FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 2

LIBERTY COUNTY, GEORGIA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
ALLENHURST, TOWN OF	130350
FLEMINGTON, CITY OF	130124
GUMBRANCH, CITY OF	130610
HINESVILLE, CITY OF	130125
LIBERTY COUNTY, UNINCORPORATED AREAS	130123
MIDWAY, CITY OF	130351
RICEBORO, CITY OF	130126
WALTHOURVILLE, CITY OF	130459

FEMA

REVISED:

PRELIMINARY
5/31/2016

FLOOD INSURANCE STUDY NUMBER
13179CV001C
Version Number 2.3.2.1

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FLOOD INSURANCE STUDY REPORT
LIBERTY COUNTY, GEORGIA

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Liberty County, Georgia.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Allenhurst, Town of	130350	03060204	13179C0236E 13179C0240F	
Flemington, City of	130124	03060204	13179C0140E 13179C0227F 13179C0229F 13179C0231F 13179C0233F	
Gumbranch, City of	130610	03060203	13179C0210E 13179C0225E	

Table 1: Listing of NFIP Jurisdictions - continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Hinesville, City of	130125	03060203 03060204	13179C0210E 13179C0225E 13179C0226E 13179C0227F 13179C0228E 13179C0229F 13179C0233F 13179C0236E 13179C0237F	

Table 1: Listing of NFIP Jurisdictions - continued

Liberty County, Unincorporated Areas	130123	03060203 03060204	13179C0025E 13179C0050E 13179C0075E 13179C0100E 13179C0120E 13179C0125E 13179C0140E 13179C0143E 13179C0145F 13179C0150E 13179C0175F 13179C0200E 13179C0210E 13179C0225E 13179C0226E 13179C0227F 13179C0228E 13179C0229F 13179C0231F 13179C0233F 13179C0235F 13179C0236E 13179C0237F 13179C0240F 13179C0245F 13179C0254F 13179C0255F 13179C0258F 13179C0260F 13179C0262F 13179C0265F 13179C0266F 13179C0270F 13179C0280F 13179C0290F 13179C0295F 13179C0315F 13179C0350F 13179C0352F 13179C0355F 13179C0356F 13179C0360F 13179C0365F	

Table 1: Listing of NFIP Jurisdictions - continued

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
			13179C0370F 13179C0380F 13179C0385F 13179C0390F 13179C0395F 13179C0405F 13179C0410F 13179C0415F 13179C0420F 13179C0430F 13179C0435F 13179C0440F 13179C0445F	
Midway, City of	130351	03060204	13179C0254F 13179C0258F 13179C0262F 13179C0266F 13179C0270F 13179C0290F	
Riceboro, City of	130126	03060204	13179C0245F 13179C0265F 13179C0270F 13179C0350F 13179C0352F 13179C0355F 13179C0356F 13179C0360F	
Walthourville, City of	130459	03060203 03060204 03070106	13179C0225E 13179C0236E 13179C0240F 13179C0350F	

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater

Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial Countywide FIS Report for Liberty County became effective on September 26, 2008. Refer to Table 28 for information about subsequent revisions to the FIRMs.

- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels. In addition, former flood hazard zone designations have been changed as follows:

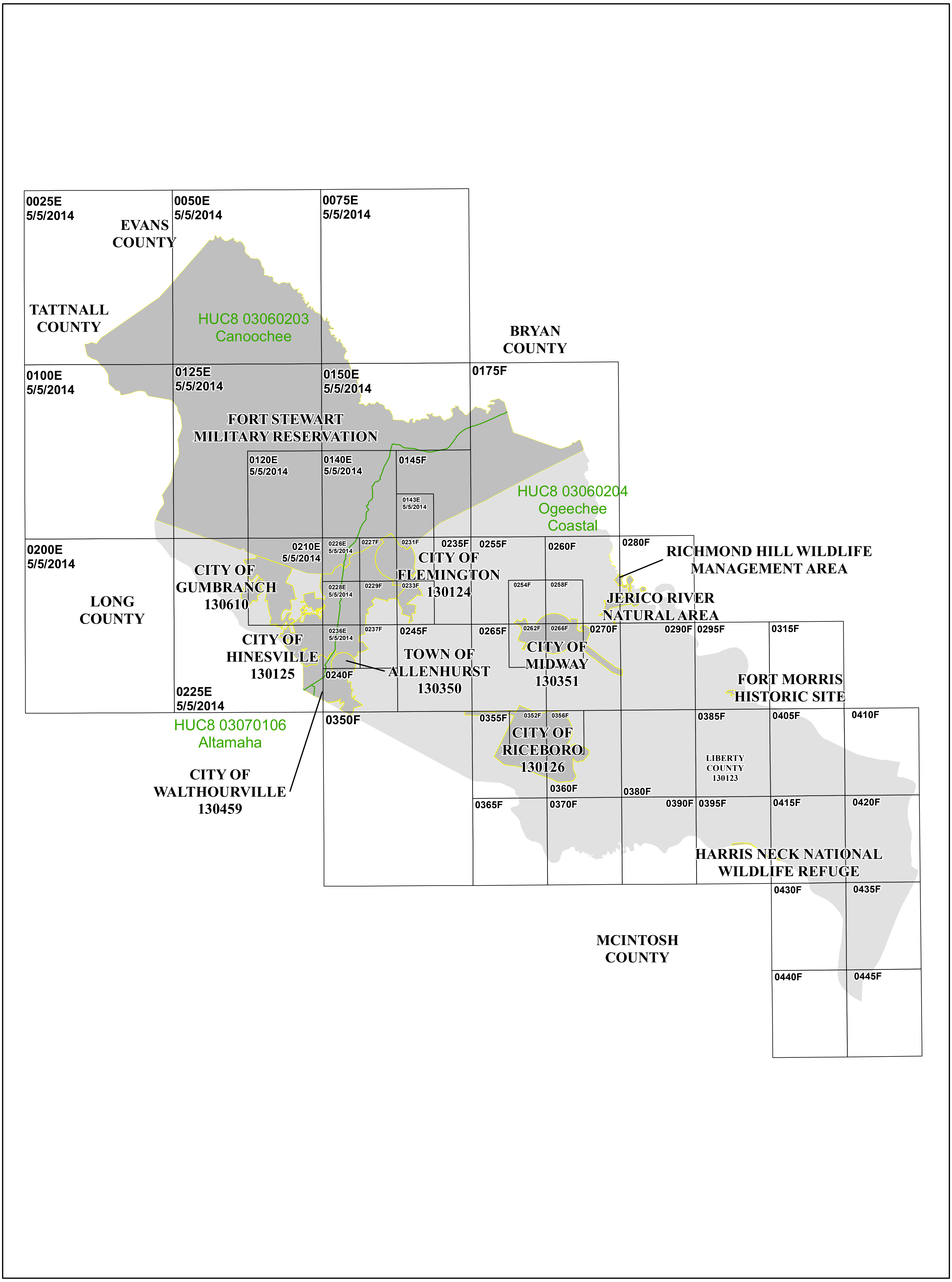
Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

  The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at www.fema.gov/national-flood-insurance-program-community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Liberty County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources.



N

1 inch = 4.5 miles

Miles
0 4.5 9

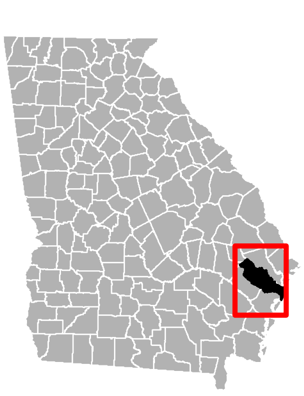
Map Projection:
State Plane Gaorgia East FIPS 1001;
North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

Figure 1: FIRM Panel Index



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

LIBERTY COUNTY, GEORGIA and Incorporated Areas

PANELS PRINTED:
0025E, 0050E, 0075E, 0100E, 0125E, 0125E, 0140E, 0143E, 0145F, 0150E, 0175F, 0200E, 0210E, 0225E, 0226E, 0227F, 0228E, 0229F, 0231F, 0233F, 0235F, 0236E, 0237F, 0240F, 0245F, 0254F, 0255F, 0258F, 0260F, 0262F, 0265F, 0266F, 0270F, 0280F, 0290F, 0295F, 0315F, 0350F, 0352F, 0355F, 0356F, 0360F, 0365F, 0370F, 0380F, 0385F, 0390F, 0395F, 0405F, 0410F, 0415F, 0420F, 0435F, 0440F, 0445F

