0	0	0
PERDIDO BEACH	9/15/2021	Flash Flood	0/0	250,000	0
MARLOW	10/4/2021	Flash Flood	0/0	0	0
ROSINTON	10/4/2021	Flash Flood	0/0	0	0
BON SECOUR	8/24/2022	Flash Flood	0/0	0	0
FOLEY	8/25/2022	Flash Flood	0/0	0	0
OAK	5/17/2023	Flash Flood	0/0	0	0
LOXLEY	6/16/2023	Flash Flood	0/0	0	0
MAGNOLIA SPRGS	6/19/2023	Flash Flood	0/0	0	0
FOLEY	6/19/2023	Flash Flood	0/0	0	0
BARNWELL	6/19/2023	Flash Flood	0/0	0	0
MARNOLIA SPRGS	6/19/2023	Flash Flood	0/0	0	0
SUMMERDALE	5/13/2024	Flash Flood	0/0	0	0

The following provides details on flood events detailed in the NCEI database and from members of the FMPC.

April 14, 2014 - Heavy rain caused Highway 90 just east of Highway 59 to flood. Numerous roads closed in Fairhope, Robertsdale and Silverhill. Highway Department placed warning barricades up across roads experiencing high water. One person was rescued from a residence due to flooding.

January 2, 2017 - Significant flash flooding occurred, especially in the Foley area, due to 5 to 7 inches of rain falling the span of only a couple of hours. A water rescue had to be performed on Fernwood Circle due to the rapid rise of Sandy Creek. Numerous roads in the central and southern half of the county were flooded and closed, with several sustaining damages due to the flooding.

October 22, 2017 - The rapid rise of the Fish River resulted in significant flooding from County 32 to Highway 104. County Road 32 was flooded just east of the bridge. Over 10 water rescues were performed from County Road 32 north to Highway 104. Multiple cars were under water.

December 1, 2018 - Thunderstorms developed ahead of a strong cold front moving across the southeast. The storms produced 5 to 10 inches of rain across extreme southeastern Baldwin County near the Florida state line. This resulted in isolated flash flooding. Fast moving water across several roads was reported near County Road 99 and Highway 98 in Lillian.

July 12, 2019 - A weak area of low pressure moved southward into the northeast Gulf on July 9th and become better developed as it tracked southwest and westward just to south of the marine area. The system become a Tropical Storm on July 11th and briefly a Hurricane on July 13th before making landfall near Intercoastal City, Louisiana

as a weak Category 1 hurricane. The system brought coastal flooding, gusty winds and heavy rain to the area. Water reported over Pelican Point at the mouth of Weeks Bay.

September 15, 2021 - Over 6 inches of rain in just a couple of hours resulted in significant flash flooding in parts of the Lillian and Seminole areas. In Lillian, fast moving water over Highway 98 washed cars off the road. A water rescue had to be performed at the Lillian Post Office due to a person being trapped in their vehicle. County Road 99 at Pearson Branch Bridge was closed due to flooding. In Seminole, a portion of Liatrus Lane near Juniper Road caved in with a six-to-10-foot sink hole.

June 19, 2023 - Unusually strong wind shear combined with strong instability and numerous disturbances led to a very active period of severe weather through the month of June. Numerous reports of large hail and damaging winds were recorded along with a few tornadoes. Making County Road 49 impassable between Laurent Road and County Road 12 due to flooding.

According to the USDA's Risk Management Agency, insured crop losses in Baldwin County as a result of excessive moisture from 2014 to 2024 totaled $7,240,769.59. Historical crop insurance claims as a result of flooding are detailed in Table 3.7.

Table 3.7 Claims Paid in Baldwin County for Crop Loss as a Result of Excessive Moisture/Precipitation/Rain, 2014-2024

Year	Crop	Hazard	Claims Paid
2014	Corn, Cotton, Oats, Peanuts, Pecans, Soybeans, Wheat, and all other Crops	Excess Moisture/Precip/Rain	$780,300.66
2015	Corn, Cotton, Oats, Peanuts, Soybeans, Wheat, and all other Crops	Excess Moisture/Precip/Rain	$884,409.86
2016	Corn, Oats, Peanuts, Pecans, Potatoes, and Wheat	Excess Moisture/Precip/Rain	$214,257.25
2017	Corn, Cotton, Peanuts, Pecans, Soybeans, Wheat, and all other Crops	Excess Moisture/Precip/Rain	$1,378,869.82
2018	Corn, Peanuts, Potatoes, and Soybeans	Excess Moisture/Precip/Rain	$259,025.00
2019	Corn, Cotton, Oats, Peanuts, Soybean, Wheat	Excess Moisture/Precip/Rain	$172,778
2020	Peanuts	Excess Moisture/Precip/Rain	$16,336
2021	Corn, Cotton, Peanuts, Pecans, Potatoes, Soybeans, and all other Crops	Excess Moisture/Precip/Rain	$1,396,986
2022	Corn, Cotton, Peanuts, Pecans, Potatoes, Soybeans	Excess Moisture/Precip/Rain	$1,809,785
2023	Corn, Oats, Peanuts, Potatoes, Soybeans	Excess Moisture/Precip/Rain	$214,035
2024	Peanuts, Potatoes	Excess Moisture/Precip/Rain	$113,987

	Total	**$7,240,769.59**

Source: USDA Risk Management Agency, 2024 https://www.rma.usda.gov/

Probability of Future Occurrences

Very High - Based on data from FEMA, the NCEI database and local accounts, from 1996 to 2017, there were 50 records of flood or flash flood events over a 22-year period. The average number of flood and flash flood events calculates to 2.3 per year.

Magnitude/Severity

Significant - The floodplain extends into some populated areas of the planning area indicatingthat some property damage from riverine flooding will occur during larger

events. The most frequent type of flooding and damages are as a result of the frequent flash flood events. These are especially problematic in areas where development increases the rate of water flow and decreases the ability for water to be absorbed into the ground.

Changing Future Conditions

As previously noted in Chapter 2, precipitation along the northern Gulf Coast has increased annually and in summer. Increases in rainfall frequency and intensity are likely to put additional stress on natural hydrological systems and stormwater systems. Flood-prone areas should be prepared for a potential increase in facility closures and/or damages, as well as an increase in public demand for flood response and assistance. Natural features that experience repeated flooding may manifest changes in the form of stream bank instability and changing shoreline, floodplain, and wetland boundaries. Baldwin County may also wish to plan for the potential loss of cropland and damage to both private property and public infrastructure such as bridges.

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

Flood Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Partial	Very High	Significant	High

3.2.2 Flooding – Stormwater/Localized

Description

Localized stormwater flooding can also occur throughout Baldwin County. Localized stormwater flooding occurs when heavy rainfall and an accumulation of runoff overburden the stormwater drainage system. The cause of localized flooding within Baldwin County can be attributed to a number of factors, including its low elevation, relatively flat terrain, close proximity to the coast, tides, abundance of water features, and the amount of developed and impervious land, which limits ground absorption and increases surface water runoff. Localized flooding may be also caused by the following maintenance related issues:

- ***Clogged Inlets*** – debris covering the asphalt apron and the top of grate at catch basin inlets may contribute to an inadequate flow of stormwater into the system which may cause flooding near the structure. Debris within the basin itself may also reduce the efficiency of the system by reducing the carrying capacity.

- ***Blocked Drainage Outfalls*** – debris blockage or structural damage at drainage outfalls may prevent the system from discharging runoff, which may lead to a back-up of stormwater within the system.

- ***Improper Grade*** – poorly graded asphalt around catch basin inlets may prevent stormwater from entering the catch basin as designed. Areas of settled asphalt may create low spots within the roadway that allow for areas of ponded water.

Geographic Location

Community Wide – Stormwater infrastructure is maintained by the Baldwin County Highway Department and encompasses over 1,600 miles of dirt, gravel, and paved roads. Additionally, all subdivision plan submittals must include stormwater design calculations as described in the “Baldwin County Highway Department Stormwater Calculations, Submittal Requirements” and include written narrative that describes in detail the existing and proposed drainage patterns and characteristics of the proposed development as well as the proposed method of stormwater management to be used.

Figure 3.4 presents the location of all County maintained roadways.

Previous Occurrences

Areas of localized flooding, as provided by the Baldwin County Highway Department, are presented in Table 3.8 and include roadway locations that have experienced damage from previous flood events such as road, bridge, culvert, and abutment washouts.

Figure 3.4 Localized Flooding Locations

Table 3.8 Localized Flooding Locations

Roadway	Description
ARD RD	S OF BREWER RD
BOOTHE RD	TRIPLE PIPE
BOYNTON RD	AT 10097
BRINKS WILLIS RD	AT 20512
CHAROLAIS RD	E OF GRANTHAM RD
COUNTY RD 36	1,050 ft east of 59
COUNTY RD 10	200FT W OF WINDY WILLOW LOOP
COUNTY RD 10	800FT W OF COUNTY RD 49
COUNTY RD 10	800FT W OF COUNTY RD 49
COUNTY RD 12 S	W OF COUNTY RD 65
COUNTY RD 12 S	300FT E ROY WATERS RD
COUNTY RD 13	S OF 32 @ THOROUGHBRED RUN
COUNTY RD 16	BT 17252-17746
COUNTY RD 19	AT CARVER RD
COUNTY RD 20	E OF SWIFT CHURCH RD
COUNTY RD 24	EAST OF SR 181
COUNTY RD 24	EAST OF COUNTY RD 13
COUNTY RD 24	WEST OF GREENO
UNDERWOOD RD	E OF GEORGE YOUNCE RD
COUNTY RD 26	BW 27001-27553
COUNTY RD 26	AT 15847
MAGNOLIA SPRINGS HWY	AT 10597
COUNTY RD 28	500FT W OF HICKORY ST
COUNTY RD 28	W OF MIKKELSEN RD
COUNTY RD 28	W OF GEORGE YOUNCE RD
COUNTY RD 28	800FT W OF COUNTY RD 55
COUNTY RD 28	300 FT W OF COUNTY RD 55
COUNTY RD 28	200FT E OF RED STAR DR
COUNTY RD 28	500 FT 3 COUNTY RD 9
COUNTY RD 32	500' EAST OF SR 181
COUNTY RD 32	BETWEEN COUNTY RD 3 & 98
COUNTY RD 32	E COUNTY RD 13
COUNTY RD 32	CULVERT ON UNNAMED CREEK
COUNTY RD 32	W OF COUNTY RD 83
COUNTY RD 32	W OF COUNTY RD 83
COUNTY RD 32	E OF RESMONDO DR

Roadway	Description
COUNTY RD 85	N OF WALTER WALLACE RD
COUNTY RD 87	AT 12149
COUNTY RD 87	S OF BRUHN RD
COUNTY RD 87	E OF ROSE RD
COUNTY RD 87	S OF MERCHANT LN
COUNTY RD 87	N BLACK WATER BRIDGE
COUNTY RD 9	N OF MILLER LN
COUNTY RD 9	AT POLECAT CREEK
COUNTY RD 91	AT CARRIER DR
COUNTY RD 91	AT 12181
COUNTY RD 91	N OF W MAIDMONT LN
COUNTY RD 93	13161
COUNTY RD 95	N OF TOTSCH LN
COUNTY RD 95	S OF 98
COUNTY RD 95	S OF BURKHARDT LN
COUNTY RD 95	S OF LEITERMAN RD
COUNTY RD 95	AT COUNTY RD 32
COUNTY RD 95	N OF COMSTOCK
COUNTY RD 97	AT 12291
COUNTY RD 99	PETERSON BRANCH BRIDGE
COUNTY RD 99	S OF CARRIER DR
COUNTY RD 99	N OF COYLE LN
COUNTY RD 99	BUENA VISTA DR
E RIVER RD N	250 ft N of Heidelberg Rd
EAST SILVERHILL AVE	EAST OF HUBBARD RD
FEELY RD	BW 26575-26537
FISH RIVER RD	200FT S OF MANNICH LN
FISH TRAP RD	BT 27815-28155
GEAN RD	E OF ALBRITON RD
HAMMOCK RD	BT 9001-9499
HEIDELBERG RD	BETWEEN 19058-19398
HEIDELBERG RD	525' N of BC300-401
JUNIPER LN	OFF COUNTY RD 9
JUNIPER ST N	N OF SELLERS LN
KENDRICK RD	EAST OF COUNTY RD 65
KICHLER CIR N	W OF COUNTY RD 87

Roadway	Description	Roadway	Description
COUNTY RD 33	SOUTH OF COMALANDER RD	KICHLER CIR W	BT 13401-13829
LEHMAN RD	W OF HARMS RD	KLEINSCHMIDT RD	E OF COUNTY RD 83
COUNTY RD 36	E OF BRYANT LN	MALKOSKIE RD	BT 29167-29799
COUNTY RD 38	W OF COMMUNITY LN	MCLEOD BLVD	
COUNTY RD 48	WEST OF COUNTY RD9	MIFLIN CREEK RD	AT MIFLIN RD
COUNTY RD 48	E OF BLUEBERRY LN	MIFLIN RD	W MIFLIN CREEK RD
COUNTY RD 48	WEST OF JACKSON LN	STUCKI RD	N OF COUNTY RD 20
COUNTY RD 48	BETWEEN SNARR RD & JACKSON LN	OLD BATTLES RD	TRIPLE PIPE
MAGNOLIA SPRINGS HWY	AT MAREM DR	OLD BATTLES RD	WEST OF SECTION ST.
COUNTY RD 49 S	AT 16313	RADA RD	S OF WEST BLVD
COUNTY RD 52	EAST OF ROCKWELL RD	RIVER PARK RD	N CHAMPION RD
COUNTY RD 52	AT SILVER CREEK CULVERT	SANBORN AVE	BETWEEN #20300-20398
COUNTY RD 54	BETWEEN HILL RD & FORLAND RD	SCENIC 98	BETWEEN 17583-17221
COUNTY RD 54	WEST OF CR 49 & PERONE CREEK	SECTION ST	S OF BATTLES RD
COUNTY RD 55	N OF RHODES LN	SELLERS LN	AT 20447
COUNTY RD 69	EAST OF COUNTY RD 69	SOLDIERS CREEK RD	BW 9001-9329
COUNTY RD 64	W OF COUNTY RD 65	STUCKI RD	BW 11300-11520
COUNTY RD 65	S OF ACCESS DR	TWIN BEECH RD	CULVERT
COUNTY RD 68	E OF PHILLIPS PLACE	TWIN BEECH RD	E OF COUNTY RD 13
COUNTY RD 71 EXT	BT 18501-18897	VAUGHN RD	AT 19403
COUNTY RD 71	N OF COUCH PLANT RD	W MAIDMONT LN	AT 31401
COUNTY RD 73	S OF COUNTY RD 32	WOERNER RD	W COUNTY RD 83
COUNTY RD 8	1500FT E OF 59	WOLF FIELD RD	S OF FISH TRAP RD
COUNTY RD 83	S OF WOERNER RD	WOODLAND LN	LILLIAN

Probability of Future Occurrences

Very High - Due to the low elevations, a flat terrain, a consistent level of annual precipitation and the tidal influence on drainage resulting from heavy rainstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding.

Magnitude/Severity

Moderate – Stormwater/localized flood events result as land loses its ability to absorb rainfall as it is converted from fields or woodlands to roads, buildings, and parking lots. Urbanization increases runoff two to six times over what would occur on undeveloped terrain. During periods of urban flooding, streets can become swift moving rivers.

The FMPC determined that the magnitude/severity of this hazard would have moderate potential for economic losses and structure damage.

Changing Future Conditions

Climate change and sea level rise have the potential to affect localized flooding in Baldwin County. The intensity of individual rainfall events is likely to increase, which may overwhelm stormwater drainage systems.

Flooding: Stormwater/Localized Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Community-Wide	Very High	Moderate	Moderate

3.2.3 Hurricane and Tropical Storms

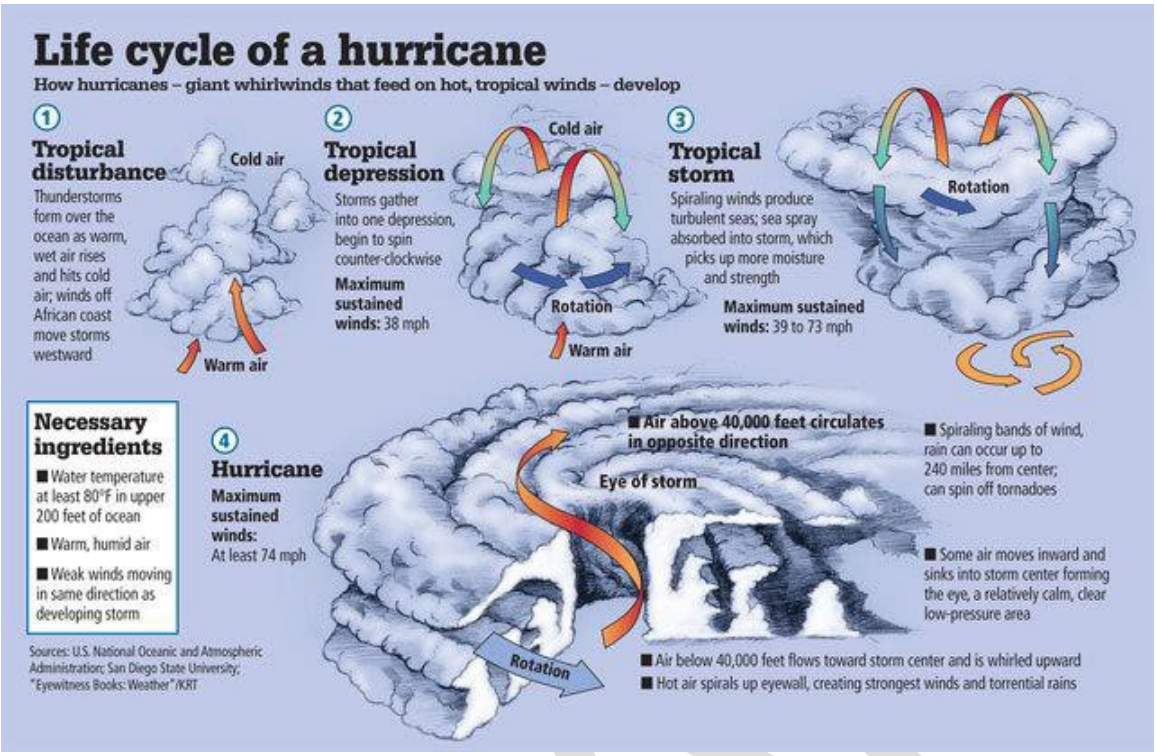
Description

A hurricane is a type of tropical cyclone or severe tropical storm that forms in the southern Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and in the eastern Pacific Ocean. A typical cyclone is accompanied by thunderstorms, and in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface. All Atlantic and Gulf of Mexico coastal areas are subject to hurricanes. The Atlantic hurricane season lasts from June to November, with the peak season from mid-August to late October.

Hurricanes evolve through a life cycle of stages from birth to death. While hurricanes pose the greatest threat to life and property, tropical storms and depressions also can be devastating. Floods from heavy rains and severe weather, such as tornadoes, can cause extensive damage and loss of life. A tropical disturbance can grow to a more intense stage through an increase in sustained wind speeds. The progression of a tropical disturbance is described below and can be seen in Figure 3.5.

- ***Tropical Disturbance*** - A discrete tropical weather system of apparently organized convection -- generally 100 to 300 nmi in diameter -- originating in the tropics or subtropics, having a non-frontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field.
- ***Tropical Depression -*** a tropical cyclone in which the maximum 1-minute sustained surface wind is 33 knots (38 mph) or less. When viewed from a satellite, tropical depressions appear to have little organization. However, the slightest amount of rotation can usually be perceived when looking at a series of satellite images. Instead of a round appearance similar to hurricanes, tropical depressions look like individual thunderstorms that are grouped together.
- ***Tropical Storm -*** a tropical cyclone in which the maximum 1-minute sustained surface wind ranges from 34 to 63 knots (39 to 73 mph) inclusive. As the storm transitions from tropical depression to tropical storm, the storm itself becomes more organized and begins to become more circular in shape – resembling a hurricane.
- ***Hurricane -*** A hurricane is a tropical cyclone in which the maximum sustained surface wind is 74 mph or more. Hurricanes are classified by intensity into one of five categories on the Saffir-Simpson Hurricane Wind Scale as shown in Table 3.9. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous, however, and require preventative measures.

Figure 3.5 Life Cycle of a Hurricane



Source: NOAA, San Diego State University; "Eyewitness Books: Weather"

Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf and the shape of the coastline in the landfall region. The following describes the characteristics of each category storm from the Saffir-Simpson Hurricane Wind Scale Extended Table:

Table 3.9 – Saffir-Simpson Hurricane Wind Scale, 2012

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
3 (Major)	111-129 mph 96-112 kt 178-208 km/h	Devastating damage will occur: Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (Major)	130-156 mph 113-136 kt 209-251 km/h	Catastrophic damage will occur: Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (Major)	157 mph or higher 137 kt or higher 252 km/h or higher	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA National Hurricane Center; https://www.nhc.noaa.gov/aboutsshws.php

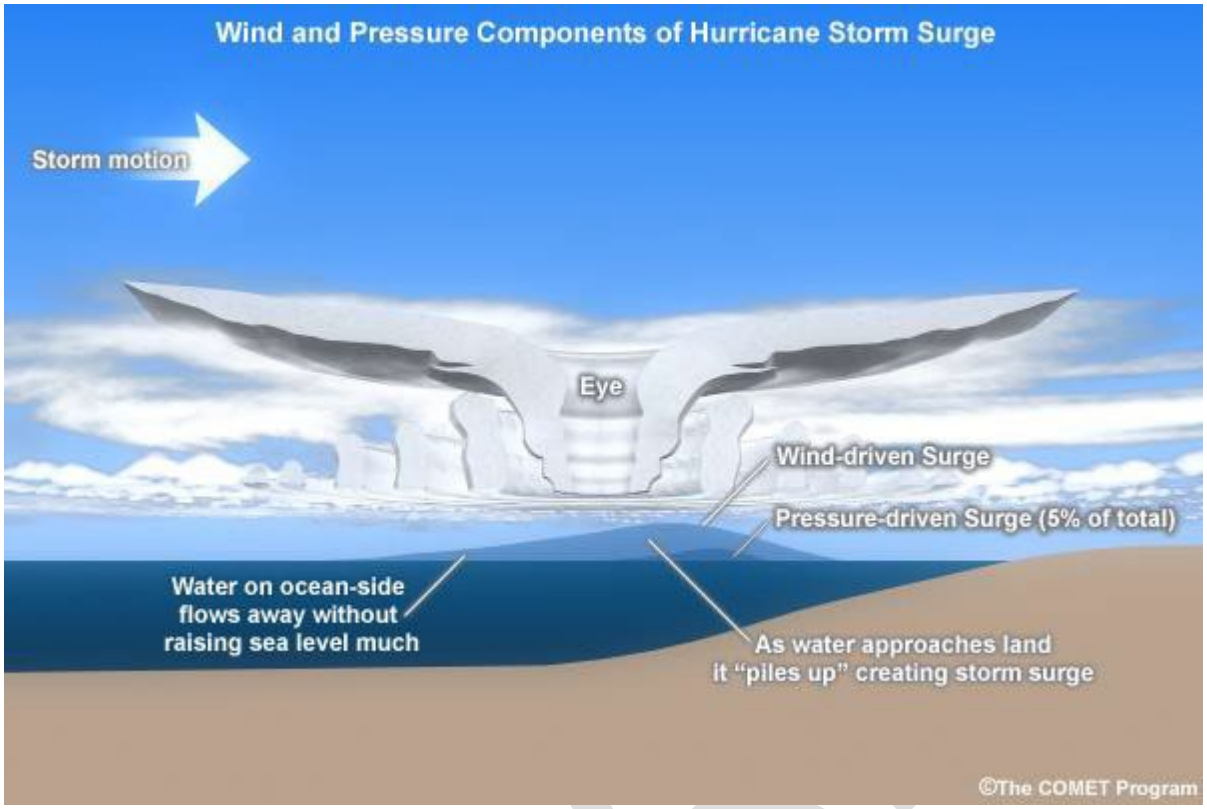
Hurricanes can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can produce winds exceeding 157 miles per hour as well as tornadoes and microbursts. Additionally, hurricanes can create storm surges along the coast and cause extensive damage from heavy rainfall. Floods and flying debris from the excessive winds are often the deadly and destructive results of these weather events. Flash flooding can also occur due to intense rainfall.

Storm Surge

The greatest potential for loss of life related to a hurricane is from the storm surge. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm as shown in Figure 3.6. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level to heights impacting roads, homes and other critical infrastructure. In addition, wind driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides.

The maximum potential storm surge for a particular location depends on a number of different factors. Storm surge is a very complex phenomenon because it is sensitive to the slightest changes in storm intensity, forward speed, size (radius of maximum winds-RMW), angle of approach to the coast, central pressure (minimal contribution in comparison to the wind), and the shape and characteristics of coastal features such as bays and estuaries. Other factors which can impact storm surge are the width and slope of the continental shelf. A shallow slope will potentially produce a greater storm surge than a steep shelf.

Figure 3.6 Components of Hurricane Storm Surge

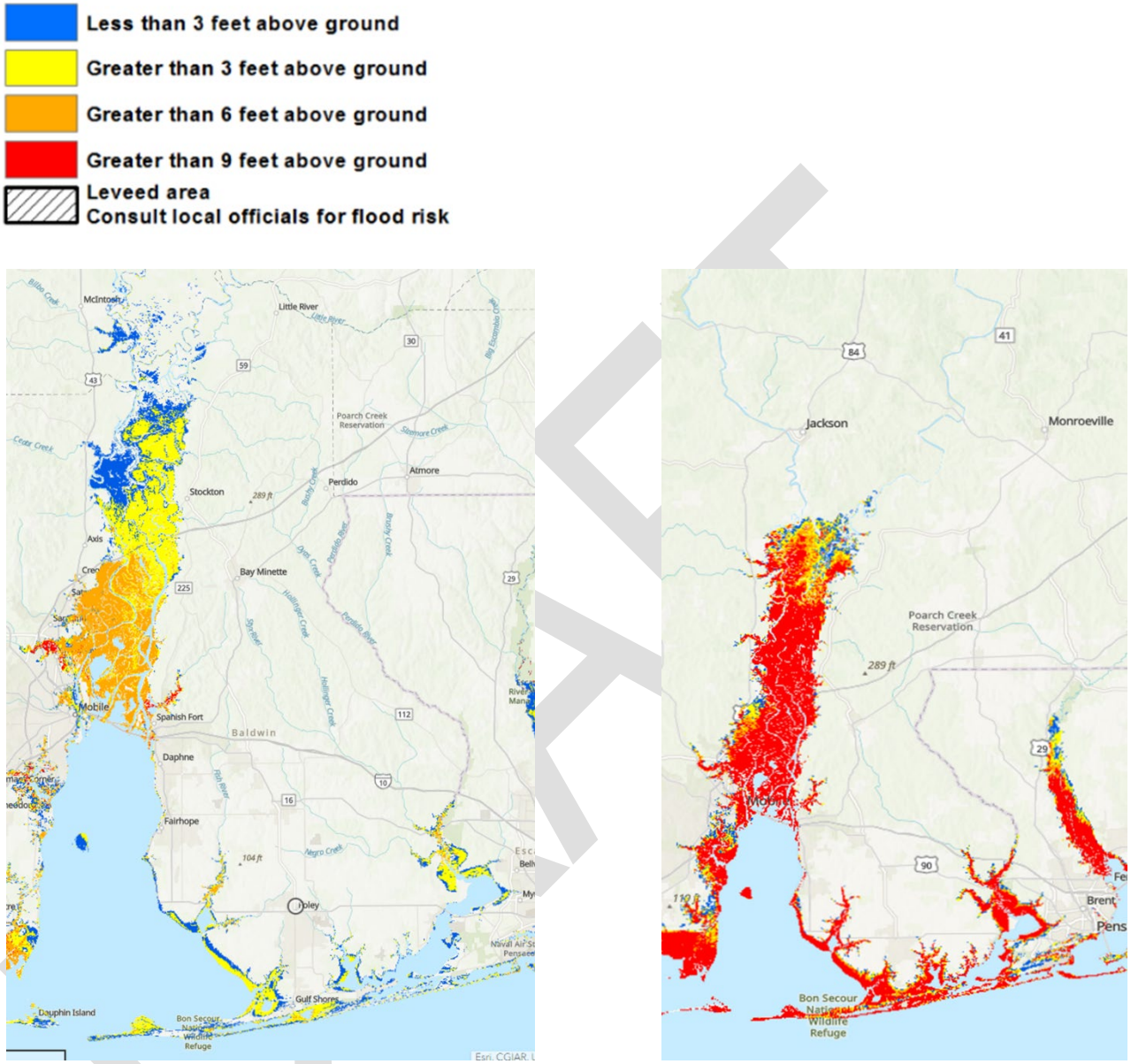


Storm Surge Mapping

The Sea, Lake and Overland Surges from Hurricanes (SLOSH) model is a computerized numerical model developed by the National Weather Service (NWS) to estimate storm surge heights resulting from historical, hypothetical, or predicted hurricanes by taking into account the atmospheric pressure, size, forward speed, and track data. These parameters are used to create a model of the wind field which drives the storm surge. The SLOSH model consists of a set of physics equations which are applied to a specific locale's shoreline, incorporating the unique bay and river configurations, water depths, bridges, roads, levees and other physical features.

Anticipated SLOSH model surge elevations for Category 1-5 hurricanes are shown for Baldwin in Figure 3.7. The feature set depicting surge zones in this figure was created using data derived from National Hurricane Center SLOSH model runs on all the NOAA SLOSH basins throughout Alabama. The runs create outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data. The MOMs are used in this surge model.

Figure 3.7 Storm Surge for Category 1 and 5Hurricanes



Geographic Location

Community-wide - All of unincorporated Baldwin County is subject to the risk of hurricane winds. The coastal areas are at a greater risk for high winds and storm surge, as presented in Figure 3.8.

Previous Occurrences

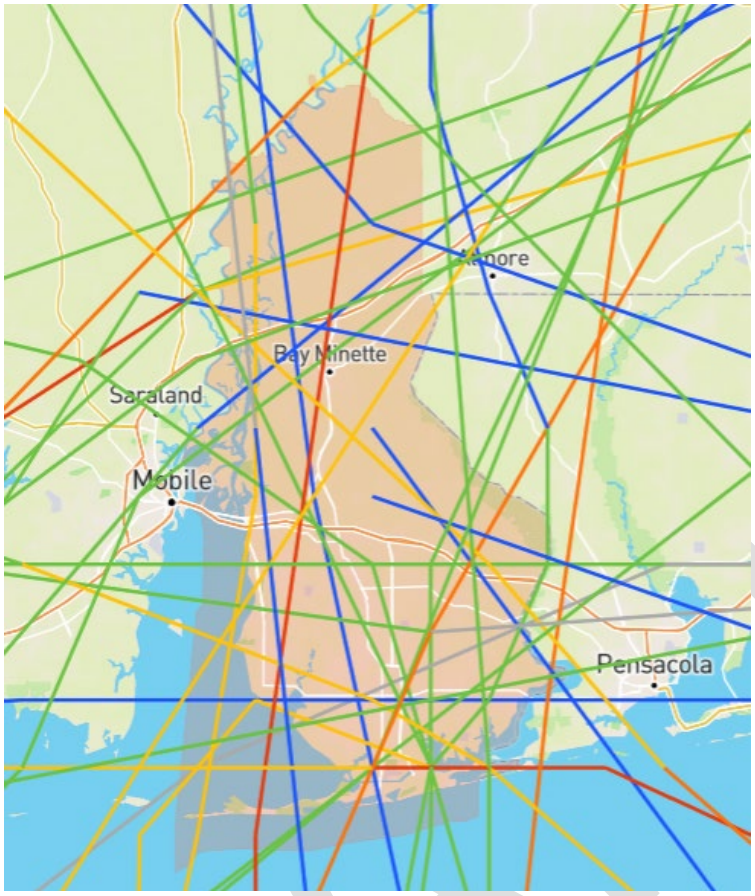
Table 3.10 shows flood events from causes other than hurricanes reported by the NCEI since 1950 for Baldwin County.

Table 3.10 Components of Hurricane Storm Surge

Location	Date	Event Type	Injuries / Deaths	Property Damage	Crop Damage
UPPER BALDWIN (ZONE)	7/18/1997	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	7/18/1997	Hurricane (typhoon)	0/1	$60,500,000	$2,500,000
UPPER BALDWIN (ZONE)	9/1/1998	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	9/1/1998	Hurricane (typhoon)	0/0	$5,000	$0
UPPER BALDWIN (ZONE)	9/25/1998	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	9/25/1998	Hurricane (typhoon)	0/0	$82,000,000	$0
LOWER BALDWIN (ZONE)	9/21/2000	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	9/21/2000	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	8/4/2001	Tropical Storm	0/0	$40,000	$0
UPPER BALDWIN (ZONE)	8/4/2001	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	9/12/2002	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	9/12/2002	Tropical Storm	0/0	$40,000	$0
LOWER BALDWIN (ZONE)	9/24/2002	Tropical Storm	0/0	$2,000,000	$0
UPPER BALDWIN (ZONE)	9/24/2002	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	10/2/2002	Hurricane (typhoon)	0/0	$75,000	$0
UPPER BALDWIN (ZONE)	10/2/2002	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	9/13/2004	Hurricane (typhoon)	0/0	$0	$0
UPPER BALDWIN (ZONE)	9/13/2004	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	10/9/2004	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	10/9/2004	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	6/10/2005	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	6/10/2005	Tropical Storm	0/0	$1,500,000	$0
LOWER BALDWIN (ZONE)	7/5/2005	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	7/5/2005	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	7/9/2005	Hurricane (typhoon)	0/0	$0	$0

Location	Date	Event Type	Injuries / Deaths	Property Damage	Crop Damage
LOWER BALDWIN (ZONE)	7/9/2005	Hurricane (typhoon)	0/0	$0	$0
UPPER BALDWIN (ZONE)	7/10/2005	Hurricane (typhoon)	0/0	$0	$0
UPPER BALDWIN (ZONE)	8/27/2005	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	8/27/2005	Hurricane (typhoon)	0/0	$0	$0
LOWER BALDWIN (ZONE)	8/23/2008	Tropical Depression	0/0	$0	$0
UPPER BALDWIN (ZONE)	8/23/2008	Tropical Depression	0/0	$0	$0
LOWER BALDWIN (ZONE)	8/31/2008	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	8/31/2008	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	9/1/2008	Tropical Storm	0/0	$0	$0
UPPER BALDWIN (ZONE)	9/1/2008	Tropical Storm	0/0	$0	$0
LOWER BALDWIN (ZONE)	8/28/2012	Tropical Storm	0/0	$0	$0

Figure 3.8 NOAA Historical Hurricane Tracks, Baldwin County, AL



Source: NOAA National Hurricane Center; https://coast.noaa.gov/hurricanes/

Probability of Future Occurrences

Moderate - Based on data from FEMA, the NCEI database and local accounts, from 1996 to2017, there were 19 records of tropical storm or hurricane events over a 21-year period. The average number of flood and flash flood events calculates to 0.9 per year.

Magnitude/Severity

Significant - Hurricanes can cause catastrophic damage to coastlines and several hundred miles inland. Hurricanes can also produce winds exceeding 157 miles per hour as well as tornadoes and mircrobursts. Additionally, hurricanes can create storm surges along the coast and cause extensive damage from heavy rainfall. Floods and flying debris from the excessive winds are often the deadly and destructive results of these weather events. Flash flooding can also occur due to intense rainfall.

Changing Future Conditions

The probability of future hurricane occurrences in Baldwin County, Alabama, is significant due to its coastal location along the Gulf of Mexico. Historically, the region has been impacted by numerous major hurricanes, including notable events like Hurricane Ivan (2004), Hurricane Katrina (2005), and Hurricane Sally (2020). The National Oceanic and Atmospheric Administration (NOAA) and other sources suggest that Baldwin County experiences severe hurricanes roughly every 5–10 years.

The future likelihood is influenced by factors such as climate patterns, including warmer sea surface temperatures contributing to stronger and more frequent storms. Baldwin County has already seen the effects of slower-moving hurricanes like Sally, which bring higher rainfall and prolonged storm impacts, increasing overall risk
https://www.gulfshoresnews.com/historic-hurricanes-which-impacted-alabama-s-coast

This highlights the county's vulnerability to hurricanes, underlining the importance of comprehensive mitigation and preparedness measures. If you're seeking more specific recurrence intervals or risk data, the National Hurricane Center or local emergency management resources could provide detailed statistics.

Hurricane/Tropical Storm Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Community-Wide	Moderate	Significant	High

3.2.4 Coastal Bank Erosion

Description

Coastal erosion is a process whereby large storms, flooding, strong wave action, sea level rise, and human activities, such as inappropriate land use, alterations, and shore protection structures, wears away the beaches and bluffs along the coast. Erosion undermines and often destroys homes, businesses, and public infrastructure and can have long-term economic and social consequences. According to NOAA, coastal erosion is responsible for approximately $500 million per year in coastal property loss in the United States, including damage to structures and loss of land. To mitigate coastal erosion, the federal government spends an average of $150 million every year on beach nourishment and other shoreline erosion control measures.

Coastal erosion has both natural causes and causes related to human activities. Gradual coastal erosion results naturally from the very slow rise of sea-level. Severe coastal erosion can occur over a very short period of time when the shore is impacted by hurricanes, tropical storms and other weather systems. Sand is moved parallel to the shore by longshore drift and currents. Sand is continually removed by longshore currents in some areas but it is also continually replaced by sand carried in by the same type of currents. Structures such as piers or sea walls, jetties, and navigational inlets may interrupt the movement of sand. Sand can become “trapped” in one place by these types of structures. The currents will, of course, continue to flow, though depleted of sand trapped elsewhere. With significant amounts of sand trapped in the system, the continuing motion of currents (now deficient in sand) results in erosion. In this way, human construction activities that result in the unnatural trapping of sand have the potential to result in significant coastal erosion.

Erosion rates and potential impacts are highly localized. Severe storms can remove wide beaches, along with substantial dunes, in a single event. In undeveloped areas, these high recession rates are not likely to cause significant concern, but in some heavily populated locations, one or two feet of erosion may be considered catastrophic (NOAA, 2014).

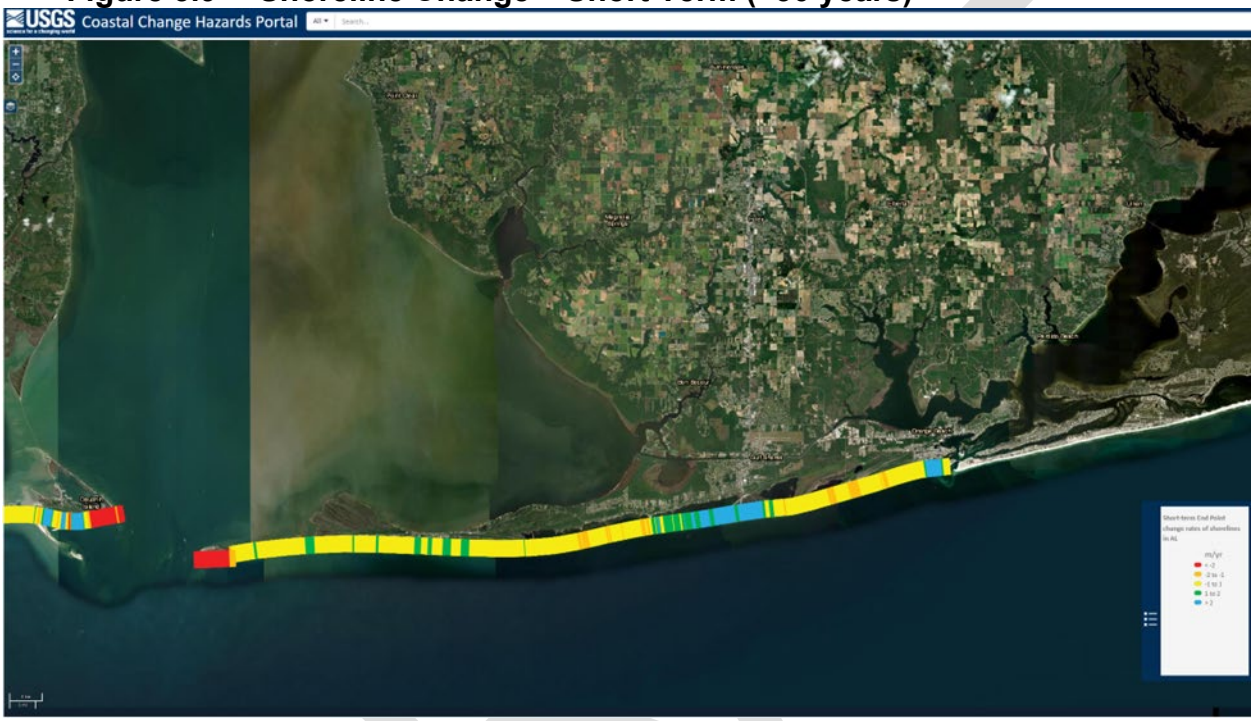
Geographic Location

Minimal - The total area identified as a coastal high hazard area (10.4 sq. mi.) is less than 10-percent of the planning area, 1,503.24 square miles.

Previous Occurrences

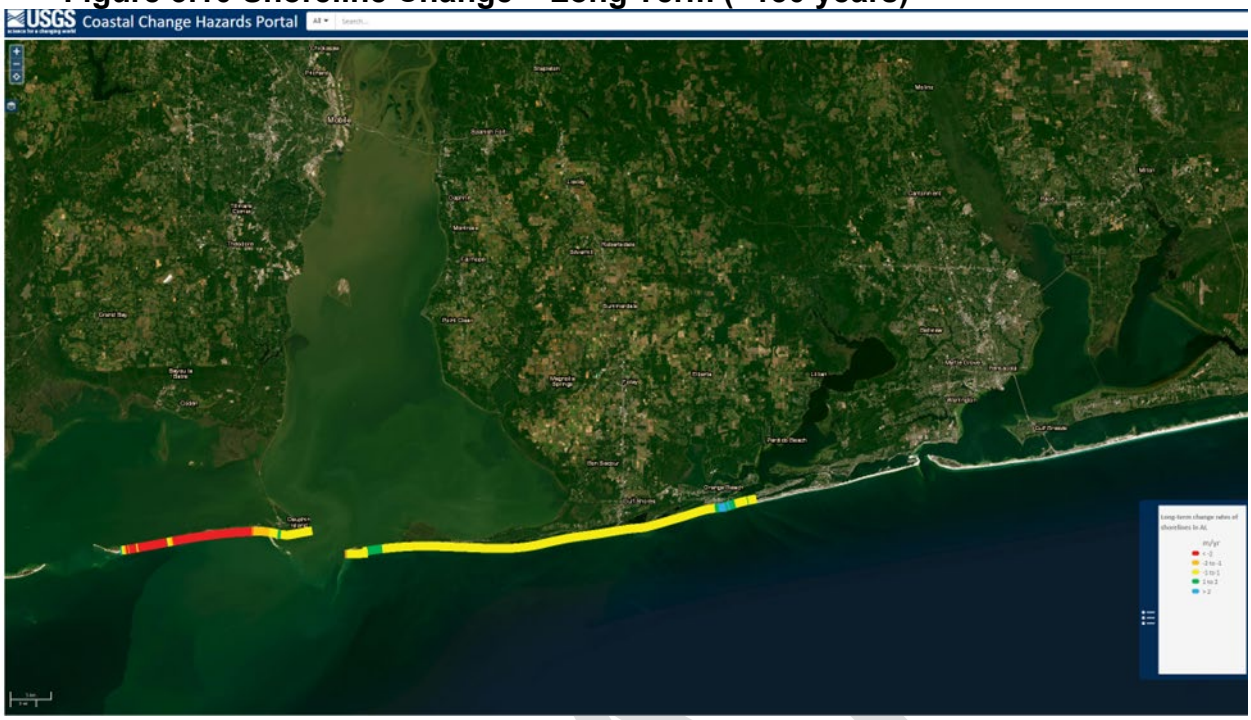
Figures 3.9 and 3.10 depict Baldwin County's short-term (<30 years) rates of shoreline change for open-ocean, sandy shorelines from 1970-2001; and long-term (78+ years) rates of shoreline change for open-ocean shorelines from the 1800's to 2008, respectively.

Figure 3.9 Shoreline Change – Short Term (~30 years)



Source: USGS Coastal Change Hazards Portal; https://marine.usgs.gov/coastalchangehazardsportal/

Figure 3.10 Shoreline Change – Long Term (~150 years)



Probability of Future Occurrences

Very High - The combination of large waves and surges and low coastal elevations makes the entire gulf region vulnerable to significant coastal erosion during storms. The USGS defines probabilities of coastal change due to collusion (when waves reach the base of the dune), overwash (when waves and surge exceed the dune crest elevation), and inundation (when the dune crest and beach is completely submerged).

For direct landfall of the lowest category hurricane (category 1), 100 percent of Baldwin County beaches are very likely to experience dune erosion due to collision, 69 percent of the coastal areas are vulnerable to overwash, and 4-percent of the coast are likely to be inundated. For a category 3 hurricane landfall, again 100 percent of Baldwin County beaches are very likely to experience dune erosion due to collision, 100 percent of beaches are vulnerable to overwash, and 74-percent of the coast is likely to be inundated. For a category 5 hurricane landfall, there is a 100-percent probability for coastal change due to collusion, overwash, and inundation.