FEMA

PRELIMINARY
5/31/2016

MAP NUMBER
13179CINDOC

MAP REVISED

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Coastal flood elevations are also provided in the Coastal Transect Parameters table in the FIS Report for this jurisdiction. Elevations shown in the Coastal Transect Parameters table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

Figure 2. FIRM Notes to Users

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Coordinate System, Georgia East FIPS 1001. The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was derived from digital orthophotography provided by the NAIP. This imagery was flown in 2015 and was produced at 1 meter resolution. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Figure 2. FIRM Notes to Users

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Liberty County, Georgia, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Liberty County, Georgia**,** effective February 29, 2016.

COASTAL BARRIER RESOURCES SYSTEM (CBRS): This map includes approximate boundaries of the CBRS for informational purposes only. Flood insurance is not available within CBRS areas for structures that are newly built or substantially improved on or after the date(s) indicated on the map. For more information see www.fws.gov/cbra/, the FIS Report, or call the U.S. Fish and Wildlife Service Customer Service Center at 1-800-344-WILD.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in Zone VE.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Liberty County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were 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 A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM

	Regulatory Floodway determined in Zone AE.
	Non-encroachment zone (see Section 2.4 of this FIS Report for more information)
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
NO SCREEN	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
(ortho) (vector)	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
Aqueduct Channel Culvert Storm Sewer	Channel, Culvert, Aqueduct, or Storm Sewer
Dam Jetty Weir	Dam, Jetty, Weir
	Levee, Dike, or Floodwall
Bridge	Bridge

Figure 3: Map Legend for FIRM

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.*

Symbol	Description
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area

REFERENCE MARKERS

Symbol	Description
22.0 ●	River mile Markers

CROSS SECTION & TRANSECT INFORMATION

Symbol	Description
(B) 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
(5280) 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
(8) - - - - - -	Coastal Transect

Symbol	Description
——- ——— -	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
——-- ———--	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
~~ 513 ~~~~	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity

Figure 3: Map Legend for FIRM

BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}E$	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Liberty County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, "Map Legend for FIRM", describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Liberty County, Georgia, respectively.

Table 2 "Flooding Sources Included in this FIS Report," lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Atlantic Ocean (Flooding Controlled by the Atlantic Ocean)	Liberty County, Unincorporated Areas	Entire Coastline	Entire Coastline	03060204	27.9		N	VE, AE	2015
Alligator Canal	Flemington, City of; Liberty County, Unincorporated Areas	Confluence of Goshen Canal	Approximately 3,600 feet upstream of Old Hines Road	03060204	1.6		Y	AE	2012
Cay Creek	Midway, City of; Liberty County, Unincorporated Areas	Confluence of Peacock Creek	Approximately 2,500 feet upstream of Ocean Highway	03060204	1.9		Y	AE	2012/LOMR
Goshen Canal	Flemington, City of; Liberty County, Unincorporated Areas	Confluence with Peacock Creek	Approximately 100 feet upstream of Old Hines Road	03060204	3.7		Y	AE	1980 (redelineated in 2008 and 2012)
Jerico River	Liberty County, Unincorporated Areas	Confluence of Jerico Creek	Approximately 7,200 feet downstream from State Highway 144	03060204	13.3		N	AE	2012
Mallard Canal	Flemington, City of; Liberty County, Unincorporated Areas	Confluence of Alligator Canal	Oglethorpe Highway	03060204	0.6		Y	AE	2012
Mill Creek	Hinesville, City of; Liberty County, Unincorporated Areas	Approximately 15,500 feet upstream of 18th Street	From Elma G Miles Pky	03060203	5.3		Y	AE	2012
Mill Creek Tributary No. 2	Hinesville, City of; Liberty County, Unincorporated Areas	Confluence of Mill Creek	From Debbie Drive	03060203	2.0		Y	AE	2012