Magnitude/Severity

Moderate - While the coastal beaches of Baldwin County serve as a natural barrier between the ocean and the inland community, infrastructure, ecosystems, and natural resources, this dynamic environment changes in response to winds, waves, and currents. During flood hazard events, large waves may erode beaches and high storm surges may shift the erosive force of the waves higher on the beach. Structures built on or a near a dune can be undermined during wave attack and subsequent erosion. The FMPC determined that the magnitude/severity of this hazard would have moderate potential for economic losses and structure damage.

Changing Future Conditions

Sea-level rise will raise all tide levels, from low tide to storm surge. Wave action at higher tide levels may cause erosion of sandy beaches as well as the banks of tidally influenced rivers. Higher storm surges, which may be accompanied by stronger storm winds, could wash over the tops of sand dunes, flooding the burrows of dune-nesting animals. The combined effects of wind and waves could damage dunes, leaving the beachfront more vulnerable (UF/IFAS Extension, 2013).

Coastal Bank Erosion Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Minimal	Very High	Moderate	Moderate

3.2.5 Dam Failure

Description

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. A dam failure is the collapse, breach, or other failure resulting in downstream flooding.

A dam impounds water in the upstream area, referred to as the reservoir. Theamount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

The failure of dams could result in injuries, loss of life, or damage to property, the environment, and the economy. Dams often serve multiple purposes, one of which may be flood control. Severe flooding and other storms can increase the potential that dams will be damaged and fail as a result of the physical force of the flood waters or overtopping.

Dams are usually engineered to withstand a flood with a computed risk of occurrence.If a larger flood occurs, then that structure will likely be overtopped. If during the overtopping, the dam fails or is washed out, the water behind is released as a flash flood. Failed dams can create floods that are catastrophic to life and property, in part because of the tremendous energy of the released water.

The hazard potential for dam failure is classified according to the following definitions accepted by the Interagency Committee on Dam Safety:

- **High Hazard Dam**—A dam located in an area where failure could result in any of the following: extensive loss of life, damage to more than one home, damage to industrial or commercial facilities, interruption of a public utility serving a large number of customers, damage to traffic on high-volume roads that meet the requirements for hazard class C dams or a high-volume railroad line, inundation ofa frequently used recreation facility serving a relatively large number of persons, or two or more individual hazards described for significant hazard dams
- **Significant Hazard Dam**—A dam located in an area where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet certain requirements, damage low-volume railroad tracks, interrupt the use or service of a utility serving a small number of customers, or inundate recreation facilities, including campground areas intermittently used for sleeping and serving a relatively small number of persons
- **Low Hazard Dam**—A dam located in an area where failure could damage only farm

or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low-volume roads that meet the requirements for low hazard dams

Dam failures can result from any one or a combination of the following causes:

- Prolonged periods of rainfall and flooding, which causes most failures;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments;
- Improper design, including the use of improper construction materials and construction practices;
- Negligent operation, including failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway;
- Landslides into reservoirs, which cause surges that result in overtopping;
- High winds, which can cause significant wave action and result in substantial erosion; and
- Earthquakes, which typically cause longitudinal cracks at the tops of embankments and weaken the entire structures.

Geographic Location

According to the National Inventory of Dams, there are 20 dams located within the unincorporated areas of Baldwin County. All of the dams are privately owned and not regulated nor inspected by a state authority. Table 3.11 and Figure 3.11 summarize the dams located within Baldwin County.

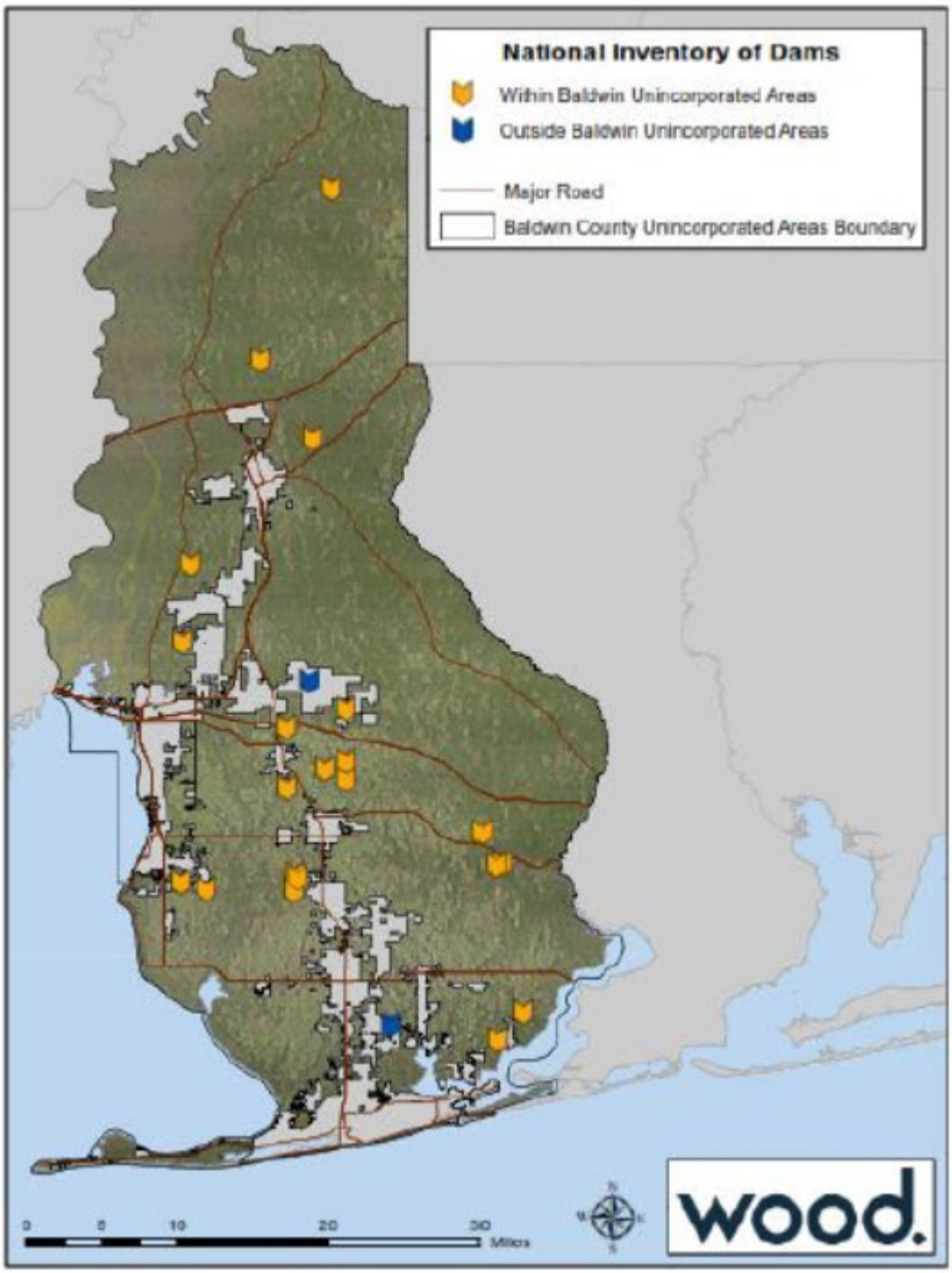
Table 3.11 Dams Located within Unincorporated Baldwin County, 2024

Dam	River	National Dam Inventory Identification Number
Baroco Lake Dam No.	Tr Soldier Creek	AL01377
Bob Pace	Tr-Blackwater River	AL00027
Branchland Lake Dam	Cowpen Creek-Offstream	AL01373
Calvin Childers Lake	Tr Polecat Creek	AL01372
Calvin Childers Lake	Tr Polecat Creek	AL01371
Childress Dam	Tr-Blackwater River	AL01984
Cook Lake Dam	Tr Blackwater River	AL01376
Cooper Number One	Mill Creek	AL00029
Corte Dam	Fly Creek	AL01985
Crosby Lumber	Tr Mccurtin Creek	AL00036
Deep South Girl Scouts	Aikin Ck	AL01986
J P Bertolli	Tr-Styy River	AL00031
John Q Kendrick	Tr-Styx River	AL00035
Lake Bobo	Tr-Joes Ck	AL01987
Miles Neumann	Tr-Spring Br	AL01988

Dam	River	National Dam Inventory Identification Number
Patterson	Seven Mile Ck	AL00032
Paul Childress Lake	Tr Blackwater River	AL01375
Raynagua	Perone Branch	AL00030
Stacey Lake Dam	Tr Whitehouse Creek	AL01370
Wynn Brothers Lake	Tr Polecat Creek	AL01374

Source: USACE National Inventory of Dams, http://nid.usace.army.mil

Figure 3.11 Dams Located within Unincorporated Baldwin County, 2024



Previous Occurrences

There have been no reported previous occurrences of dam failure in or impacting the planning area.

Probability of Future Occurrences

Because dam failure is generally a secondary effect of other causes and hazards, calculating probability is difficult. Based on the past performance of these structures during flooding conditions, the FMPC determined that the probability of this hazardis "very low."

Magnitude/Severity

Although there have been no documented failures of dams that could impact the planning area and the probability of failure is low, if failure were to occur, people and structures in the inundation path would be at risk. There is only one dam in the planning area categorized as significant hazard. All other dams are low hazard dams where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low-volume roads. The FMPC determined that the magnitude/severity of this hazard is "slight."

Changing Future Conditions

Since dam failure is heavily reliant on other causes like design error, inadequate maintenance and upkeep, changing conditions are not directly related to dam failure. However, increased rainfall and flooding events are predicted to increase in future occurrences, so it could potentially put a stress on dams and increase the likelihood of dam failure.

Dam Failure Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Minimal	Very Low	Slight	Low

3.2.6 Changing Future Conditions and Sea Level Rise

Description

Changing future conditions, or climate change, refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014). Climate change is a natural occurrence in which the earth has warmed and cooled periodically over geologic time. The recent and rapid warming of the earth over the past century has been cause for concern, as this warming is very likely due to the accumulation of human-caused greenhouse gases, such as CO2, in the atmosphere (IPCC, 2007). This warming is occurring almost everywhere in the world, which suggests a global cause rather than changes in localized weather patterns.

Geographic Location

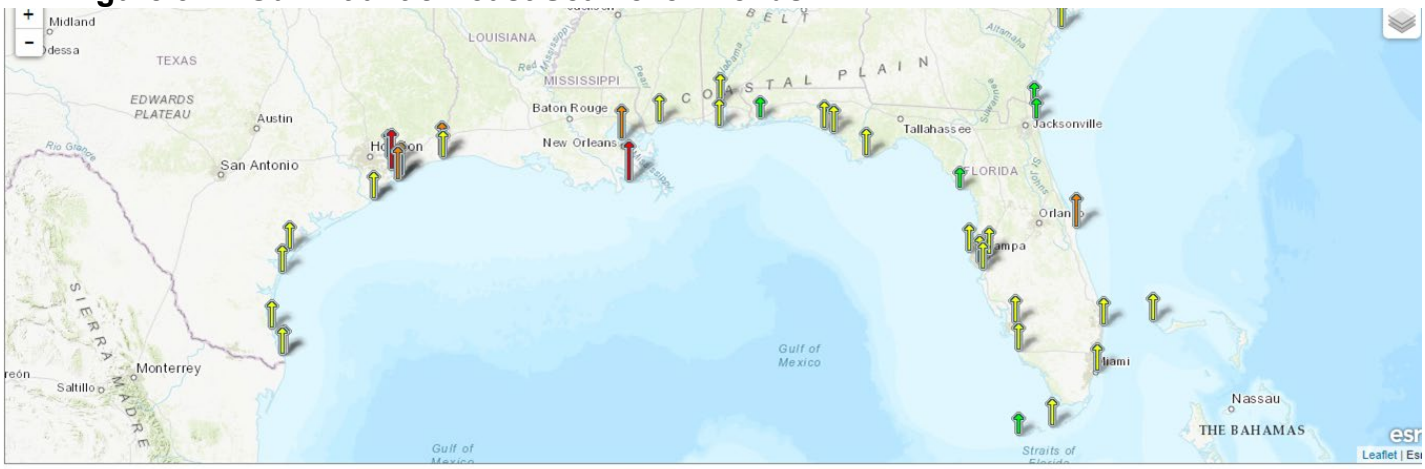
Minimal - The total area identified as a coastal high hazard area (10.4 sq. mi.) is less than 10-percent of the planning area, 1,503.24 square miles.

Previous Occurrences

There are generally two separate mechanics involved in global sea level rise. The first is directly attributed to global temperature increases, which warm the oceans waters and cause them to expand. The second is attributed to the melting of ice over land which simply adds water to the oceans. Global sea level rise is likely caused by a combination of these two mechanics and can be exasperated on the local level by factors such as erosion and subsidence. The rate of sea level rise has varied throughout geologic history, and studies have shown that global temperature and sea level are strongly correlated.

The Center for Operational Oceanographic Products and Services has been measuring sea level for over 150 years, with tide stations operating on all U.S. coasts. Changes in Mean Sea Level (MSL), either a sea level rise or sea level fall, have been computed at 128 long-term water level stations using a minimum span of 30 years of observations at each location. These measurements have been averaged by month to remove the effect of higher frequency phenomena (e.g. storm surge) in order to compute an accurate linear sea level trend. Figure 3.12 illustrates regional trends in sea level from NOAA.

Figure 3.12 Gulf/Atlantic Coast Sea Level Trends



The map above illustrates relative sea level trends , with arrows representing the direction and magnitude of change. Click on an arrow to access additional information about that station.

Relative Sea Level Trends

mm/yr (feet/century)

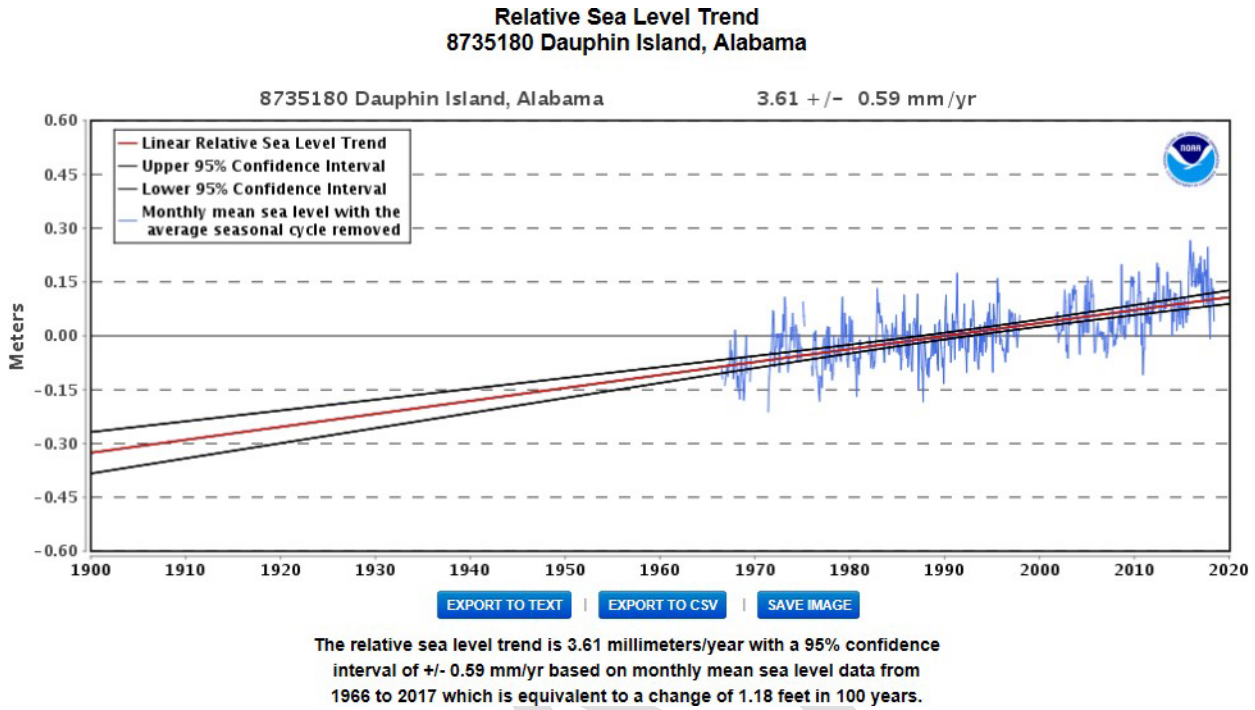
Above 9 (Above 3)	6 to 9 (2 to 3)	3 to 6 (1 to 2)	>0 to 3 (0 to 1)	-3 to 0 (-1 to 0)	-6 to -3 (-2 to -1)	-9 to -6 (-3 to -2)	Below -9 (Below -3)

The Center for Operational Oceanographic Products and Services has been measuring sea level for over 150 years, with tide stations of the National Water Level Observation Network operating on all U.S. coasts. Changes in RSL, eith a rise or fall, have been computed at 142 long-term water level stations using a minimum span of 30 years of observations at each location. These measurements have been averaged by month which removes the effect of high frequency phenomena in order to compute an accurate linear sea level trend. The trend analysis has also been extended to 240 global tide stations using data from the Permanent Service for Mean Sea Level (PSMSL). This work funded in partnership with the NOAA OAR Climate Observation Division.

Source: NOAA Tides & Currents,https://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml

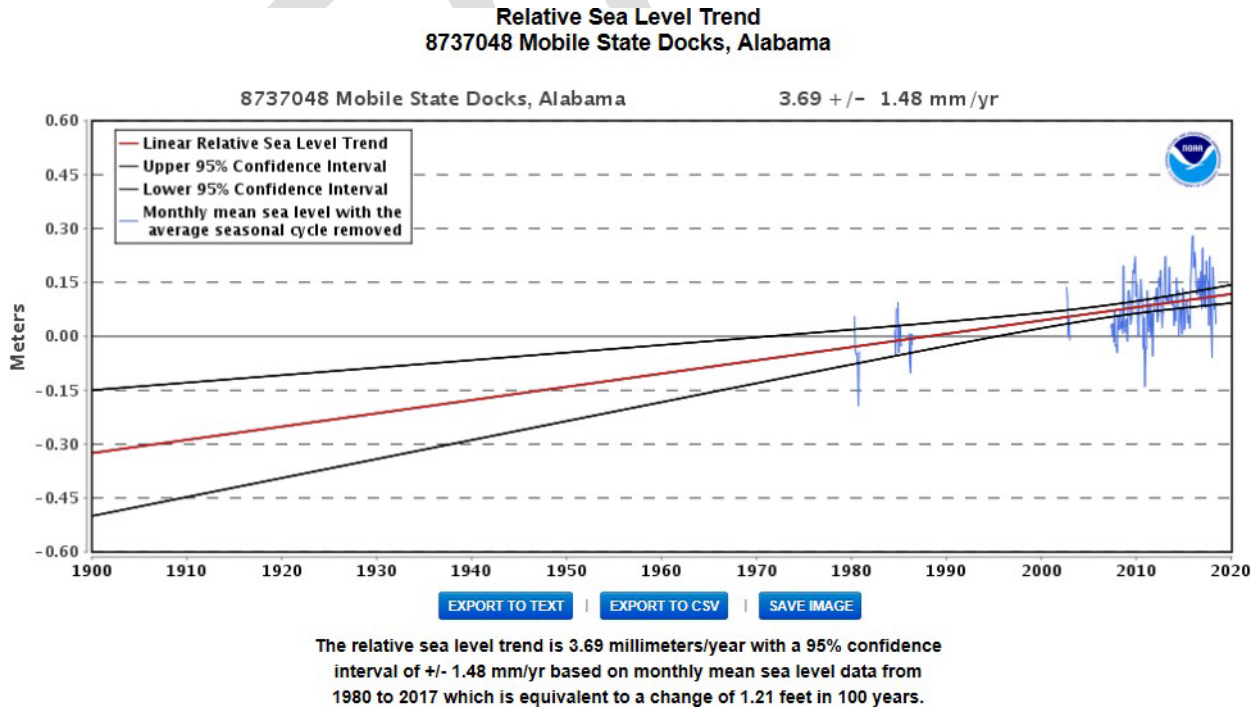
Figures 3.13 and 3.14 present the monthly mean sea level trend at NOAA's Dauphin Island and Mobile State Docks, Alabama stations without the regular seasonal fluctuations due to coastal ocean temperatures, salinities, winds, atmospheric pressures, and ocean currents. The mean sea level trend is 3.61 and 3.69 millimeters/year, respectively, with a 95% confidence interval of +/- 0.33 mm/yr based on monthly mean sea level data from 1935 to 2006 which is equivalent to a change of 1.18 and 1.21 feet, respectively, in 100 years.

Figure 3.13 Relative Sea Level Trend, Dauphin Island, Alabama



Source: NOAA Tides & Currents,https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8735180

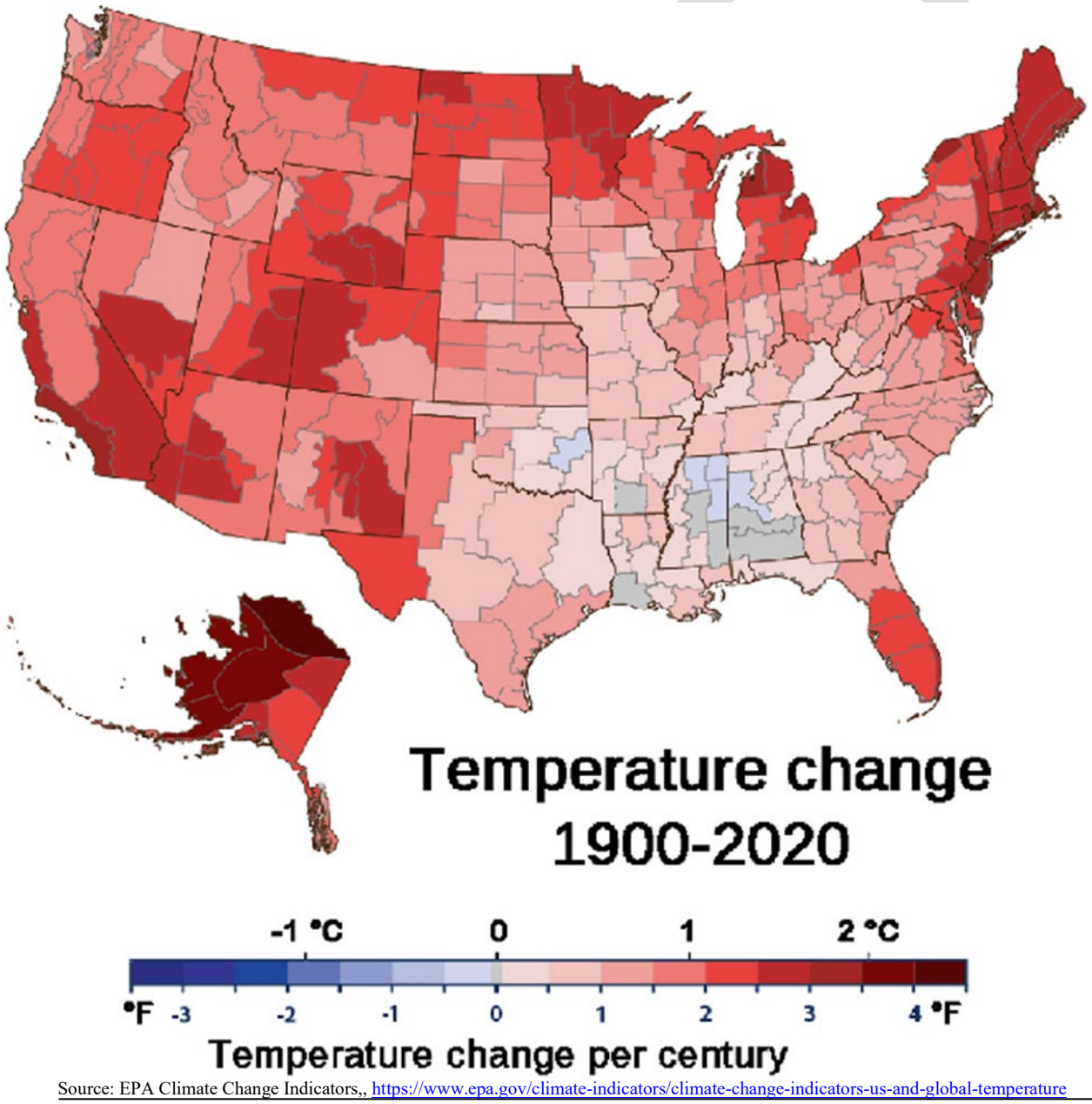
Figure 3.14 Relative Sea Level Trend, Mobile State Docks, Alabama



Source: NOAA Tides & Currents,https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8737048

Since 1901, the average surface temperature across the contiguous 48 states has risen at an average rate of 0.17°F per decade. Average temperatures have risen more quickly since the late 1970s (0.32 to 0.51°F per decade since 1979). For the contiguous United States, nine of the 10 warmest years on record have occurred since 1998, and 2012 and 2016 were the two warmest years on record. Figure 3.15 below, based on data from NOAA and prepared by the EPA, shows how annual average air temperatures have changed in various parts of the United States since 1901. The North, the West, and Alaska have seen temperatures increase the most, while some parts of the Southeast have experienced little change.

Figure 3.15 Rate of Temperature Change in the United States, 1901-2023



Source: EPA Climate Change Indicators,, https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature

www.ncei.noaa.gov.

Probability of Future Occurrences

High - Sea level rise is a certainty along the Alabama coast. The mean sea level trends measured by NOAA indicate that sea level at Dauphin Island and Mobile State Docks have increased by 1.18 and 1.21 feet, respectively, in 100 years.

Understanding trends in sea level, as well as the relationship between global and local sea level, provides critical information about the impacts of the Earth's climate on our oceans and atmosphere. Changes in sea level are directly linked to a number of atmospheric and oceanic processes. Changes in global temperatures, hydrologic cycles, coverage of glaciers and ice sheets, and storm frequency and intensity are examples of known effects of a changing climate, all of which are directly related to, and captured in, long-term sea level records. Sea levels provide an important key to understanding the impact of climate change along our coasts. By combining local rates of relative sea level change for a specific area based on observations with projections of global sea level rise, communities can begin to analyze and plan for the impacts of sea level rise for long-range planning (NOAA, 2014).

Uncertainties in sea level rise projections exist due to natural variability, limitations of existing computer models, and the inability to forecast human response in limiting greenhouse gas emissions. Therefore, projections will need to be reviewed and revised in the future as modeling capabilities improve and major findings in climate science data become available. Ultimately, it is important to understand that sea level rise is not an endpoint but rather a continuing trend, and Baldwin County should consider and plan for sea level rise in future policy decisions.

Magnitude/Severity

Slight – Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion. The population and assets projected to be exposed to coastal risks as well as human pressures on coastal ecosystems will increase significantly in the coming decades due to population growth, economic development, and urbanization (IPCC, 2014).

Sea level rise may place additional stress on aquifers (saltwater intrusion) and gravity flow stormwater and septic systems to a rising groundwater table. An elevated storm surge due to sea level rise could produce a cascade of consequences affecting things such as land use, infrastructure, facilities, waterway navigation, the local economy, public health and safety, drinking water supplies, and ecosystems.

Sea Level Rise Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Minimal	High	Slight	Moderate

3.2.7 Tsunami

Description

A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteor impacts, or onshore slope failures can cause this displacement. Tsunamis radiate outward in all directions from the point of origin and can move across entire ocean basins. When a tsunami reaches the coast, it can cause dangerous coastal flooding and powerful currents that can last for several hours or days.

Tsunamis can be generated in all of the world's oceans, inland seas, and in any large body of water. They have caused damage and deaths in coastal areas all around the world. However, certain areas are particularly prone to tsunamis due to their proximity to tsunami sources, the depth and shape of the ocean floor near the coast (bathymetry), and coastal elevation and features (topography).

Geographic Location

Minimal - The U.S. Gulf Coast is not located near a subduction zone, which is a particularly active seismic zone, where large earthquakes can produce damaging waves that threaten nearby and distant coasts. Additionally, there has not been much tsunami or seismic activity recorded in the region. However, according to the national tsunami hazard assessments conducted for the National Tsunami Hazard Mitigation Program by NOAA, evidence suggests a tsunami is possible. In 1918, an earthquake off Puerto Rico produced the only tsunami on record for the Gulf Coast. The geography of the Gulf may reduce the impact of most distant tsunamis. Geologic evidence in the Gulf of Mexico points to underwater landslides as the region's likeliest tsunami source.

Previous Occurrences

Of the 754 confirmed events in the Global Historical Tsunami Database between 1900 and 2015, approximately 78% occurred in the Pacific Ocean (around the geologically active "Ring of Fire"), 8% in the Atlantic Ocean and Caribbean Sea, 6% in the Mediterranean Sea, 5% in the Indian Ocean, and 1% in other seas. Figure 3.16 presents the location of historic tsunami events and the associated cause.

There have been no reported previous occurrences of tsunami events in or impacting the planning area.

Figure 3.16 Historic Tsunami Events and Causes

Cause of the Tsunami:

Effects of the Tsunami:	Volcanic Eruption	Landslide	Unknown/ Miscellaneous	Earthquake Magnitude >=9 >=8 >=7 >=6 <6 or ?
Very Many Deaths (~1001 or more deaths)	▲	■	?	● ● ● ● ●
Many Deaths (~101 to 1000 deaths)	△	□	?	○ ○ ○ ○ ○
Some Deaths (~51 to 100 deaths)	▲	■	?	● ● ● ● ●
Few Deaths (~1 to 50 deaths)	▲	■	?	● ● ● ● ●
No Deaths / Unknown	△	□	?	○ ○ ○ ○ ○

Source: NOAA, Natural Hazards Viewer, https://maps.ngdc.noaa.gov/viewers/hazards/?layers=0

Probability of Future Occurrences

Very Low - The assessment of the tsunami hazard in the United States shows that a tsunami can strike any U.S. coast, but the hazard level varies. For the Gulf Coast, the probability is very low, see Table 3.12. These hazard levels are based largely on the historical record through 2014, geological evidence, and location relative to tsunami sources, all of which provide clues to what might happen in the future.

Table 3.12 Qualitative Tsunami Hazard Assessment

Region	Hazard Level
Pennsylvania, Delaware, Virginia, North Carolina, Georgia, Florida (Gulf coast), Alabama, Mississippi, Louisiana, Alaska Arctic coast	Very Low
Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, South Carolina, Florida (Atlantic coast), Texas	Low
None	Moderate
Puerto Rico, Virgin Islands, Washington, Oregon, Guam, Northern Mariana Islands, American Samoa	High
California, Alaska, Hawaii	Very High

Magnitude/Severity

Slight - If a tsunami were to reach the Baldwin County coastline, the relatively shallow shoreline relief and densely populated coastal areas would expose coastal communities to significant losses. However, for the unincorporated areas of Baldwin County, less than 10-percent of the planning area is located within the coastal high hazard area.

Changing Future Conditions

Scientists are beginning to believe there may be a connection between changing climate conditions and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences. However, currently no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked with climate change. While not conclusive, early research suggests that more intense earthquakes and tsunamis may eventually be added to the adverse consequences that are caused by changing future conditions.

Tsunami Hazard Summary

Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Minimal	Very Low	Slight	Low

3.2.11 Hazard Profiles Summary

Table 3.13 summarizes the results of the hazard profiles and how each hazard varies by jurisdiction. This assessment was used by the FMPC to prioritize those hazards of greatest significance to each jurisdiction, enabling the jurisdictions to focus resources where they are most needed and develop the mitigation strategy accordingly.

Table 3.13 Planning Significance Scores

Hazard	Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Flood: 100-/500-Year	Partial	Very High	Significant	High
Hurricane and Tropical Storms (including storm surge)	Community-Wide	Moderate	Significant	High
Flood: Stormwater/Localized	TBD	TBD	TBD	Moderate
Coastal Bank Erosion	Minimal	Very High	Moderate	Moderate
Changing Future Conditions and Sea Level Rise	Minimal	High	Slight	Moderate
Dam/Levee Failure	Minimal	Very Low	Slight	Low
Tsunami	Minimal	Very Low	Slight	Low

3.3 Vulnerability Assessment

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

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

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

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

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

3.3.1 Methodology

The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards. The vulnerability assessment for this plan followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses* (2002).

The vulnerability assessment was conducted based on the best available data and the significance of the hazard. Data to support the vulnerability assessment was collected from the following sources:

- FEMA's HAZUS loss estimation software
- Written descriptions of assets and risks provided by participating jurisdictions
- Existing plans and reports
- Personal interviews with FMPC members and other stakeholders
- Other sources as cited

The Vulnerability Assessment is divided into four parts:

- **Section 3.3.2 Community Assets** first describes the assets at risk in Baldwin County, including the total exposure of people and property; critical facilities and infrastructure; natural, cultural, and historic resources; and economic assets.
- **Section 3.3.3 Vulnerability by Hazard** describes the vulnerability to each hazard identified in section 3.1 and profiled in section 3.2. This vulnerability analysis includes a vulnerability overview for each hazard. For hazards of high and

moderate significance, the vulnerability analysis includes evaluation of vulnerable buildings, infrastructure, and critical facilities; estimated losses and a description of the methodology used to estimate losses; discussion of future development in relation to hazard-prone areas.

- **Section 3.3.10 Future Land Use and Development** discusses development trends, including population growth, housing demand, and future projects.
- **Section 3.3.11 Summary of Key Issues** summarizes the key issues and conclusions identified in the risk assessment process.

3.3.2 Identify Community Assets

This section assesses the population, structures, critical facilities and infrastructure, and other important assets in the planning area that may be at risk to natural hazards.

Total Exposure of Population and Structures

As previously noted in Section 2.1.4 Population/Demographics, the total population for unincorporated Baldwin County was estimated as 89,449 for 2010 and 94,523 for 2016.

There is a total of 66,002 parcels within unincorporated Baldwin County with a total assessed value of $1,169,546,780, per the parcel data provided by Baldwin County.

Critical Facilities and Infrastructure

Of significant concern with respect to any disaster event is the location of critical facilities in the planning area. Critical facilities are often defined as those essential services and facilities in a major emergency which, if damaged, would result in severe consequences to public health and safety or a facility which, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities presented within Table 3.14 and Figure 3.17.

Table 3.14 Inventory of Critical Facilities and Infrastructure

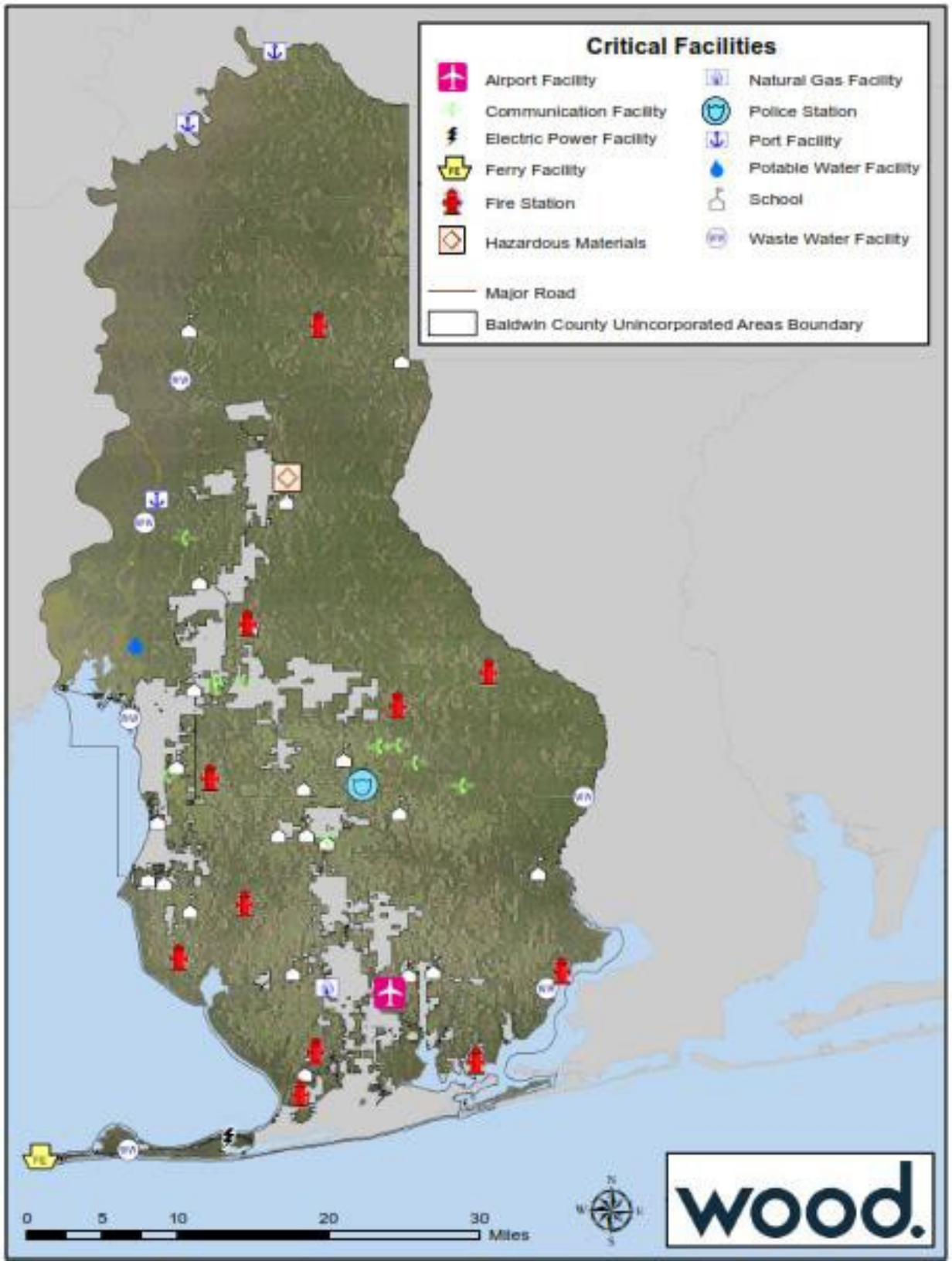
Facility	Name	Address / Parcel Number
Airport	BARIN WOLF	01003011502
Communication	WEAR-TV CH 3	01003010904
Communication	WPMI CH 15	01003010904
Communication	WALA-TV CH 10	01003010703
Communication	WMPV-TV CH 21	01003010904
Communication	WBPG CH 55	01003010904
Communication	WHBR CH 33	01003010904
Communication	WKRG-TV CH 5	01003010703
Communication	WJTC CH 44	01003010904
Communication	WDLT 660	01003010800
Communication	WDXZ 1000	01003010905
Communication	WBLX-FM CH 225	01003010904
Communication	WYOK CH 281	01003010904
Communication	WMXC CH 260	01003010703
Communication	WJLQ CH 264	01003010904

Facility	Name	Address / Parcel Number
Communication	WNSP CH 288	01003010300
Communication	WBHY-FM CH 203	01003010703
Communication	WXBM-FM CH 274	01003010904
Communication	WPCS CH 208	01003010904
Communication	WRKH CH 241	01003010703
Communication	WKSJ-FM CH 235	01003010904
Communication	WTKX-FM CH 268	01003010904
Communication	WHIL-FM CH 217	01003010703
Communication	WABB-FM CH 248	01003010703
Communication	WMEZ CH 231	01003010904
Electric Power	BALDWIN COUNTY ELECTRIC COOP.	200 WEST 22ND STREET
Ferry Facility	Fort Morgan	
Fire Station	Huggerlanding/ Oyster Bay Volunteer Fire	4590 CO RD 6
Fire Station	Rabun Volunteer Fire Department	47860 Rabun RD
Fire Station	Barnwell Volunteer Fire & Rescue Departm	13319 CO RD 13
Fire Station	Gateswood Volunteer Fire Department	33014 ST HWY 112
Fire Station	Styx River Volunteer Fire Department	23350 Dunbar RD
Fire Station	Stapleton Fire Department	36276 State Highway 59
Fire Station	Belforest Volunteer Fire Search & Rescue	25490 HWY 54 W
Fire Station	Fish River Marlow Fire & Rescue Department	13355 CO RD 32
Fire Station	Bon Secour Volunteer Fire Department	7392 HWY 65
Fire Station	Josephine Volunteer Fire Department	6824 CO RD 95
Fire Station	Lillian Volunteer Fire Department	34180 Widell AVE
Hazardous Materials	BALDWIN POLE & PILING CO. INC.	OLD PENSACOLA HWY.
Hazardous Materials	BALDWIN POLE & PILING CO. INC.	OLD PENSACOLA HWY.
Hazardous Materials	BALDWIN POLE & PILING CO. INC.	OLD PENSACOLA HWY.
Natural Gas	RIVIERA UTILITIES	AZALEA RD OFF HWY 59
Police Station	Baldwin County Sheriff	18126 County Rd 54
Port Facility	Alliance Resources Co., Oswell Loading F	South Carlton, AL Oil Fields.
Port Facility	Kimberly-Clark Corp., Dixie Wood Yard Ba	Foot of County Road 84.
Port Facility	Tensaw River Docks and Storage Yard Whar	Foot of County Road 7.
Potable Water	SPANISH FORT WATER SYSTEM INC	WELL 4 TREATMENT PLT HWY 31
Runway	00323.4*A AL09/27	
School	CENTRAL CHRISTIAN SCHOOL	17395 Highway 104 West
School	THE ACADEMY AT MISSION SAMARIA	32586 SEMINOLE ROAD WEST
School	BAYSHORE CHRISTIAN SCHOOL	23050 US HIGHWAY 98
School	SILVERHILL CHRISTIAN ACADEMY	PO BOX 207
School	BEREAN BAPTIST CHRISTIAN SCHOO	P.O. BOX 237
School	FAITH PRESBYTERIAN CHR SCH	18632 BERNER ROAD
School	VAUGHN SCHOOL	55260 COUNTY ROAD 21
School	PERDIDO ELEMENTARY SCHOOL	23589 COUNTY ROAD 47
School	DELTA ELEMENTARY SCHOOL	10251 WHITE HOUSE FORK RD
School	STAPLETON SCHOOL	35500 BALDWIN AVE
School	PINE GROVE ELEMENTARY SCHOOL	43980 PINE GROVE RD
School	SPANISH FORT HIGH SCHOOL	ONE PLAZA DE TOROS
School	ELSANOR SCHOOL	23440 US HIGHWAY 90
School	ROSINTON SCHOOL	19757 COUNTY ROAD 64
School	CENTRAL BALDWIN MIDDLE SCHOOL	24545 STATE HIGHWAY 59
School	DAPHNE EAST ELEMENTARY SCHOOL	26651 COUNTY ROAD 13
School	FAIRHOPE HIGH SCHOOL	18800 GREENO RD

Facility	Name	Address / Parcel Number
School	J LARRY NEWTON SCHOOL	9761 COUNTY ROAD 32
School	BALDWIN COUNTY ALTERNATIVE SCHOOL	6925 TWIN BEECH RD
School	SWIFT CONSOLIDATED ELEMENTARY SCHOOL	6330 BON SECOUR HWY
School	MAGNOLIA SCHOOL	1 JAGUAR LOOP
School	ELBERTA ELEMENTARY SCHOOL	25820 HIGHWAY 98
Wastewater Facility	ADOT I 10 WELCOME CENTER LAG	ALABAMA DEPARTMENT OF TRANSPOR
Wastewater Facility	LAKE FOREST WASTE WATER TREATMENT PLANT	29280 COUNTY ROAD 11
Wastewater Facility	LANDING INCORPORATION THE WWTP	LANDING INCORPORATION THE
Wastewater Facility	LILLIAN SEWER CO LLC WWTF	LILLIAN SEWER COMPANY LLC
Wastewater Facility	POLLUTION CONTL SYS FT MORGAN	
Wastewater Facility	TENSAW ISLAND LAND SHORES WWTP	TENSAW ISLAND LAND OWNERS ASSC

Sources: FEMA HAZUS, Baldwin County, AL

Figure 3.17 Critical Facilities in Baldwin County



Other Assets

Assessing the vulnerability of the planning area to disaster also involves inventorying the natural, historic, cultural, and economic assets of the area. This is important for the following reasons:

- The planning area may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing about them ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.
- Losses to economic assets (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

In the planning area, specific assets include the following:

- Natural Resources:
  - There are 30 known species in the planning area with state endangered, threatened, recovery, or candidate status. The list of such species includes 9 birds; 3 clams, 3 fishes; 1 flowering plant; 4 mammals; and 10 reptiles. For the list of species and their status, go to https://www.fws.gov/daphne/es/specieslst.html.
  - Bicentennial Park, a 367-acre area in North Baldwin County
  - Live Oak Landing Park, a 175-acre Baldwin County Park on the banks of the Tensaw River
  - Bon Secour National Wildlife Refuge – this 7,157-acre national wildlife refuge is located within both Baldwin and Mobile Counties and serves as a resting and feeding area for migratory birds and as a sanctuary for native flora and fauna. The refuge is one of the largest undeveloped parcels of land on the Alabama coast.
- Cultural Resources:
  - Baldwin County Heritage Museum
  - Historic Fort Morgan
- Economic Assets (major manufacturing employers, see also Section 2.1.5)
  - TC Aerospace Systems

- Standard Furniture

  - Ace Hardware Support Center
  - Quincy Compressors
  - Vulcan, Inc.
  - Bon Secour Fisheries
  - Quality Filters
  - Ascend Materials
  - Segers Aerospace
  - Dental EZ

- Historic resources
  - There are 24 properties on the National Register of Historic Places in unincorporated Baldwin County. For a specific listing of properties and additional details, go to https://www.nps.gov/nr/research/

3.3.3 Analyze Risk

Overview

Planning Significance: High

Flood damage is directly related to the depth of flooding by the application of a depth damage curve. In applying the curve, a specific depth of water translates to a specific percent damage to the structure, which translates to the same percentage of the structure's replacement value. SFHAs for Baldwin County are shown in Section 3.2.1, Figure 3.2.