Table 2: Flooding Sources Included in this FIS Report - continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Peacock Creek	Flemington, City of; Hinesville, City of; Liberty County, Unincorporated Areas	Approximately 17,100 feet above I-95	Approximately 800 feet upstream of Joseph Martin Drive	03060204	13.6		N	AE	2012
Peacock Creek Tributary No. 1	Flemington, City of; Hinesville, City of	Confluence of Peacock Creek	Oglethorpe Highway	03060204	2.2		Y	AE	2012
Porter Creek	Midway, City of; Liberty County, Unincorporated Areas	Confluence of Peacock Creek	Coastal Highway	03060204	4.2		N	AE	2012/LOMR
Porter Creek Tributary No. 1	Liberty County, Unincorporated Areas	Confluence of Porter Creek	Coastal Highway	03060204	1.7		N	AE	2012/LOMR
Riceboro Creek	Riceboro, City of; Liberty County, Unincorporated Areas	Approximately 6,000 feet upstream of confluence of Peacock Creek	Approximately 1,300 feet upstream of US Highway 17/State Highway 25 South Coastal Highway	03060204	2.6		N	AE, A	2012

Table 2: Flooding Sources Included in this FIS Report - continued

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Alligator Canal, Canoochee River, Cay Creek, Goshen Canal, Gress River, Jerico Creek, Jones Creek, Mount Hope Creek, Payne Creek, Peacock Creek Tributary No. 1, Raccoon Branch, Riceboro Creek, Riceboro Creek Tributary No. 6, Riceboro Creek Tributary No. 7, South Newport River	Multiple - Refer to FIRM	Refer to FIRM	Refer to FIRM	N/A	N/A	N/A	N	A	2012
Porter Creek Tributary No. 2, Taylors Creek									2007

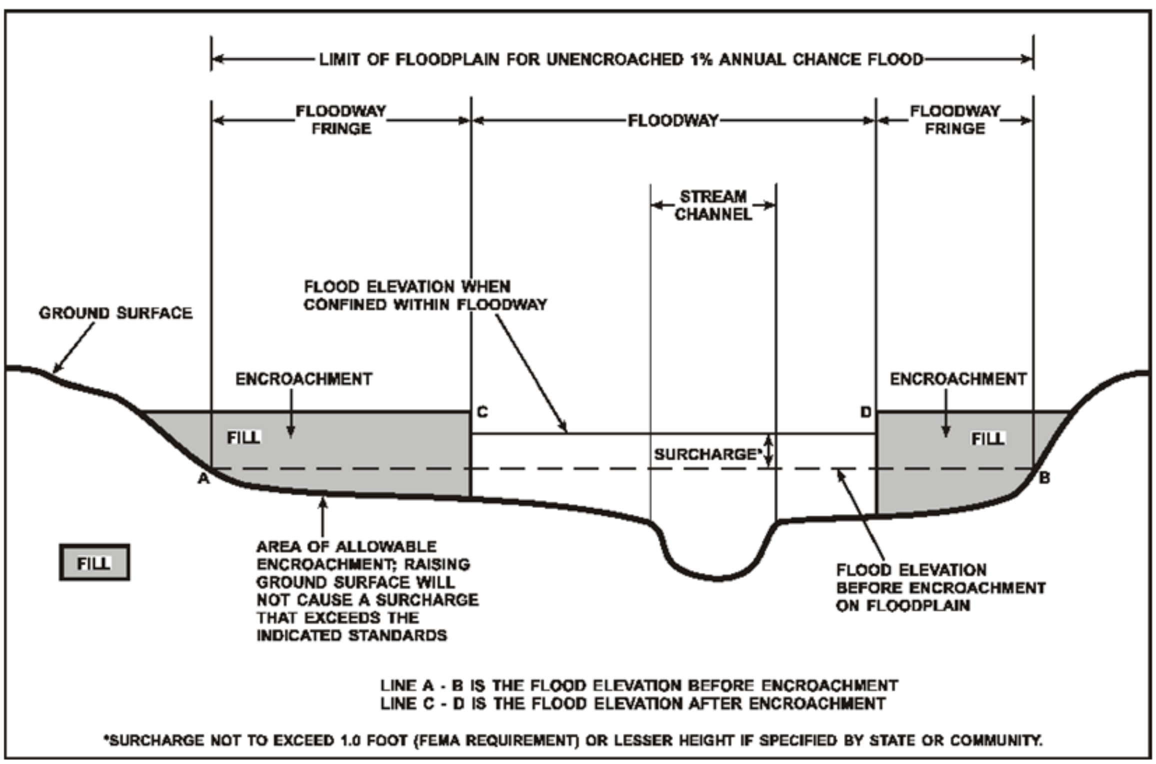
2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, "Floodway Data."