Building counts by FEMA flood zone were determined using a spatial intersection of the building footprints provided by the Baldwin County and the effective FEMA flood zones provided in the Baldwin County preliminary FIRM Database 07/31/2017. In order to determine the correct occupancy class for each parcel, the land use codes provided in the Baldwin County parcel data were translated into FEMA Hazus specific occupancy classes (i.e. RES1, COM4, EDU2, etc.). These were translated to ensure the correct depth damage function was applied to the parcel based on its occupancy class to ensure a more accurate damage assessment of the parcel.

Structure value estimations were also obtained from the Baldwin County parcel data. Content value estimations for each structure are based on FEMA Hazus methodologies of estimating value as a percent of improved structure values by property type. Table 3.15 shows the breakdown of the different property types in Baldwin County and their estimated content replacement value percentages.

Structures at Risk

The loss estimate for flood is based on the total of the improved building value and the contents value. Land value is not included in any of the loss estimates as generally the land is not subject to loss from floods. It is important to note that information on those properties mitigated (e.g., floodproofed or elevated) in the SFHA was not available for analysis, thus the resulting flood damage loss estimates could be lower than actual figures. Once the potential value of affected parcels was calculated, damage factors were applied to obtain loss estimates by flood zone.

Table 3.15 Content Replacement Values

Property Type	Content Replacement Values
Residential	50%
Agriculture	100%
Commercial	100%
Government	100%
Religious	100%
Industrial	150%

Table 3.16 shows the building count, total value, estimated damages and loss ratio for buildings that fall within the 100-year floodplain by flood zone and land use type. The loss ratio is the loss estimate divided by the total potential exposure (i.e., total of improved and contents value for all buildings located within the 100-year floodplain) and displayed as a percentage of loss. FEMA considers loss ratios greater than 10% to be significant and an indicator a community may have more difficulties recovering from a flood.

Table 3.16 Estimated Building Damage and Content Loss

Occupancy Type	Total Number of Buildings	Total Value (Bldg & Content)	Estimated Building Damage	Estimated Content Damage	Estimated Total Damage	Loss Ratio
AE						
Residential	4044	$1,843,705,285	$692,973,918	$417,302,768	$1,110,276,686	60.2%
Commercial	70	$66,022,556	$13,515,521	$18,442,342	$31,957,863	48.4%
Agriculture	74	$13,640,184	$4,610,576	$5,262,179	$9,872,755	72.4%
Government	13	$6,106,952	$2,821,136	$1,777,164	$4,598,300	75.3%
Industrial	12	$3,349,362	$241,459	$683,365	$924,824	27.6%
Religious	17	$4,749,112	$1,784,118	$1,218,041	$3,002,159	63.2%
Total	**4230**	**$1,937,573,451**	**$715,946,728**	**$444,685,859**	**$1,160,632,587**	**59.9%**
A						
Residential	139	$5,186,276	$402,357	$224,949	$627,306	12.1%
Commercial	1	$26,000	$7	$13	$20	0.1%
Agriculture	23	$790,440	$4,016	$16,264	$20,280	2.6%
Government	0	$0	$0	$0	$0	0.0%
Industrial	0	$0	$0	$0	$0	0.0%
Religious	0	$0	$0	$0	$0	0.0%
Total	**163**	**$6,002,716**	**$406,380**	**$241,226**	**$647,606**	**10.8%**
VE						
Residential	533	$307,214,204	$115,488,859	$64,414,997	$179,903,856	58.6%
Commercial	3	$14,665,200	$7,332,600	$7,331,700	$14,664,300	100.0%
Agriculture	1	$477,000	$238,500	$238,500	$477,000	100.0%
Government	0	$0	$0	$0	$0	0.0%
Industrial	1	$110,600	$0	$0	$0	0.0%
Religious	3	$694,200	$329,310	$208,260	$537,570	77.4%
Total	**541**	**$323,161,204**	**$123,389,269**	**$72,193,457**	**$195,582,726**	**60.5%**
500-Year						
Residential	1386	299698445	93611015	50200675	$143,811,690	48.0%
Commercial	15	2076532	163182	555644	$718,826	34.6%
Agriculture	63	6750262	797752	1557987	$2,355,739	34.9%
Government	1	2440000	245030	1220000	$1,465,030	60.0%
Industrial	4	750300	10500	24203	$34,703	4.6%
Religious	1	411600	20669	108798	$129,467	31.5%
Total	**1470**	**$312,127,139**	**$94,848,148**	**$53,667,307**	**$148,515,455**	47.6%

Population at Risk

A separate analysis was performed to determine the population at risk to the individual FEMA flood zones. Using GIS, the FIRM flood zones were intersected with the building footprint layer. Those residential buildings that intersected the flood zones were counted and multiplied by the 2020 Census Bureau household factor for unincorporated Baldwin County (2.62) as shown in Table 3.17.

Table 3.17 Estimated Population at Risk

Flood Zone	Residential Property Count	Population at Risk
AE	4,950	12,524
A	725	1,834
VE	339	858
500-Year	5,137	12,997
TOTAL	**11,151**	**28,213**

Critical Facilities at Risk

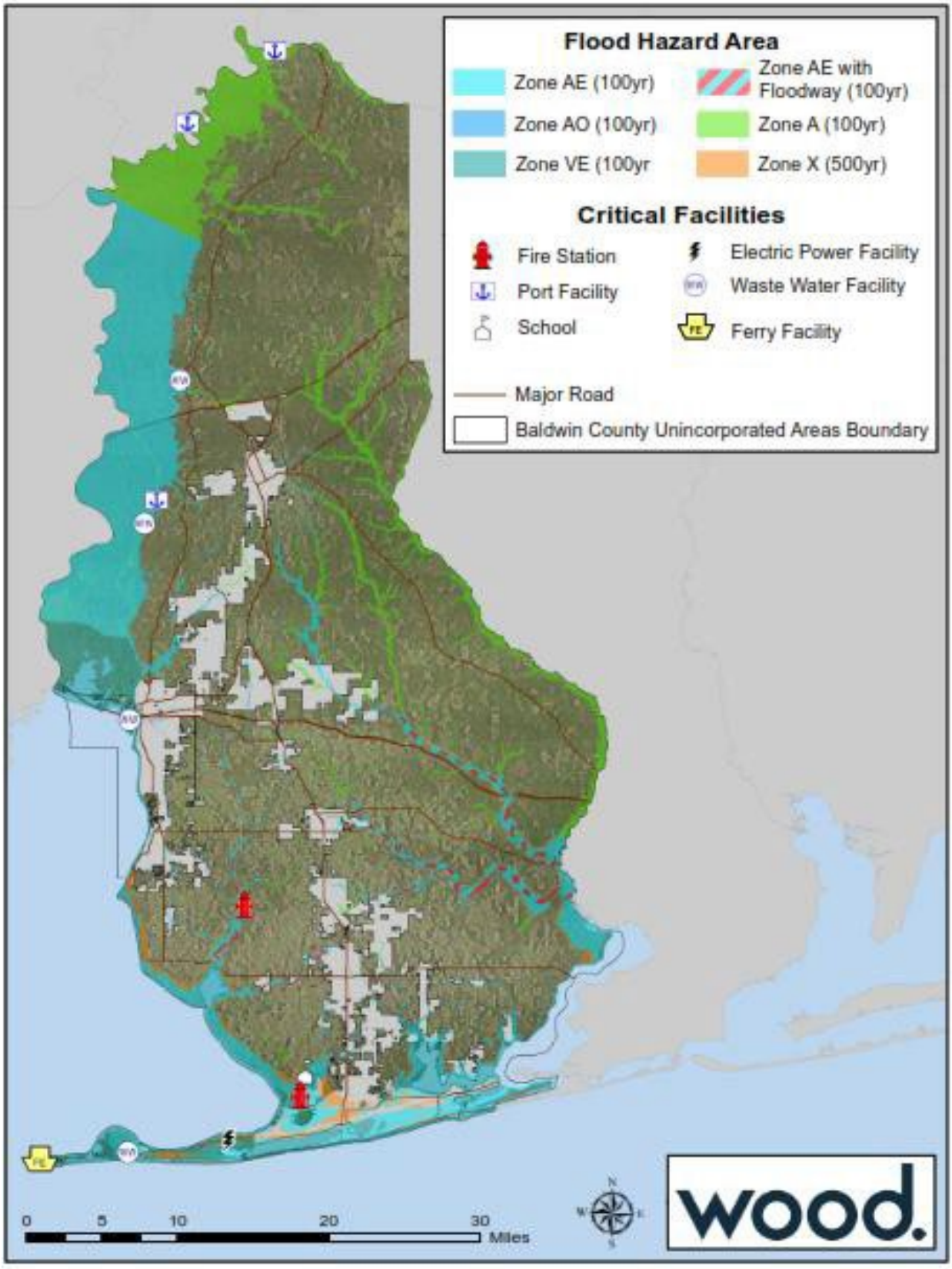
A separate analysis was performed to determine critical facilities located in the 100- and 500-year floodplains. Using GIS, the FIRM flood zones were overlayed on the critical facility location data. Table 3.18 and Figure 3.18 present the critical facilities located within the 100- and 500-year floodplains by facility type.

Table 3.18 Inventory of Critical Facilities and Infrastructure

Facility	Name
Fire Station	Huggerlanding/ Oyster Bay Volunteer Fire
Fire Station	Fish River Marlow Fire & Rescue Departme
Fire Station	Volunteer Fire Departments
Port Facility	Alliance Resources Co., Oswell Loading F
Waste Water Facility	POLLUTION CONTL SYS FT MORGAN
Waste Water Facility	TENSAW ISLAND LAND SHORES WWTP
Waste Water Facility	LANDING INCORPORATION THE WWTP
Waste Water Facility	East Baldwin WWTP
School	SWIFT CONSOLIDATED ELEMENTARY SCHOOL
School	Perdida Elementary
School	Elsanor Elementary
School	Rosinton Elementary
School	Stapleton Elementary

Sources: FEMA HAZUS, Baldwin County, AL

Figure 3.18 Critical Facilities in the SFHA in Baldwin County



Flood Insurance Analysis

One valuable source of information on flood hazards is current flood insurance data for active policies and past claims. Flood insurance is required as a condition of federal aid or a mortgage or loan that is federally insured for a building located in a FEMA flood zone.

Baldwin County has been a participant in the NFIP since January 1973 and has achieved a Class 7 flood insurance rating through participation in the NFIP's Community Rating System which rewards all policyholders in unincorporated County with a 15-percent reduction in their flood insurance premiums. Tables 3.19 through 3.22 reflect NFIP policy and claims data for the County categorized by structure type, flood zone, Pre-FIRM and Post-FIRM.

Table 3.19 NFIP Policy and Claims Data by Structure Type, 2024

Structure Type	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
Single Family	3651	$3,018,263.00	$1,127,005,000.00	10,003	$233,381,673.04
2-4 Family	218	$143,409.00	$53,260.00	395	$9,001,083.75
All Other Residential	2411	$502,578.00	$558,157,000.00	359	$33,582,964.005
Non-Residential	120	$435,485	$56,090,000.00	460	$22,382,244
Total	**6,400**	**$4,099,735.00**	**$1,794,512,000.00**	**11217**	**$298,347,965.41**

Table 3.20 NFIP Policy and Claims Data by Flood Zone, 2024

Flood Zone	Number of Policies in Force	Total Premium	Total Coverage	Number of Closed Paid Losses	Total of Closed Paid Losses
AE Zones	4,258	$2,676,154.00	$1,156,794,000.00	6,928	$188,311,883.10
A Zones	5	$8,703.00	$1,328,000.00	201	$6,602,665.88
VE Zones	152	$228,930.00	$36,559,000.00	2330	$33,677,385.64
D Zones	0			82	$1,416,665.90
B, C & X Zone	0				
Standard	1,985	$1,859,948.00	$599,831,000.00	927	$47,972,697.52
Preferred	0			749	$20,423,281.20
Total	**6,400**	**$4,099,735.00**	**$1,794,512,000.00**	**11,217**	**$298,404,879.24**

Table 3.21 NFIP Policy and Claims Data Pre/PostFIRM, 2024

Flood Zone	Policies in Force	Total Premium	Insurance in Force	Number of Closed Paid Losses	Total of Closed Paid Losses
AE Zones	4258	$2,676,154	$1,156,794,000	6928	$188,311,883.10
A Zones	5	$8703	$1,328,000	201	$6,602,665.88
VE Zones	152	$228,930	$36,559,000	2330	$33,677,685.64
D Zones				82	$1,416,665.90
B, C & X Zone					
Standard	1985	$1,185,948	$599,831,000	927	$47,972,697.52
Preferred	0	$0	$0	749	$20,423,281.20
Total	**6400**	**$4,099,735**	**$1,794,512,000**	**11,217**	**$20,801,522.69**

Table 3.22 Community Repetitive Loss

	AE, A1-30, AO, AH, A	VE,V1-30,V	B, C,X	TOTAL
RL Buildings Total	1774	655	382	2828
RL Buildings Insured	301	31	59	391
RL Losses total	3115	1261	599	5011
RL Losses Insured	509	78	95	682
RL Payments total	$110,632,700.68	$21,936,338.37	$34,130,180.66	$167,769,879.78
Building	$90,521,579.01	$20,030,594.48	$28,075,329.59	$139,432,089.52
Contents	$20,111,121.67	$1,905,743.89	$6,054,851.07	$28,337,790.26
RL Payments Insured	$20,492,010.10	$783,594,48	$5,212,178.70	$26,487,783.28
Building	$16,961,062.42	$731,655.25	$4,089,226.84	$21,781,944.51
Contents	$3,530,947.68	$51,939.23	1,122,951.86	$4,705,838.77

Repetitive Loss Analysis

A repetitive loss property is a property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within any 10-year period since 1978. An analysis of repetitive loss was completed by Baldwin County to examine repetitive loss properties against FEMA flood zones.

According to 2018 NFIP records, there are a total of 410 unmitigated repetitive loss properties within unincorporated Baldwin County. There are 50 properties are classified as severe repetitive loss. . Table 3.22 details repetitive loss building counts, FEMA flood zones and total payment for the unmitigated properties.

Figure 3.19 illustrates the location of unmitigated repetitive loss properties in relation to mapped FEMA flood zones within the County.

Agricultural Impacts

In addition, USDA crop insurance claims as a result of flood and excessive moisture damage has averaged $854,410 per year from 2014 to 2024 and total $7,240,769.59 for the period.

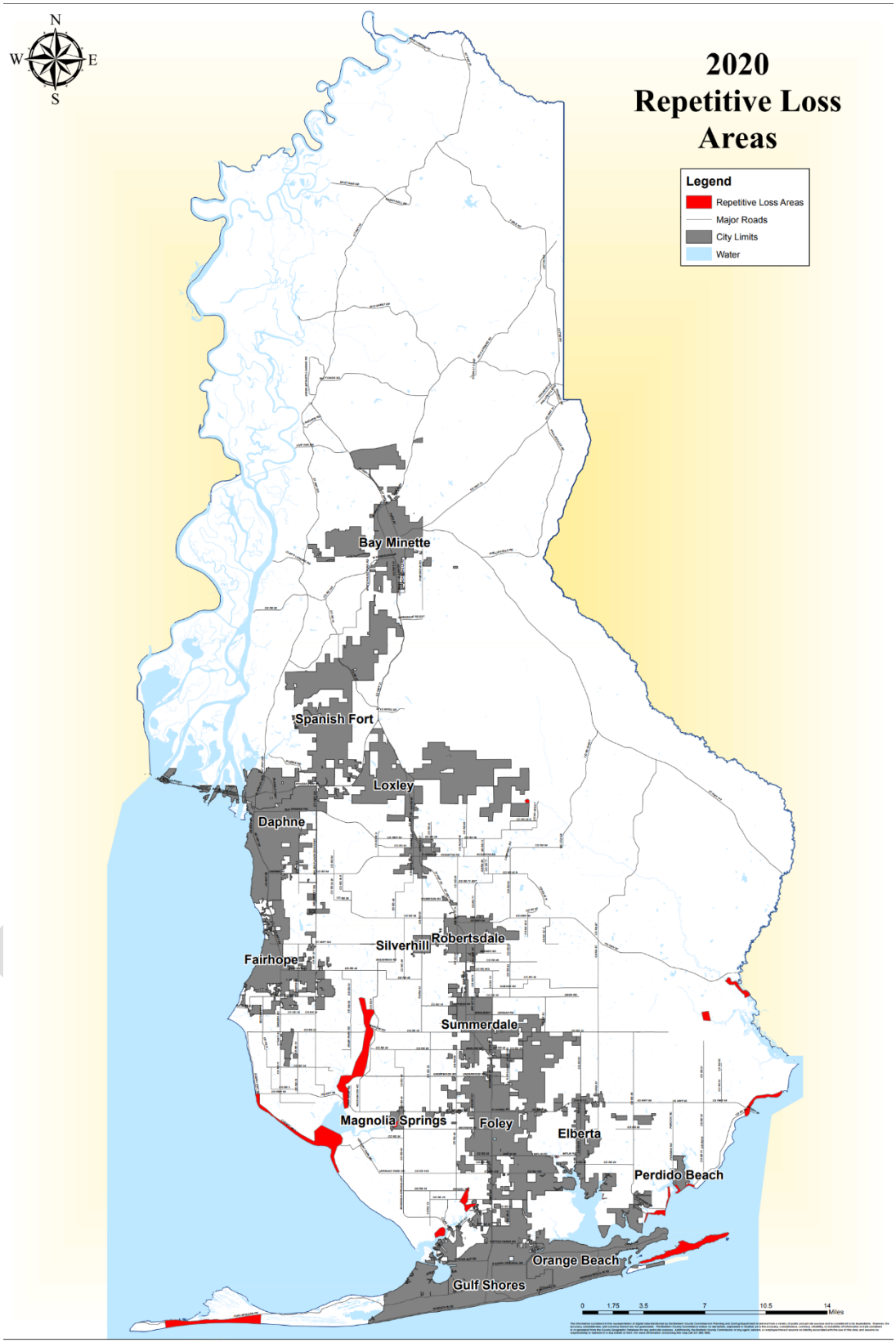
Table 3.23 Claims Paid in Baldwin County for Crop Loss as a Result of Flood/Excessive Moisture/Rain (2014 – 2024)

12-Year Insurance Paid	Adjusted 12-Year Flood Losses (considering 82% insured)	Estimated Annualized Losses	202 Ag Census Value of Crops	Annualized Crop Loss Ratio (Losses/Value)
$7,240,769.59	$8,544,108	$854,410	$122,652,000	0.69%

Future Development

Any future development in floodplains would increase risk in those areas. Since Baldwin County participates in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas. However, even if structures are mitigated, evacuationmay still be necessary due to rising waters. In addition, floods that exceed mitigated levels may still cause damages.

Figure 3.19 Repetitive Loss Properties in Baldwin County



3.3.4 Summarize Vulnerability

Overview

Planning Significance: Moderate

Potential Losses to Existing Development

Localized flooding occurs at various times throughout the year with several areas of primary concern to unincorporated Baldwin County. Localized flooding and ponding affect streets and property. Localized flooding locations, as identified by the Highway department, correlate with unmitigated repetitive loss properties.

Future Development

The risk of localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity and an evaluation of regional drainage issues. Mitigating the root causes of the localized flooding or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to this hazard.

3.3.5 Hurricane and Tropical Storms Vulnerability

Overview

Planning Significance: High

Potential Losses to Existing Development

The heavy rains associated with tropical weather systems are not only responsible for major flooding in areas where the storm initially strikes, but they can also affect areas hundreds of miles inland. Torrential rains from hurricanes and tropical storms can produce extensive urban and riverine flooding, especially if the storm systems are large and slow moving. Winds from these storms located offshore can drive ocean water up the mouth of a river, compounding the severity of inland overbank flooding.

In addition to the combined destructive forces of wind, rain, and lightning, hurricanes can cause a surge in the ocean, which can raise the sea level as high as 25 feet or more in the strongest hurricanes. As a hurricane approaches the coast, its winds drive water toward the shore. Once the edge of the storm reaches the shallow waters of the continental shelf, the water begins to pile up. Winds of hurricane strength eventually force the water onto the shore. At first, the water level climbs slowly, but as the eye of the storm approaches water rises rapidly. Furthermore, storm surge can also cause extensive damage on the backside of a hurricane as storm surge waters head back out to sea.

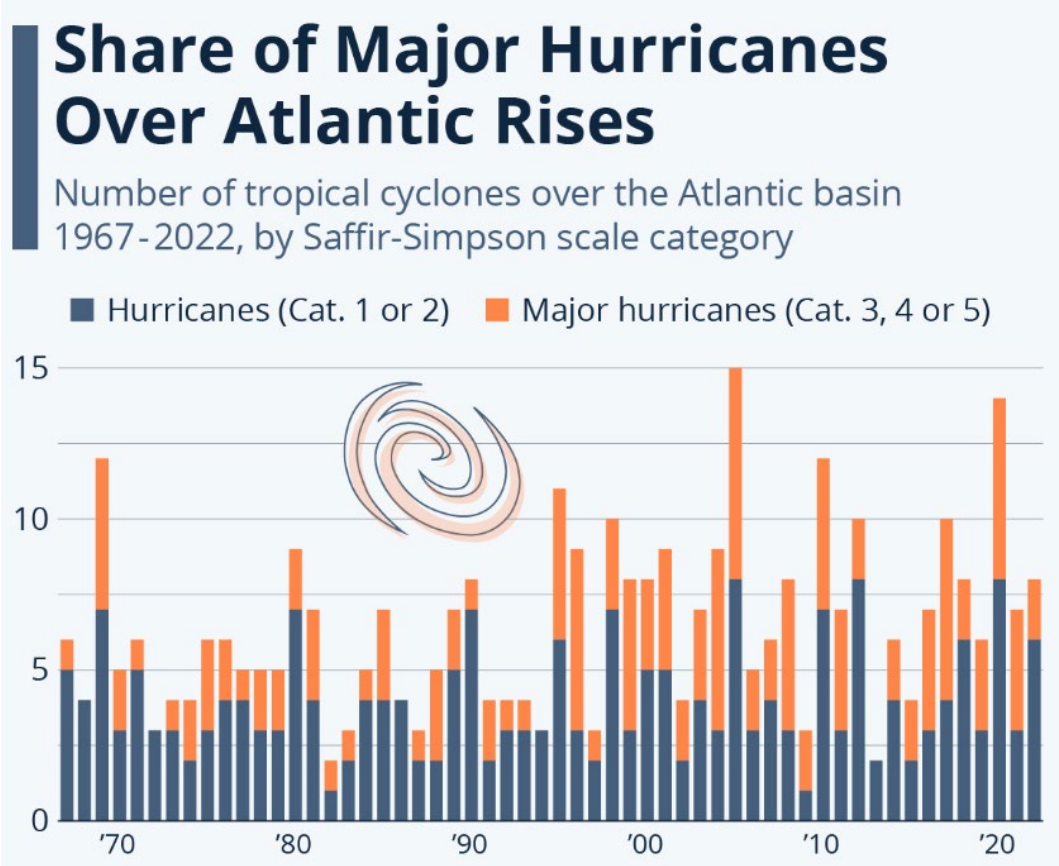
Natural resources, particularly beaches, are devastated by hurricanes. The erosion of the coastline is considerable due to the impact of wind, waves, and debris in a hurricane event. Beaches need to be replenished with appropriate materials to reduce erosion. More importantly, the dune system needs to be protected and remain intact in order to prevent having to replenish beaches. Sand dunes are the first line of defense against coastal storms and beach erosion. They absorb the impact of storm surge and high waves, preventing or delaying flooding of inland areas and damage to inland structures. They are also sand storage areas that supply sand to eroded beaches during storms and buffer windblown sand and salt spray. Storm surge and subsequent erosion of the shoreline often leads to the loss of property. The vulnerability of Baldwin County to coastal erosion is discussed in Section 3.3.6.