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and l% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. For flooding sources with medium flood risk, field surveys are often not collected and surveyed bridge and culvert geometry is not developed. Standard hydrologic and hydraulic analyses are still performed to determine BFEs in these areas. However, floodways are not typically determined, since specific channel profiles are not developed. To assist communities with managing floodplain development in these areas, a "non-encroachment zone" may be provided. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event. As with a floodway, all surcharges must fall within the acceptable range in the non-encroachment zone.

General setbacks can be used in areas of lower risk (e.g. unnumbered Zone A), but these are not considered sufficient where unnumbered Zone A is replaced by Zone AE. The NFIP requires communities to ensure that any development in a non-encroachment area causes no increase in BFEs. Communities must generally prohibit development within the area defined by the non-encroachment width to meet the NFIP requirement.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1% annual chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1% annual chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1% annual chance storm. The 1% annual chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

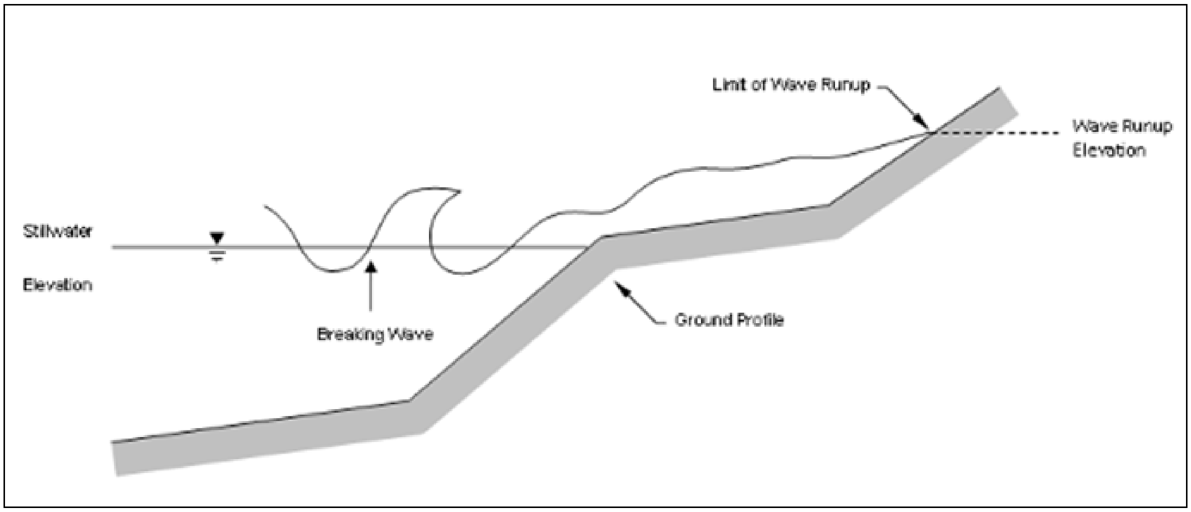
Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.

- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

Figure 5: Wave Runup Transect Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in **Figure 8**, "1% Annual Chance Total Stillwater Levels for Coastal Areas."

In some areas, the 1% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% annual chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 26 presents the types of coastal analyses that were used in mapping the 1% annual chance floodplain in coastal areas.