The Atlantic basin hurricane season runs from June 1st to November 30. The Atlantic basin includes the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico. Figure 3.20 shows the progress of a typical hurricane season in terms of the total number of tropical systems and hurricanes produced throughout the year in the Atlantic basin. The curves represent the average cumulative production of all named tropical systems, all hurricanes, and those hurricanes which were Category 3 or stronger in those basins.

A hurricane surge analysis was conducted by intersecting the building footprint layer provided by Baldwin County with the polygon shapefile for each hurricane surge layer. The hurricane surge layer data was derived from National Hurricane Center SLOSH model runs on all the NOAA SLOSH basins throughout Alabama. The runs create outputs for all different storm simulations from all points of the compass. Each direction has a MEOW (maximum envelope of water) for each category of storm (1-5), and all directions combined result in a MOMs (maximum of maximums) set of data. The MOMs are used in this surge model. The application uses three input parameters or data:

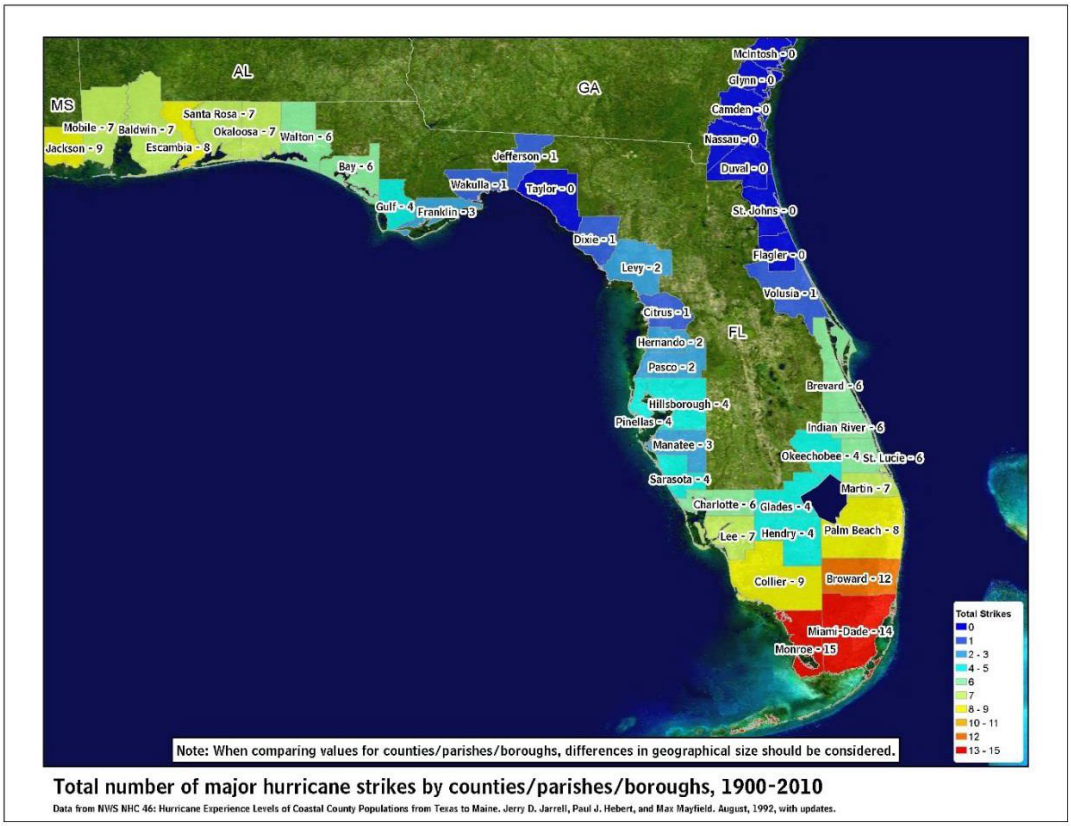
elevation (from LIDAR), SLOSH basin results, and contiguous shoreline or sea polygons.

Figure 3.20 Average Number of Tropical Storms per Year (Atlantic Basin)



Source: NOAA; https://www.statista.com/chart/11009/hurricanes-over-the-atlantic-basin/

Figure 3.21 Total Number of Major Hurricane Strikes by County, 1900-2010



Source: NOAA; https://www.nhc.noaa.gov/climo/images/strikes_egulf_mjr.jpg

Table 3.24 provides a summary of assets at risk to hurricane surge based on each hurricane category. The assets at risk estimate for each hurricane category is based on the total of improved and contents value. The value of land is not included in the loss estimates as generally the land is not subject to loss from hurricane and tropical storm damage.

Table 3.24 Assets at Risk to Category 1 Storm Surge

Occupancy Type	Total Number of Buildings	Total Building Value	Total Content Value	Total Value
Category 1				
Residential	1,262	$353,820,402	$176,910,198	$530,730,600
Commercial	30	$5,433,492	$5,433,492	$10,866,984
Agriculture	20	$2,795,482	$2,771,182	$5,566,664
Government	3	$1,320,000	$1,320,000	$2,640,000
Industrial	8	$862,360	$1,265,896	$2,128,256
Religious	3	$347,100	$347,100	$694,200
Total	**1,326**	**$364,578,836**	**$188,047,868**	**$552,626,704**
Category 2				
Residential	4,192	$1,263,542,548	$631,771,257	$1,895,313,805
Commercial	57	$14,274,487	$14,274,487	$28,548,974
Agriculture	63	$6,160,520	$6,089,620	$12,250,140
Government	15	$2,738,144	$2,738,144	$5,476,288
Industrial	12	$1,024,416	$1,508,980	$2,533,396
Religious	20	$2,693,878	$2,693,878	$5,387,756
Total	**4,359**	**$1,290,433,993**	**$659,076,366**	**$1,949,510,359**
Category 3				
Residential	5,811	$1,732,673,460	$866,336,699	$2,599,010,159
Commercial	94	$30,850,055	$30,850,055	$61,700,110
Agriculture	92	$8,873,437	$8,622,237	$17,495,674
Government	23	$4,592,301	$4,592,301	$9,184,602
Industrial	23	$6,115,164	$9,089,356	$15,204,520
Religious	22	$2,796,234	$2,796,234	$5,592,468
Total	**6,065**	**$1,785,900,651**	**$922,286,882**	**$2,708,187,533**
Category 4				
Residential	6,170	$1,929,595,755	$964,797,847	$2,894,393,602
Commercial	114	$38,129,818	$38,129,818	$76,259,636
Agriculture	101	$9,322,387	$8,932,187	$18,254,574
Government	24	$4,907,201	$4,907,201	$9,814,402
Industrial	31	$7,180,039	$10,522,068	$17,702,107
Religious	22	$2,796,234	$2,796,234	$5,592,468
Total	**6,462**	**$1,991,931,434**	**$1,030,085,355**	**$3,022,016,789**
Category 5				
Residential	6,275	$1,983,932,355	$991,966,145	$2,975,898,500
Commercial	118	$56,335,980	$56,335,980	$112,671,960
Agriculture	105	$9,489,382	$9,099,182	$18,588,564

Occupancy Type	Total Number of Buildings	Total Building Value	Total Content Value	Total Value
Government	24	$4,907,201	$4,907,201	$9,814,402
Industrial	32	$7,334,939	$10,676,968	$18,011,907
Religious	22	$2,796,234	$2,796,234	$5,592,468
Total	**6,576**	**$2,064,796,091**	**$1,075,781,710**	**$3,140,577,801**

Population at Risk

A separate analysis was performed to determine the population at risk to the individual hurricane inundation zones. Using GIS, the FIRM flood zones were intersected with the building footprint layer. Those residential buildings that intersected the hurricane inundation zones were counted and multiplied by the 2010 Census Bureau household factor for unincorporated Baldwin County (2.62) as shown in Table 3.25.

Table 3.25 Estimated Population at Risk

Hurricane Category	Residential Property Count	Population at Risk
Category 1	5,811	15,225
Category 2	4,192	10,983
Category 3	5,811	15,225
Category 4	6,170	16,165
Category 5	6,275	16,441

Source: Baldwin Parcel Data, U.S. Census Bureau (2010)

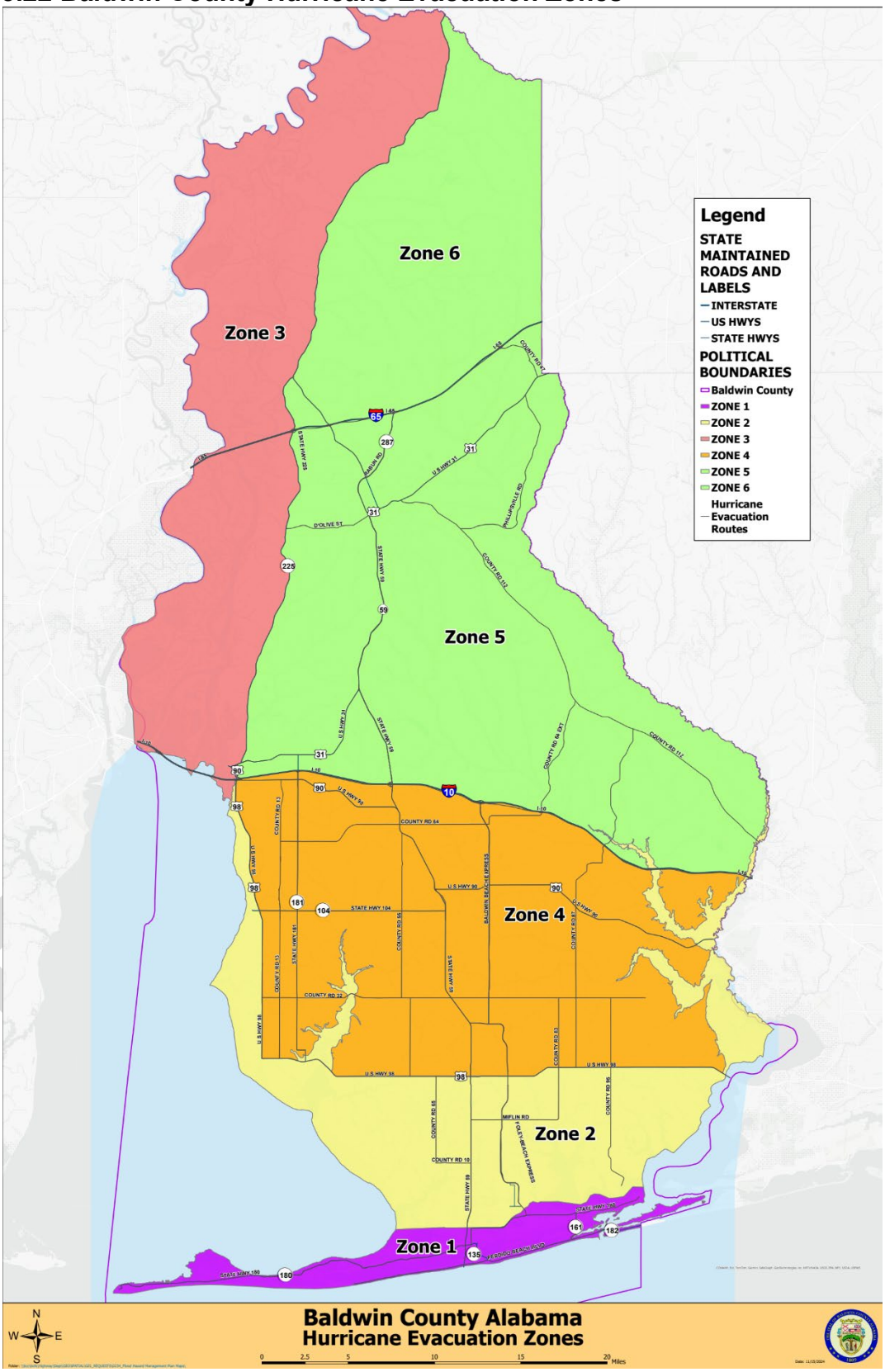
Evacuation Zones

Baldwin County has five hurricane evacuation zones as shown in Figure 3.22. When evacuation orders are given, residents and visitors are encouraged to move further inland or move to higher ground. Once an evacuation order is issued all major roadway networks within Baldwin County will be considered evacuation routes for local travel.

Future Development

Any future development within the County would will be at risk for hurricanes and tropical storms, with those located near the coastline at risk to associated storm surge. Since Baldwin County participates in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction within flood inundation areas. Hurricane/tropical winds are addressed through the Baldwin County Building Codes including the Wood Frame Construction Manual for 110 mph, 120 mph, and 130 mph winds.

Figure 3.22 Baldwin County Hurricane Evacuation Zones



3.3.6 Coastal Bank Erosion Vulnerability

Overview

Planning Significance: Moderate

Potential Losses to Existing Development

The severity of coastal erosion is typically measured through a quantitative assessment of annual shoreline change for a given beach cross-section profile (feet or meters per year) over a long period of time. Erosion rates vary as a function of shoreline type and are influenced primarily by episodic events but can be used in land use and hazard management to define areas of critical concern. Coastal erosion is currently occurring in Baldwin County as discussed in Section 3.2.4 and should be expected to continue to occur in the future.

Future Development

The vulnerability of sandy beaches can be expected to change in the future due to variations in storminess, sea-level rise, and human engineering efforts that alter beach configurations.

3.3.7 Changing Future Conditions and Sea Level Rise Vulnerability

Overview

Planning Significance: Moderate

Potential Losses to Existing Development

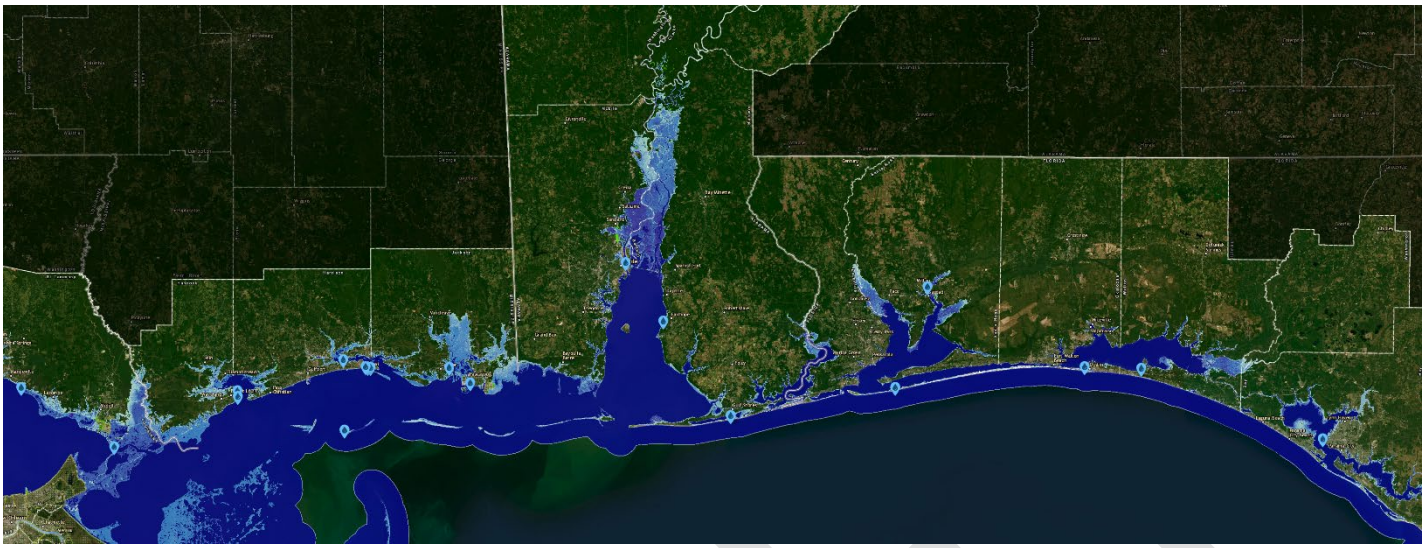
Baldwin County, due to its close proximity to the Gulf Coast and the tidally influenced rivers, is vulnerable to the potential impacts of climate change and sea level rise. The climate change hazard profile in Section 3.2.6 discusses how climate-driven hazards such as hurricanes and flooding are likely to increase in frequency, and possibly intensity, in the future. Thus the 50-year flood of today may become the 10-year event in the future. The reader should refer to the vulnerability assessment discussions on Flood (Section 3.2.1), Hurricane (Section 3.2.3), and Coastal Erosion (Section 3.2.4) for the current exposure and risk to these hazards with the perspective that climate change has the potential to exacerbate the existing risk and vulnerabilities. This section will focus on an assessment of direct impacts from sea level rise, using best available data. The potential impacts of climate change and sea level rise include increased flooding frequency, potential damage to critical infrastructure, and increasing public costs associated with flood insurance claims, infrastructure repair and maintenance, environmental impacts and increased costs associated with emergency management efforts.

Sea level rise may have the following impacts on property and infrastructure in Baldwin County:

- Roads and bridges
- Utility infrastructure
- Erosion hazard zones
- Built environment including residential development
- Natural resources
- Recreational facilities and amenities such as parks
- Salt water intrusion into water supply
- Loss of property and property tax revenue due to inundation

NOAA Coastal Services Center provides a sea level rise and coastal flooding impacts viewer in order to assess how sea level rise will impact coastal communities. Figure 3.23 reflects the impact of three feet of sea level rise on Baldwin County using the coastal flooding impacts viewer provided by NOAA. The sea levels represent inundation at high tide, and areas that are hydrologically connected are shown in shades of blue (darker blue = greater depth). The low-lying areas, displayed in green, are hydrologically "unconnected" areas that may flood. The shaded area is unmapped. Table 3.27 provides an exposure analysis based on the elevation of land that structures are located on relative to local high tide. The results do not factor in structure elevation.

Figure 3.23 Impact of 3-Ft of Sea Level Rise, Baldwin County



Source: NOAA, Sea Level Rise Viewer, https://coast.noaa.gov/digitalcoast/tools/slr.html

Future Development

As a rise in sea level will raise the starting point for waves, tides, and storm surge, future coastal floods may be more severe and more frequent. Any future development in the coastal flood zones (VE) would increase risk in those areas. Since Baldwin County participates in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas.

Communities may be able to reduce sea level rise impacts by establishing defenses, accommodating floods, or relocating some development, at uncertain cost.

Table 3.26 Sea Level Rise and Coastal Flood Exposure, Baldwin County

Elevation relative to local high tide line (Mean Higher High Water)											
	Unit	< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
BY TOTALS											
High social vulnerability population	Count	84	296	732	1296	2066	2964	3933	5090	6845	7796
Medium social vulnerability population	Count	141	413	1013	1813	2615	3285	3934	4509	5051	5564
Low social vulnerability population	Count	13	58	129	220	311	378	434	503	587	655
Property value	$Million	466	1027	2402	4129	5931	7721	9750	11829	13880	15562
Population	Count	238	767	1874	3329	4992	6628	8301	10102	12482	14015
Caucasian population	Count	231	744	1821	3237	4847	6436	8063	9809	12098	13567
Population of color	Count	9	32	76	136	215	281	347	421	548	633
African-American population	Count	2	8	18	31	48	62	76	95	130	154
Asian population	Count	2	8	19	35	61	78	90	102	119	128
Hispanic population	Count	5	13	30	49	76	111	151	198	295	361
Native American population	Count	3	10	25	47	75	98	122	146	184	213
Homes	Count	396	1133	2664	4756	7424	10227	13280	16197	19223	21504
Schools	Count	0	0	0	0	0	0	0	1	1	1
Libraries	Count	0	0	0	0	0	0	0	0	1	1
Museums	Count	0	0	0	0	0	0	0	1	1	2
Houses of worship	Count	1	1	2	2	2	2	4	5	6	10
Roads	Miles	2	7	27	57	92	125	160	197	238	274
County roads	Miles	0	0	3	6	9	11	12	14	14	15
Federal roads	Miles	0	2	4	5	6	7	8	10	11	12
Local roads	Miles	2	5	19	42	70	97	122	150	183	211
Secondary roads	Miles	0	2	5	9	13	17	26	33	41	48
State roads	Miles	0	0	0	4	6	10	18	23	29	35
Heliports	Count	4	4	5	5	5	5	5	5	5	5
EPA listed sites	Count	11	17	30	47	55	60	65	73	76	84
NPDES sites	Count	11	16	24	40	47	52	54	60	63	68
OIL sites	Count	0	0	1	1	1	1	1	1	1	1
RADINFO sites	Count	0	1	5	6	7	7	8	10	10	13

	Unit	< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
BY TOTALS											
Hazardous materials facilities	Count	0	0	1	1	1	1	1	1	1	1
Oil facilities	Count	0	0	1	1	1	1	1	1	1	1
Hazardous waste sites	Count	0	1	5	6	7	7	8	10	10	13
Minor hazwaste source sites	Count	0	1	3	3	4	4	4	4	4	6
Unspecified hazardous waste sites	Count	0	0	2	3	3	3	4	6	6	7
Wastewater sites	Count	11	16	24	40	47	52	56	62	65	70
Major wastewater sites	Count	1	1	1	1	1	2	2	2	2	2
Nonmajor wastewater sites	Count	10	15	23	39	46	50	52	58	61	66
Land	Acres	41304	73690	86303	96439	105145	113977	122674	131131	139665	147100
Protected land	Acres	19429	39396	45775	50304	53192	55938	58543	60815	62661	63974
Federal protected land	Acres	20	458	1385	2351	3080	3924	4821	5622	6211	6663
State protected land	Acres	19219	38677	44048	47316	49340	51162	52804	54183	55368	56148

Source: Surging Seas.org; ssrf.climatecentral.org/states/AL/downloads/analysis_total_tables/County/AL_Baldwin_County-total.xls

3.3.8 Dam Failure Vulnerability

Overview

Planning Significance: Low

Potential Losses to Existing Development

According to the National Inventory of Dams, there are 20 dams located within the unincorporated areas of Baldwin County, one of which is listed as a significant hazard. All other dams are low hazard dams where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low-volume roads.