Coastal BFEs

Coastal BFEs are calculated as the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm plus the additional flood hazard from overland wave effects (storm-induced erosion, overland wave propagation, wave runup and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 17, "Coastal Transect Parameters." The locations of transects are shown in Figure 9, "Transect Location Map." More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1% annual chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1% annual chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

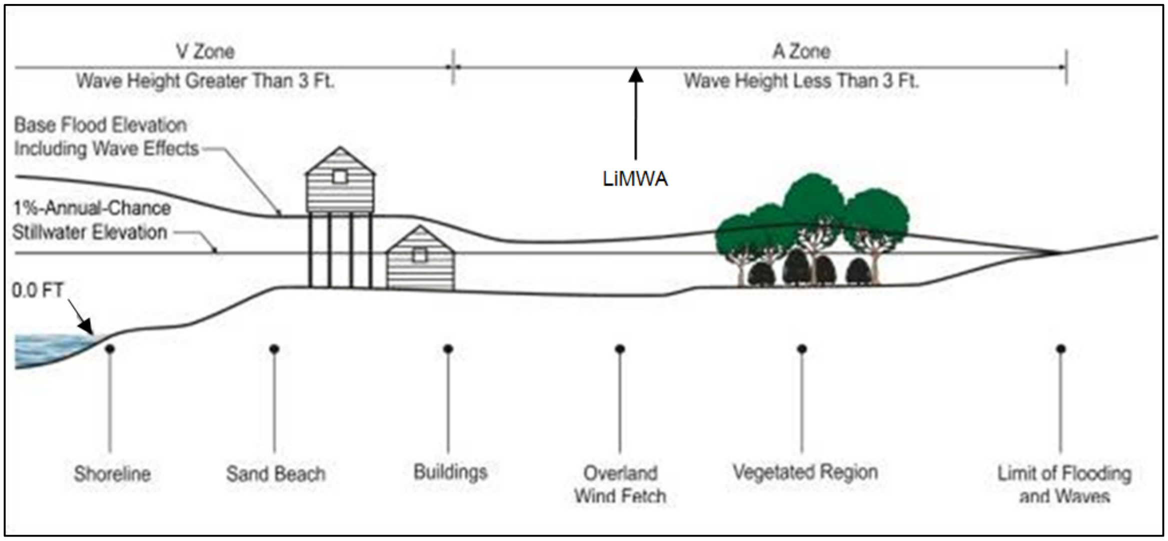
CHHAs are designated as "V" zones (for "velocity wave zones") and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as "A" zones on the FIRM.

Figure 6, "Coastal Transect Schematic," illustrates the relationship between the base flood elevation, the 1% annual chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6: Coastal Transect Schematic



Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, "Map Legend for FIRM." In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 17 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

Laboratory tests and field investigations have shown that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE building construction. Wood-frame, light gage steel, or masonry walls on shallow footings or slabs are subject to damage when exposed to waves less than 3 feet in height. Other flood hazards associated with coastal waves (floating debris, high velocity flow, erosion, and scour) can also damage Zone AE construction.

Therefore, a LiMWA boundary may be shown on the FIRM as an informational layer to assist coastal communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The location of the LiMWA relative to Zone VE and Zone AE is shown in Figure 6.

The effects of wave hazards in Zone AE between Zone VE (or the shoreline where Zone VE is not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot or greater breaking waves are projected to occur during the 1% annual chance flooding event. Communities are therefore encouraged to adopt and enforce more stringent floodplain management requirements than the minimum NFIP requirements in the LiMWA. The NFIP Community Rating System provides credits for these actions.

Where wave runup elevations dominate over wave heights, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. Examples of these areas include areas with steeply sloped beaches, bluffs, or flood protection structures that lie parallel to the shore. In these areas, the FIRM shows the LiMWA immediately landward of the VE/AE boundary. Similarly, in areas where the zone VE designation is based on the presence of a primary frontal dune or wave overtopping, the LiMWA is delineated immediately landward of the Zone VE/AE boundary.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Liberty County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Allenhurst, Town of	A, X
Flemington, City of	A, AE, X
Gumbranch, City of	A, X
Hinesville, City of	A, AE, X
Liberty County, Unincorporated Areas	A, AE, VE, X
Midway, City of	A, AE, X
Riceboro, City of	A, X
Walthourville, City of	A, X

3.2 Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) of 1982 was established by Congress to create areas along the Atlantic and Gulf coasts and the Great Lakes, where restrictions for Federal financial assistance including flood insurance are prohibited. In 1990, Congress passed the Coastal Barrier

Improvement Act (CBIA), which increased the extent of areas established by the CBRA and added "Otherwise Protected Areas" (OPA) to the system. These areas are collectively referred to as the John. H Chafee Coastal Barrier Resources System (CBRS). The CBRS boundaries that have been identified in the project area are in Table 4, "Coastal Barrier Resource System Information."