Dam or levee failure is typically an additional or secondary impact of another disaster such as flooding or earthquake. The impacts to the planning area from a dam failure would be similar in some cases to those associated with flood events (see the flood hazard vulnerability analysis and discussion). The biggest difference is that a catastrophic dam failure has the potential to result in greater destruction due to the potential speed of onset and greater depth, extent, and velocity of flooding.

GIS analysis of populations and development in dam inundation areas would provide the most accurate results in terms of estimates of potential loss in the unlikely event of failure. The low hazard dams within the County are not required to prepare an emergency action plan or associated inundation mapping.

Future Development

Flooding due to a dam failure event may exceed the special flood hazard areas regulated through local floodplain ordinances. Future development located downstream from dams and within inundation zones would increase vulnerability to this hazard. Baldwin County should consider the dam failure hazard when permitting development downstream of the significant hazard dam.

3.3.9 Tsunami Vulnerability

Overview

Planning Significance: Low

Potential Losses to Existing Development

The likeliest sources for potential Gulf Coast tsunamis are underwater landslides, but the current record suggests that the large landslides were probably active prior to 7,000 years ago during a period of rapid sea level change. However, sediment supply, especially from the Mississippi River, continues to contribute to slope steepening and increasing fluid pore pressure in the sediments, which may lead to further landslide activity.

GIS analysis of populations and development within a tsunami inundation zone would provide the most accurate results in terms of estimates of potential loss in an event. Currently, tsunami inundation mapping is available for the City of Mobile and Dauphin Island/Gulf Highlands. Mapping is not currently available for Baldwin County. In addition, there are no historical events or observed data to approximate the inundation area of tsunami waves in Baldwin County.

Future Development

Future development along the coastline would be the most vulnerable to a potential tsunami event. Since Baldwin County participates in the National Flood Insurance Program, enforcement of the floodplain management regulations will ensure mitigation of future construction in those areas. However, even if structures are mitigated, evacuation may still be necessary due to rising waters. In addition, floods that exceed mitigated levels may still cause damages.

3.3.10 Future Land Use and Development

Baldwin County is experiencing a significant population growth. It is the 7th fastest growing metropolitan statistical area in the United States. Table 3.28 provides information on changes in population and housing units in the planning area and estimated population growth. There is an estimated 57.28% increase in population from 2010 to 2050 for Baldwin County. With this population growth, Baldwin County should monitor new development to ensure that it does not take place in hazard-prone areas, specifically in the floodplains and dam inundation areas. Estimation of housing growth was not available beyond 2023.

Table 3.27 Change in Population and Housing Units; and Population Projections 2020-2050

Year	Population	Percent Change in Population	Housing Units	Percent Change in Housing Units
2010	182,265		104,061	
2020	231,767	27.16%	124,915	16.67%
2025	259,022	11.76 %	n/a	n/a
2030	283,798	9.57%	n/a	n/a
2035	292,088	2.92%	n/a	n/a
2040	302,040	3.41 %	n/a	n/a
2045	300,659	-0.46%	n/a	n/a
2050	309,447	2.92%	n/a	n/a
Estimated Change from 2010 to 2050		**57.28%**	n/a	n/a

Source: U.S. Census Bureau, University of Alabama, Center for Business and Economic Research: https://cber.cba.ua.edu/edata/est_prj.html; n/a = not available

Planned Development/Expansion Activities

The Baldwin County Planning and Zoning Commission completed a comprehensive plan, *Our Vision, A Citizens Guide to Growth* in the Zoned Areas of Baldwin County, in 2023.

The comprehensive plan is a guidance document for elected and appointed officials, staff and citizens to manage growth and development in the County with regards to land uses and zoning, as well as, the development of public improvements and infrastructure. The map in Figure 3.24 shows the future land use recommendations for the County.

Future land use is divided into broad categories which represent the recommendations for the physical development of the unincorporated areas of the County. The categories are intended for planning purposes only and do not represent the adoption of zoning designations for areas which have not voted their desire to come under the zoning authority of the Baldwin County Commission. The future land use categories contained within the Master Plan include:

PLACE TYPE CATEGORIES

IDEAL CONSERVATION/PRESERVATION

• Environmental Conservation

• Protected/Open Space

Ideal Conservation or Preservation Areas would include land that is undeveloped, or minimally developed, and protected by local, state, and federal agencies or by public, private, and nonprofit organizations. This could include areas conserved for the protection of critical habitat, clean water, open space, or cultural heritage. Zoning Designations may include Environmental Conservation.

CONSERVATION DEVELOPMENT POTENTIAL

• Environmental Conservation

• Protected/Open Space

• Conservation-based Communities

Conservation Development Potential Areas are suitable for all the land uses described in the Ideal Conservation/ Preservation Areas place type but would allow for limited development based on low-impact design principles. Allowing conservation-based subdivisions in these areas could help to balance the pressure of residential development with environmental preservation and rural character. Conservation-based subdivisions allow for the clustering of residential dwellings to protect open space that is valued for natural resource protection— such as stream buffers, mature forest habitat, or wetlands— working farmland, or recreational amenities. Zoning Designations may include Environmental Conservation, CR and OR.

RURAL/AGRICULTURE/LOW IMPACT DEVELOPMENT POTENTIAL

• Rural Subdivisions

• Active Farmland

• Agri-hoods

• Rural Crossroad Center/Node

• Clustered Manufactured Home Communities

Rural Development Potential Areas include large lots, open space views, and a large buffer distance between buildings. Residential homes may be on large tracts and could include estate homes and working farmland. The development pattern may also include conservation-based subdivisions to allow for the clustering of residential dwellings to protect open space that is valued for natural resource protection— such as stream buffers, mature forest habitat, or wetlands—working farmland, or recreational amenities. Lands within these areas should be developed with additional Low Impact Development (LID) standards and buffers to limit the impact to adjacent critical environments. At key rural crossroads, rural

centers or nodes could allow for a combination of retail and service uses to meet the needs of the community. Zoning Designations may include RR, RA and RSF-E

MODERATE DEVELOPMENT POTENTIAL

• Single Family Neighborhoods

(suburban)

• Amenity-based Communities

• Neighborhood Center/Node

Moderate Development Potential Areas are suitable for all of the land uses described in the previous place types but may also include a variety of home types from large and medium-lot single-family detached homes to single-family attached homes such as duplexes and townhomes. Subdivision patterns may be amenity-based communities with small gardens, parks and playgrounds within private lots or part of a community space. Neighborhood centers or nodes at key intersections would allow for a combination of retail, office, and service uses to meet the needs of the community. Zoning Designations may include RSF-1 and RSF-2.

MID-DENSITY DEVELOPMENT POTENTIAL

• New Urban Communities

• Village Center/Node

Mid-density Development Potential Areas are suitable for all of the land uses described in the previous place types but may also include more traditional neighborhoods with a mix of housing and price points with smaller lot sizes to include patio homes, cottage homes, townhouses and multifamily. Neighborhoods have a connected and grid street network with narrow traffic lanes, sidewalks, and walkable block sizes. Village centers or nodes at key intersections would allow for a combination of retail, office, parks, schools, institution and service uses to meet the needs of the community. Zoning Designations may include RSF-3, RSF-4, RTF-4, RSF-6, RTF-6, LB, B-1 and B-2.

HIGH-DENSITY DEVELOPMENT POTENTIAL

• Mixed-Use Communities

• Apartment Communities

• Urban Mixed-Use Center/Node

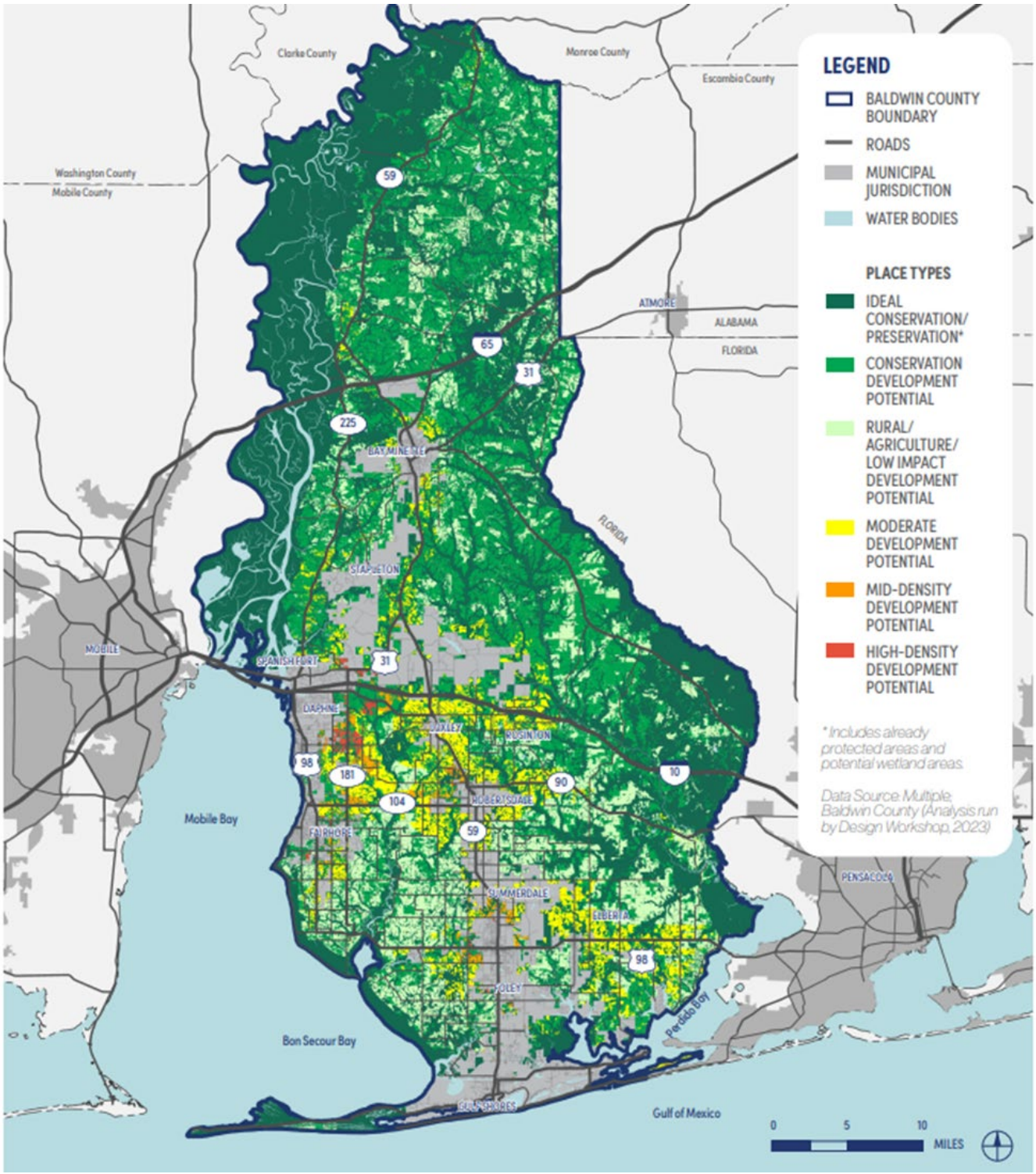
High-density Development Potential Areas are suitable for all the land uses described in the previous place types but have the highest potential for mixed-use communities with a variety of densities including apartment communities, and urban mixed-use centers. Commercial uses are oriented to pedestrian- and bicycle- friendly streets in a connected grid pattern. Zoning Designations may include RMF-6, HDR, RMH, B-3 and B-4.

Future Planning Areas

Future planning areas include locations throughout the County where new development is either underway, has been proposed or is likely to occur. These areas will be evaluated for non-binding future land use categories during the first six-month revision of the Master Plan. Future planning areas as indicated on the Master Plan Map include the following:

- The Stockton area including Bicentennial Park and Live Oak Landing;
- The area surrounding the South Alabama Mega Site;
- The Baldwin Beach Express Corridor;
- The intersection of State Highway 181 and State Highway 104 including the proposed location for a new Catholic High School; this area has adopted county zoning, Planning District 8 & 37
- The Interstate 65, County Road 47 (Rabun Road) interchange;
- The Interstate 10, County Road 64 Extension (Wilcox Road) interchange;
- The Stapleton area including the intersection of US Highway 31 and State Highway 59; and
- The area surrounding the proposed Mudcat Pointe Subdivision in Seminole.

Figure 3.24 Future Land Use Recommendations for Baldwin County



3.3.11 Summary of Key Issues

Table 3.29 shows the results of the Hazard Ranking in order of High to Low Planning Significance based on the methodology described in section 3.1.

Table 3.28 Planning Significance Scores

Hazard	Geographic Location / Spatial Extent	Probability	Magnitude	Planning Significance
Flood: 100-/500-Year	Partial	Very High	Significant	High
Hurricane and Tropical Storms (including storm surge)	Community-Wide	Moderate	Significant	High
Flood: Stormwater/Localized	Community-Wide	Very High	Moderate	Moderate
Coastal Bank Erosion	Minimal	Very High	Moderate	Moderate
Changing Future Conditions and Sea Level Rise	Minimal	High	Slight	Moderate
Dam/Levee Failure	Minimal	Very Low	Slight	Low
Tsunami	Minimal	Very Low	Slight	Low

The following section summarizes key issues and questions for the planning committee brought out by the risk assessment.

- According to the July 31, 2017 Preliminary Flood Insurance Study prepared by FEMA, approximately 25-percent of the parcel acreage within the County is located within a Special Flood Hazard Area (SFHA). Changes in floodplain development and development within the watershed in general due to future population growth is likely to increase the size of the SFHAs due to an increase in impervious area.
- Properties categorized as repetitive loss properties have a greater need for flood protection. Repetitive loss can be attributed to development within the 100-year floodplain as well as localized stormwater flooding. Both types of flooding are likely to increase in the future due to development in the floodplain/watershed as well as due to the effects of climate change and sea level rise. Therefore, is it very likely that unmitigated repetitive loss properties will continue to flood in the future.
- Flash flooding occurs repeatedly in some known areas, often outside of the mapped floodplain.
- Localized flooding issues are addressed by the Highway Department. A tracking mechanism for roadway issues and residential complaints could assist visualizing the flooding issue and prioritizing issues to address.
- Due to the level topography, poorly drained soils, a consistent level of annual precipitation and the tidal influence on canal drainage resulting from heavy

rainstorms, tropical storms, and hurricanes, it is highly likely that unmitigated properties will continue to experience localized flooding. An increase in imperious area due to future development will only exacerbate the localizing flooding issues unless measures are taken to reduce the volume of runoff. Furthermore, the intensity of individual rainfall events is likely to increase in the future due to climate change which may further overwhelm stormwater drainage systems.

- Dam Inundation Maps are needed to determine vulnerability for the identified significant hazard dam.
- Tsunami Inundation Maps are needed to determine vulnerability.

4 MITIGATION STRATEGY

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

This section presents the mitigation strategy developed by the Floodplain Management Planning Committee (FMPC) based on the risk assessment. The mitigation strategy was developed through a collaborative group process and consists of general goal statements and objectives to guide the jurisdictions in efforts to lessen disaster impacts as well as specific mitigation actions that can be put in place to directly reduce vulnerability to hazards and losses. The following definitions are based upon those found in the March 2023 *Local Mitigation Planning Policy Guide*:

- **Goals** are general guidelines that explain what the community wants to achieve with the plan. They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards.
- **Mitigation Actions** are specific actions that help achieve goals.

4.1 Goals

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

The FMPC developed goals to provide direction for reducing hazard-related losses in the planning area. These were based upon the results of the risk assessment and a review of mitigation goals from other state and local plans, specifically, the Alabama State Hazard Mitigation Plan, 2023. This review was to ensure that this plan's mitigation strategy was integrated or aligned with existing plans and policies.

Through a brainstorming process at our second meeting, the FMPC came to a consensus on four main goals. The goals of the mitigation strategy are listed below, in no particular order:

1. Reduce the vulnerability of the people, property, environment, and economy of unincorporated Baldwin County to the impacts of flood hazards.
2. Strengthen protection critical facilities and infrastructure from flood hazards to create a safer, more sustainable community.
3. Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to respond.
4. Maintain and enhance the County's ability to manage a comprehensive flood hazard program.

4.2 Identification and Analysis of

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

Mitigation Actions

After reviewing the results of the risk assessment, the committee discussed the key issues that were identified for specific hazards. In addition, The FHMP Committee provided the FMPC with information on the types of mitigation actions generally recognized by FEMA. A handout was provided with the following types of mitigation actions, which originated from the National Flood Insurance Program's Community Rating System, as well as definitions and examples for each type of action:

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built,
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area,
- **Structural:** Actions that involve the construction of structures to reduce the impact of hazard,
- **Natural resource protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems,
- **Emergency services**: Actions that protect people and property during and immediately after a disaster or hazard event, and
- **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

The FMPC then analyzed a list of potential structural and nonstructural mitigation alternatives, which were organized by hazard and based upon the risk assessment, existing capabilities, and plan goals and objectives. Through a facilitated planning process, each committee member developed ideas for mitigation actions based upon these alternatives and their own ideas. Duplicate ideas were condensed to a refined list of mitigation actions that were written on index cards and categorized by mitigation action type.

Some alternatives identified did not make it to this refined list because they were determined by the FMPC to not be politically, technically, or financially feasible or because no champion for the action was present in the group. However, these ideas are still captured in Appendix C and may be readdressed if funding opportunities change or during the next plan update process.

4.3 Implementation of Mitigation Actions

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

Each proposed mitigation action was evaluated against the following considerations:

- Compatibility with goals and objectives identified in the current Alabama Hazard Mitigation Plan (2018);
- Compatibility with goals and objectives identified in the current Baldwin County Hazard Mitigation Plan (2015);
- Assessment of the impact of identified actions on Baldwin County; and
- Compatibility with other local and regional plans and programs.

To prioritize the mitigation actions, each participating FMPC member evaluated the actions using a simple cost/benefit analysis (Table 4.1). Presented as a web-based survey, FMPC members rated each mitigation action for both benefit (low, medium, or high) and funding impact (easy, potential, or difficult). A weighted score was then applied to the total number of votes within each cost/benefit category for a total priority score. A scoring example is presented in Table 4.2. Depending on the results of the action evaluations, each action is recognized as a high priority project (60 to 100 points), medium priority project (50-59 points), or low priority project (0 to 49 points). The results of the prioritization process are included in Tables 4.3 and 4.4. Figure 4.1 presents a sample of the web-based survey.

This process of identification and analysis of mitigation options allowed the FMPC to come to consensus and to prioritize recommended mitigation actions. Emphasis was placed on the importance of a cost-benefit analysis in determining project priority; however, this was not a quantitative analysis. The Disaster Mitigation Act regulations state that benefit-cost review is the primary method by which mitigation projects should be prioritized. Recognizing the federal regulatory requirement to prioritize by benefit-cost and the need for any publicly funded project to be cost-effective, the FMPC intends to pursue implementation according to when and where damage occurs, available funding, political will, local priority, and priorities identified in the Tennessee Hazard Mitigation Plan. Cost-effectiveness will be considered in additional detail when seeking FEMA mitigation grant funding for eligible projects identified in this plan.

There are a total of 6 new mitigation actions and 19 continued mitigation actions from the previous plan for a total of 25 mitigation actions. Priorities for all mitigation actions were determined and/or updated using the cost-benefit analysis as described above. Table 4.3 summarizes identified actions and provides information on the hazards addressed and plan goals achieved. The individual action items, as recommended and prioritized by the FMPC, are then presented with the order of priority. Each action item includes

responsible office, potential funding, timeline, and estimated cost level for each identified action. Each mitigation action is also identified as either addressing current development or future development. Completed action items, as noted in Table 4.3 are presented in Appendix C.

Table 4.1 Benefit/Cost Analysis

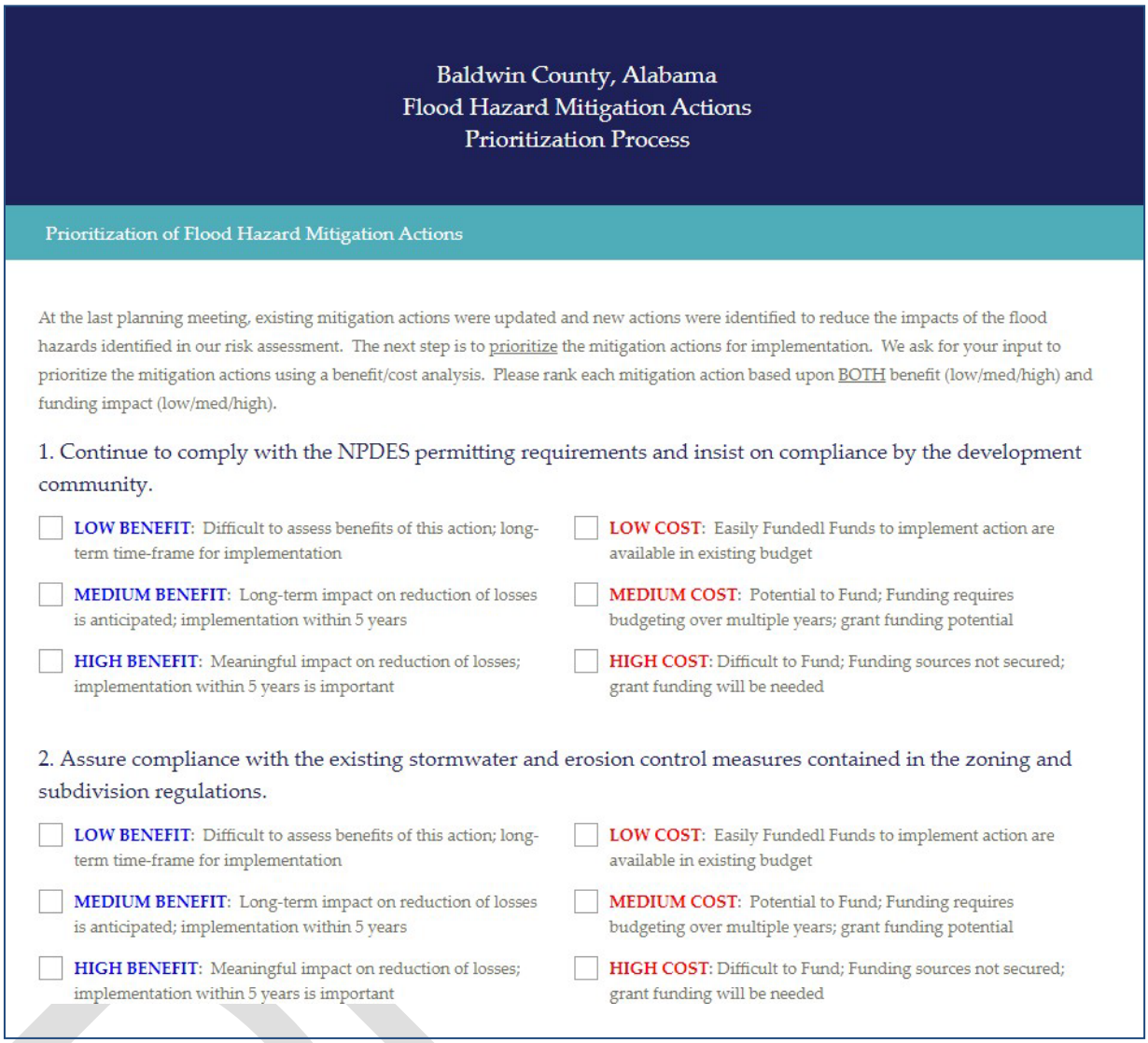
Benefit	Definition	Weighted Value
Low	Difficult to assess benefits of this action; long-term time-frame for implementation	1
Medium	Long-term impact on reduction of losses is anticipated; implementation within 5 years	2
High	Meaningful impact on reduction of losses; implementation within 5 years is important	3
Cost	**Definition**	**Weighted Value**
Difficult to Fund	Funding sources not secured; grant funding will be needed	1
Potential to Fund	Funding requires budgeting over multiple years; grant funding potential	2
Easily Funded	Funds to implement action are available in existing budget	3

Table 4.2 Example Mitigation Action Prioritization

Action: Prioritize and secure funding for buyout of repetitive flood properties.