Table 4: Coastal Barrier Resources System Information

Primary Flooding Source	CBRS/OPA Type	Date CBRS Area Established	FIRM Panel Number(s)
Atlantic Ocean (Flooding controlled by the Atlantic Ocean)	OPA	11/16/1991	13179C0405F 13179C0410F 13179C0415F 13179C0420F 13179C0430F 13179C0435F 13179C0440F 13179C0445F

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Canoochee	03060203	Canoochee Creek, Goshen Canal, Horse Creek, Little Horse Creek, Long Branch, Peacock Creek, Peacock Creeb Tributary No. 1, Riceboro Creek, Tennesee Branch	Covers the interior northwest portion of Liberty County. Affecting one third of Liberty County	N/A

Table 5: Basin Characteristics - continued

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Ogeechee Coastal	03060204	Atlantic Ocean (Flooding controlled by the Atlantic Ocean), Alligator Canal, Ashley Creek, Brunsen Creek, Canoochee River, Cay Creek, Goshen Canal, Jerico River, Mallard Canal, North Newport River, Peacock Canal, Peacock Creek, Peacock Creek Tributary No. 1, Porter Creek, Porter Creek Tributary, Riceboro Creek	Largest watershed within Liberty County, encompassing the southeastern half of the county	N/A

4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for Liberty County by flooding source.

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
Atlantic Ocean (Flooding controlled by the Atlantic Ocean)	The geographic location of Liberty County along the Atlantic Ocean places it in the hurricane path from storms originating in this warm tropical area of the Atlantic Ocean, Carribean Sea, and the Gulf of Mexico. During the last century, the county has escaped the direct path of a hurricane, but has felt the effects of some. A 1970 Environmental Science Service Administration (ESSA) document identified two storms affecting Liberty County. On August 31, 1964, Hurricane Cleo produced some side effects caused by heavy rains and winds, but resulted in no casualties, and no extensive damage was reported. Hurricane Dora produced similar effects in September 1964 (ESSA, 1970).

Table 7 contains information about historic flood elevations in the communities within Liberty County.

Table 7: Historic Flooding Elevations

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Miscellaneous	Allenhurst, Town of; Flemington, City of; Gumbranch, City of; Hinesville, City of; Liberty County, Unincorporated Areas; Midway, City of; Riceboro, City of; Walthourville, City of	N/A	N/A	N/A	N/A

4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within Liberty County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 8: Non-Levee Flood Protection Measures

[Not Applicable to this Flood Risk Project]

4.4 Levees

This section is not applicable to this Flood Risk Project.

Table 9: Levees

[Not Applicable to this Flood Risk Project]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, "Incorporated Letters of Map Change", which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, "FIRM Revisions."

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Pre-Countywide Analysis

For the Goshen Canal, discharge-frequency relationships for riverine flooding were based on the Regional Analysis as outlined in the USGS publication Open-File Report 76-511, titled Flood Frequency Analysis for Small Natural Stream in Georgia (USGS,1976). This regional analysis is based on statistical computations of discharge records at various sites in Georgia, regressed against basin characteristics. The 0.2-percent-annual-chance discharge values were extrapolated from the lower frequency floods.

September 26, 2008 Initial Countywide FIS

For the approximate study streams of Porter Creek Tributary No. 2 and Taylors Creek, peak flows were determined using the rural regression equations for Georgia (Stamey and Hess, 1993).

May 5, 2014 Countywide Revision

Approximately 194.2 stream miles of Approximate studies, 16.5 miles of Limited Detail study, and 16.3 miles of detailed study stream miles were studied as part of the revised analysis. The two-dimensional XPSWMM-2D software package (version 2011) was utilized for both the hydrologic and hydraulic modeling tasks.

Two separate rainfall data sources were considered for this study. The first source was the NRCS's WinTR-55 program, which publishes rainfall statistics for each County. The second source was the National Weather Service's TP-40, which is a collection of isohyetal maps for different storm frequencies. A spreadsheet was created to compare data from each source for each storm frequency. Rainfall values between the two sources were nearly identical. For some storm frequencies, there was a 1/2-inch difference in values, with the NRCS values typically higher in value. Because the NRCS values were typically more conservative, and because they are more current (2009 versus 1661 for TP-40), the NRCS values were chosen for all simulations.