Benefit	FMPC Votes	Weighted Value	Score
Low	0	1	0
Med	3	2	6
High	10	3	30
Cost	**Definition**	**Weighted Value**	**Score**
Difficult to Fund	0	1	0
Potential to Fund	2	2	4
Easily Funded	11	3	33
TOTAL SCORE			**73 - HIGH**

Figure 4.1 Mitigation Action Survey



Baldwin County, Alabama
Flood Hazard Mitigation Actions
Prioritization Process

Prioritization of Flood Hazard Mitigation Actions

At the last planning meeting, existing mitigation actions were updated and new actions were identified to reduce the impacts of the flood hazards identified in our risk assessment. The next step is to prioritize the mitigation actions for implementation. We ask for your input to prioritize the mitigation actions using a benefit/cost analysis. Please rank each mitigation action based upon BOTH benefit (low/med/high) and funding impact (low/med/high).

1. Continue to comply with the NPDES permitting requirements and insist on compliance by the development community.

- ☐ LOW BENEFIT: Difficult to assess benefits of this action; long-term time-frame for implementation
- ☐ MEDIUM BENEFIT: Long-term impact on reduction of losses is anticipated; implementation within 5 years
- ☐ HIGH BENEFIT: Meaningful impact on reduction of losses; implementation within 5 years is important
- ☐ LOW COST: Easily Fundedl Funds to implement action are available in existing budget
- ☐ MEDIUM COST: Potential to Fund; Funding requires budgeting over multiple years; grant funding potential
- ☐ HIGH COST: Difficult to Fund; Funding sources not secured; grant funding will be needed

2. Assure compliance with the existing stormwater and erosion control measures contained in the zoning and subdivision regulations.

- ☐ LOW BENEFIT: Difficult to assess benefits of this action; long-term time-frame for implementation
- ☐ MEDIUM BENEFIT: Long-term impact on reduction of losses is anticipated; implementation within 5 years
- ☐ HIGH BENEFIT: Meaningful impact on reduction of losses; implementation within 5 years is important
- ☐ LOW COST: Easily Fundedl Funds to implement action are available in existing budget
- ☐ MEDIUM COST: Potential to Fund; Funding requires budgeting over multiple years; grant funding potential
- ☐ HIGH COST: Difficult to Fund; Funding sources not secured; grant funding will be needed

In addition to prioritization of the mitigation actions by the FMPC, the public was invited to the Local Emergency Planning Committee (LEPC) Meeting on September 17 at the Foley Civic Center to review the proposed mitigation actions, vote on priority actions, and provide input on additional mitigation actions.

The following actions received the strongest interest of the public:

- Local plans and regulations, including development review and enforcement
- Structure and Infrastructure projects, including maintenance and/or upgrade of roadways
- Flood protection assistance including flood proofing and assistance with detention pond maintenance
- Natural land and wetland protections

Table 4.3. Mitigation Action Matrix

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Public Education					
1. Provide annual notification of flood hazard determination service to lending institutions, insurance companies, real estate companies and title insurance companies.	High	3	X		X
2. Distribute outreach materials to floodplain residents at county offices and special events.	High	3	X		X
3. Develop Program for Public Information (PPI) to Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to protect their property. Coordinate and consolidate outreach measures identified in the local hazard mitigation plan.	High	3	X		X
Emergency Services					
4. In coordination with the Local Emergency Planning Committee (LEPC), prepare and adopt a local disaster recovery plan to aid in the recovery of flood hazard events.	High	1,2	X		X
5. Strengthen flood warning activities by developing programs including a flood threat recognition system, flood prediction models and a system to disseminate flood warnings to the public.	Med	1,3	X	X	X

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Prevention					
6. Strictly administer existing flood hazard regulations (Flood Damage Prevention Ordinance) and review said regulations to determine their adequacy and whether revisions are needed.	High	1,2	X	X	X
7. Continue to comply with the NPDES permitting requirements and insist on compliance by the development community.	Med	1,2		X	X
8. Assure compliance with the existing stormwater and erosion control measures contained in the zoning and subdivision regulations.	Med	1		X	X
9. Continue participation in the CRS program to reduce flood hazards.	Med	1,2		X	X
10. Continue to assist unincorporated areas to implement planning and zoning in accordance with the provisions of Act No. 91-719, as amended.	Med	1,2		X	X
11. Assure compliance with the wetlands protection provisions contained in the zoning and subdivision regulations and utilize the ADID study findings in the land development review process.	Med	1		X	X
12. Continue to review and comment upon ADEM and COE permit applications for dredge and fill.	Med	4	X	X	X
13. Continue to coordinate flood hazard activities with state and federal environmental agencies including Health Department, ADCNR, ADEM, EPA, NRCS, FEMA, USFWS and COE.	Med	4	X	X	X

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
14. Continue to coordinate flood hazard activities with municipal governments involved in flood hazard management.	Med	4	X	X	X
15. Utilize the County's geographic information system (GIS) to identify and protect flood hazard areas.	Med	1,2	X	X	X
16. Maintain an inventory of county-maintained roads and bridges which become partially or wholly submerged during rainfall events.	Med	2	X	X	X
17. Coordinate with the Baldwin County Local Hazard Mitigation	Med	1,2,3,4	X	X	X
Property Protection					
18. Continue participation in the FEMA hazard mitigation program to purchase properties which repeatedly flood.	Med	1	X		X
19. Research and evaluate the impact of a buyout only hazard mitigation program within the floodway and pursue appropriate action.	Med	1	X		X
20. Review location of repetitive loss properties, define repetitive loss areas (RL and neighboring properties), and develop repetitive loss area analyses to provide more specific guidance on how to reduce damage from repetitive flooding.	Low	1	X		X
21. Train local Baldwin staff with specific EMI retrofitting and floodproofing courses to provide technical assistance to homeowners, builders, and developers on flood protection alternatives. Advertise service on Baldwin County Website.	Low	4	X		X

Action	FMPC Priority	Goals Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Natural Resources Protection					
22. Research the feasibility of establishing and funding a stream maintenance and restoration program and pursue appropriate action.	Med	1	X	X	X
23. Identify significant open space and wetland resources and pursue public and private grants for purchase as appropriate.	Med	1	X	X	X
24. Through continued coordination with US Fish and Wildlife and the Alabama Dept of Conservation & Natural Resources, Baldwin County will continue to examine the appropriate use of sediment-trapping vegetation, sediment mounds, etc., in addressing the impacts of coastal erosion.	Med	4	X	X	X
Structural Projects					
25. Continue program to pave County dirt roads giving priority to dirt roads with known erosion problems.	Med	2	X	X	X

Table 4.4. Mitigation Action Implementation Strategy

****Note: These are previous action items from the 2018 FHMP, please revisit on January 17th for upcoming action items for the 2025 FHMP**

Action ID	FMPC Priority	Mitigation Action	Mitigation Category	Responsible Office	Partners	Potential Resources/Funding	Estimated Cost Level	Timeframe	Status
1	High	Provide annual notification of flood hazard determination service to lending institutions, insurance companies, real estate companies and title insurance companies.	• Public Education	• Building Department	• Planning and Zoning Department	• Staff Time • Department Budgets for printing services	Low	Annually	Ongoing
2	High	Distribute outreach materials to floodplain residents at county offices and special events.	• Public Education	• Building Department	• Planning and Zoning Department	• Staff Time • Department Budgets for printing services	Low	Annually	Ongoing
3	High	Develop Program for Public Information (PPI) to Increase citizen awareness and preparedness by providing information describing all types of flood hazards, flood insurance, methods for preventing flood damage, and how to protect their property. Coordinate and consolidate outreach measures identified in the local hazard mitigation plan.	• Public Education	• Building Department	• Planning and Zoning Department	• Staff Time • Department Budgets for consulting services	Medium	Within 1-Year	Not Started
4	High	In coordination with the Local Emergency Planning Committee (LEPC), prepare and adopt a local disaster recovery plan to aid in the recovery of flood hazard events.	• Emergency Services	• Emergency Management Agency	• Building Inspection • Planning & Zoning	• Staff Time • Department Budgets for consulting services	Low	Within 1-Year	New
5	Med	Strengthen flood warning activities by developing programs including a flood threat recognition system, flood prediction models and a system to disseminate flood warnings to the public.	• Emergency Services	• Emergency Management Agency	• Building Inspection • Planning & Zoning	• Staff Time • Department Budgets for consulting services • DHS Grant Funding	Medium	Within 5-Years	In-Progress
6	High	Strictly administer existing flood hazard regulations (Flood Damage Prevention Ordinance) and review said regulations to determine their adequacy and whether revisions are needed.	• Prevention	• Building Department	Planning and Zoning Department	• Staff Time	Medium	Daily	In-Progress
7	Med	Continue to comply with the NPDES permitting requirements and insist on compliance by the development community.	• Prevention	• Planning & Zoning	Building Inspection	• Staff Time	Medium	Daily	In-Progress
8	Med	Assure compliance with the existing stormwater and erosion control measures contained in the zoning and subdivision regulations.	• Prevention	• Planning & Zoning	Building Inspection	• Staff Time	Medium	Daily	In-Progress
9	Med	Continue participation in the CRS program to reduce flood hazards.	• Prevention	• Building Department	Planning and Zoning Department	• Staff Time	Medium	Daily	Ongoing
10	Med	Continue to assist unincorporated areas to implement planning and zoning in accordance with the provisions of Act No. 91-719, as amended.	• Prevention	• Planning & Zoning	Building Inspection	• Staff Time	Medium	Daily	In-Progress
11	Med	Assure compliance with the wetlands protection provisions contained in the zoning and subdivision regulations and utilize the ADID study findings in the land development review process.	• Prevention	• Planning & Zoning	Building Inspection	• Staff Time	Medium	Daily, as applicable	In-Progress

12	Med	Continue to review and comment upon ADEM and COE permit applications for dredge and fill.	• Prevention	• Planning & Zoning	• Building Inspection	• Staff Time	Medium	Daily, as applicable	In-Progress

Action ID	FMPC Priority	Mitigation Action	Mitigation Category	Responsible Office	Partners	Potential Resources/Funding	Estimated Cost Level	Timeframe	Status
13	Med	Continue to coordinate flood hazard activities with state and federal environmental agencies including Health Department, ADCNR, ADEM, EPA, NRCS, FEMA, USFWS and COE.	• Prevention	• Building Inspection • Planning & Zoning	• Emergency Management Agency	• Staff Time	Medium	Daily, as applicable	In-Progress
14	Med	Continue to coordinate flood hazard activities with municipal governments involved in flood hazard management.	• Prevention	• Building Inspection • Planning & Zoning	• Emergency Management Agency	• Staff Time	Medium	Annually	In-Progress
15	Med	Utilize the County's geographic information system (GIS) to identify and protect flood hazard areas.	• Prevention	• Planning & Zoning		• Staff Time • General Fund	Medium	Within 1-Year	In-Progress
16	Med	Maintain an inventory of county-maintained roads and bridges which become partially or wholly submerged during rainfall events.	• Prevention	• Highway Department	• Building Inspection • Planning & Zoning • Emergency Management Agency	• Staff Time	Medium	Within 1-Year	In-Progress
17	Med	Coordinate with the Baldwin County Local Hazard Mitigation	• Prevention	• Emergency Management Agency	• Building Inspection • Planning & Zoning	• Staff Time • Department Budgets for consulting services	Medium	Annually	New
18	Med	Continue participation in the FEMA hazard mitigation program to purchase properties which repeatedly flood.	• Property Protection	• Building Inspection • Planning & Zoning	• Emergency Management Agency	• HMA Grant Funding • Staff Time	Medium	Annually	In-Progress
19	Med	Research and evaluate the impact of a buyout only hazard mitigation program within the floodway and pursue appropriate action.	• Property Protection	• Building Inspection • Planning & Zoning	• Emergency Management Agency	• HMA Grant Funding • Staff Time	Medium	Annually	In-Progress
20	Low	Review location of repetitive loss properties, define repetitive loss areas (RL and neighboring properties), and develop repetitive loss area analyses to provide more specific guidance on how to reduce damage from repetitive flooding.	• Property Protection	• Building Inspection • Planning & Zoning	• Emergency Management Agency	• HMA Grant Funding • Staff Time	Medium	Within 3-Years	New
21	Low	Train local Baldwin staff with specific EMI retrofitting and floodproofing courses to provide technical assistance to homeowners, builders, and developers on flood protection alternatives. Advertise service on Baldwin County Website.	• Property Protection	• Building Inspection		• Staff Time	Medium	Within 3-Years	New
22	Med	Research the feasibility of establishing and funding a stream maintenance and restoration program and pursue appropriate action.	• Natural Resources Protection	• Planning & Zoning		• Staff Time • EPA Grant Funding	Low	Within 5-Years	Updated
23	Med	Identify significant open space and wetland resources and pursue public and private grants for purchase as appropriate.	• Natural Resources Protection	• Planning & Zoning		• Staff Time • EPA Grant Funding • NOAA Coastal Zone Mgmt Funding • USDA, NRCS	Medium	Within 3-Years	In-Progress
24	Med	Through continued coordination with US Fish and Wildlife and the Alabama Dept of Conservation & Natural Resources, Baldwin County will continue to examine the appropriate use of sediment-trapping vegetation, sediment mounds, etc., in addressing the impacts of coastal erosion.	• Natural Resources Protection	• Planning & Zoning	• AL Dept. Conservation & Natural Resources	• Staff Time	Medium	Within 3-Years	New

Action ID	FMPC Priority	Mitigation Action	Mitigation Category	Responsible Office	Partners	Potential Resources/Funding	Estimated Cost Level	Timeframe	Status
25	Med	Continue program to pave County dirt roads giving priority to dirt roads with known erosion problems.	• Structural Projects	• Highway Department	• Planning & Zoning	• Staff Time • General Fund	Medium	Annually	In-Progress

5 Plan Maintenance Process

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

5.1 Previous Efforts to Monitor, Evaluate, and Update the Plan

Since the approval of the *Baldwin County Flood Hazard Management Plan* in 2000 and the Baldwin County Multi-Hazard Mitigation Plan, the County has demonstrated a commitment to monitoring, evaluating, and updating the plan with formal annual meetings. These annual meetings have consisted of the following:

- Summary review of the hazard mitigation plan;
- Discussion of hazard events over the previous year;
- Discussion of changes in development;
- Progress in mitigation efforts, including status updates to all mitigation actions in the previous plan;
- Discussion of available mitigation funding sources; and
- Discussion of continued public involvement.

Conducting in coordination with the annual CRS update, the Baldwin County Building Inspection Department provided the updated Flood Mitigation Strategy with the current status of each mitigation action to the Baldwin County Commission requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms.

5.2 Monitoring, Evaluating, and Updating the Plan

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

5.2.1 Floodplain Management Planning Committee

With adoption of this plan, the FMPC will continue to be tasked with plan monitoring, evaluation, and maintenance of the plan. The participating members, led by the Baldwin County Building Inspection Department, agree to

- Meet quarterly, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for flood hazard mitigation issues;
- Disseminate flood hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low- or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding

opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the Baldwin County Commissioners; and
- Inform and solicit input from the public.

The FMPC is an advisory body and will not have any powers over county staff. Its primary duty is to encourage implementation of the plan by local partners and to report to the County Commission and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting flood mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website.

5.2.2 Plan Maintenance Schedule

The FMPC agrees to meet quarterly and after a hazard event as appropriate to monitor progress and update the mitigation strategy. The Baldwin County Building Inspection Department Head is responsible for initiating these plan reviews.

A five-year written update of the plan will be submitted to the Alabama Emergency Management Agency and FEMA Region IV per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

Baldwin County coordinate five-year written updates, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be adopted in 2025, the next plan update for the County will occur in 2030.

5.2.3 Plan Maintenance Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting

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

The annual reviews and updates to this plan will:

- Consider changes in vulnerability due to action implementation,
- Document success stories where mitigation efforts have proven effective,
- Document areas where mitigation actions were not effective,

- Document any new hazards that may arise or were previously overlooked,
- Incorporate new data or studies on hazards and risks,
- Incorporate new capabilities or changes in capabilities,
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization.

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

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting on an annual basis to the jurisdictional lead on action status and providing input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional lead will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.
- As part of the quarterly review process, the Baldwin County Building Inspection Department will provide the updated Mitigation Strategy with the current status of each flood mitigation action to the County Commission requesting that the flood mitigation strategy be incorporated, where appropriate in other planning mechanisms.

Changes will be made to the plan during the update process to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as is appropriate and necessary, and as approved by the County Commission. In keeping with the five-year update process, the FMPC will convene public meetings to solicit public input on the plan and its routine maintenance and the final product will be adopted by the County Commission.

Specifically, the County will adhere to the following process for the next update of this FMP:

Quarterly Plan Review Process

For the 2018 Floodplain Hazard Management Plan update review process, Baldwin County's Building Inspection Department will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The review of the Floodplain Hazard Management Plan will be conducted as follows:

- The Building Inspection Department will place an advertisement in the local newspaper advising the public of the date, time, and place for each quarterly review of the plan and will be responsible for leading the meeting to review the plan.
- Notices will be mailed to the members of the FMPC, federal, state, and local agencies, non-profit groups, local planning agencies, representatives of business interests, neighboring communities, and others advising them of the date, time, and place for the review.
- Local County officials will be noticed by email and telephone or personal visit and urged to participate.
- Members of the Baldwin County Commission will also be noticed by email and either by telephone or personal visit.
- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- The local news media will be contacted and a copy of the current plan will be available for public comment.
- After the review meeting, minutes of the meeting and a quarterly report will be prepared by the FMPC and forwarded to the news media (public) and the ISO/CRS specialist for the CRS program. The report will also be presented to the County Commission for review, and a request will be made that the Commission take action to recognize and adopt any changes resulting from the review.

Criteria for Quarterly Reviews

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, the quarterly reviews will include the following information:

- Community growth or change in the past quarter.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to public infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether or not the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the community or closure of businesses, schools, or public services.
- The dates of hazard events descriptions.

- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures due to the hazard and the length of time closed.
- Assessment of the number of private and public buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed. The assessment will include residences, mobile homes, commercial structures, industrial structures, and public buildings, such as schools and public safety buildings.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the community and how and if the policy changes can or should be incorporated into the Floodplain Hazard Management Plan. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

5.3 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants will use existing plans and/or programs to implement flood hazard mitigation actions. Based on the capability assessments, Baldwin County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- Baldwin County Master Plan;
- Ordinances;
- Baldwin County Local Emergency Operations Plan;
- Capital improvement plans and budgets;
- Other community plans within the County, such as stormwater management plans, and parks and recreation plans; and
- Other plans and policies outlined in the capability assessment.

FMPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the Flood Hazard Management Plan, as appropriate. The FMPC is also responsible for monitoring this integration and incorporating the appropriate information into the five-year update of the multi-hazard mitigation plan.

Section 5.2 Monitoring, Evaluating and Updating the Plan, incorporation into existing planning mechanisms will be done through the routine actions of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this Floodplain Hazard Management Plan.

5.4 Continued Public Involvement

44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. Information will be posted in the Newspaper and on the County website following the annual review of the mitigation plan. A public hearing(s) to receive public comment on plan maintenance and updating will be held during the update period. When the FMPC reconvenes for the update, it will coordinate with all stakeholders participating in the planning process, including those who joined the FMPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets, primarily newspapers.

APPENDIX A
ADOPTION RESOLUTION

Flood Hazard Management Planning Committee (FHMPC)

Name	Representing
Staff Members	
Flowers, Corey	Baldwin County Building Inspection Department
Dandridge, Vernon	Baldwin County Emergency Management Agency
Newman, Josh	Baldwin County Planning and Zoning Department
Acreman, Mark	Baldwin County Highway Department
Community Members	
Summerville, Peggy	Citizen Member, Relator
Miller, Christian	Mobile Bay National Estuary Program
Joffe, Donald	Environmental Advisory Committee
Williams, Nick	Sustainability Coordinator, City of Foley

Flood Hazard Management Planning Committee Meetings

- August 7, 2024 – Coordination and organizational meeting number one with staff
- September 4, 2024 - Coordination and organizational meeting number two with staff
- October 8, 2024 – FHMPC Kickoff Meeting
- November 4, 2024 – FHMPC full committee meeting, public meeting
- December 2, 2024 – FHMPC full committee meeting, public meeting
- January 2, 2025 - FHMPC full committee meeting, public meeting
- January 9, 2025 – Public Hearing on the Flood Hazard Management Plan update at the Baldwin County Planning and Zoning Commission meeting
- January 21, 2025 – FHMPC final full committee meeting and public hearing.

Public Involvement

- October 11, 2024 - Public Questionnaire published
- December 17, 2024 – Public Information Flyer published
- Baldwin County Website and Social Media Postings
- Public meetings (see above dates)
- January 9, 2025 - Public Hearing
- Stakeholder emailed information