The hydrology for Mill Creek, Mill Creek Tributary 2, and Horse Creek was modeled in USACE's HEC-HMS program. The Green and Ampt infiltration method was used as a loss method to account for losses in each watershed. The HEC-HMS model was calibrated to fit the regional flood-frequency curve.

Countywide Revision

The two-dimensional XPSWMM-2D software package (version 2011) was utilized for both the hydrologic and hydraulic modeling tasks.

The hydrology for Cay Creek, Porter Creek and Porter Creek Tributary No.1 was developed by Thomas and Hutton using USACE's HEC-HMS program. The Soil and Conservation (SCS) was used as a loss method to account for losses in each watershed.

Peak discharges for Alligator Canal, Mallard Canal, and Peacock Creek Tributary were estimated using USGS regression equations (USGS, 2009).

A summary of the discharges is provided in Table 10. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 11. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 17.) Stream gage information is provided in Table 12.

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Alligator Canal	At the confluence with Goshen Canal	3.5	376	*	653	797	*	1138
Alligator Canal	Just downstream of Old Hines Road	2.4	298	*	521	638	*	914
Cay Creek	Upstream of the confluence with Peacock Creek	7.6	1163	*	1715	2007	*	2735
Cay Creek	Approximately 5,800 feet upstream of Cay Creek Road	4.2	1038	*	1433	1657	*	2241
Cay Creek	Upstream of Ocean Highway	1.8	771	*	995	1133	*	1445
Goshen Canal	Upstream of confluence with Peacock Creek	8.4	760	*	1,190	1,410	*	1,970
Goshen Canal	Approximately 5,300 feet Highway 84/State Highway 38/East Oglethorpe Highway	10.3	860	*	1,350	1,600	*	2,240
Goshen Canal	Just below Old Hines Road	9.5	820	*	1,280	1,520	*	2,120

Table10: Summary of Discharges - continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Mallard Canal	Approximately 430 feet upstream of the confluence with Alligator Canal	0.8	152	*	270	333	*	483
Mallard Canal	Just below U.S. Highway 84/State Highway 38/East Oglethorpe Highway	0.4	99	*	178	220	*	322
Mill Creek	Just above 18th Street	18.4	1,204	*	1,906	2,269	*	3,150
Mill Creek	Approximately 3,925 feet upstream of Fort Stewart Railway	13.1	990	*	1,550	1,840	*	2,600
Mill Creek	Approximately 6600 feet downstream of the confluence of Mill Creek Tributary No. 2	10.89	837	*	1,353	1,647	*	2,401
Mill Creek	Just downstream of the confluence of Mill Creek Tributary No. 2	7.53	482	*	754	911	*	1,302
Mill Creek	Just upstream of the of the confluence of Mill Creek Tributary No. 2	2.81	200	*	350	430	*	619

Table10: Summary of Discharges - continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Mill Creek Tributary No. 2	Just upstream of the confluence with Mill Creek	3.92	264	*	413	499	*	687
Mill Creek Tributary No. 2	Immediately upstream of Glenn Bryant Road	3.08	246	*	395	476	*	653
Peacock Creek	At confluence with North Newport River	65.5	2,550	*	4,080	4,920	*	7,000
Peacock Creek	Downstream of the confluence of Cay Creek	65.1	2,540	*	4,070	4,900	*	6,970
Peacock Creek	Downstream of the confluence of Riceboro Creek	56.2	2,330	*	3,720	4,480	*	6,300
Peacock Creek	Upstream of the confluence of Riceboro Creek	48.8	2,140	*	3,420	4,110	*	5,800
Peacock Creek	At USGS Gage	31.5	1,650	*	2,630	3,150	*	4,400
Peacock Creek	Downstream of the confluence of Goshen Canal	26.4	1,490	*	2,370	2,830	*	3,950
Peacock Creek	Upstream of the confluence of Goshen Canal	14.3	898	*	1,525	1,845	*	2,594

Table10: Summary of Discharges - continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Peacock Creek	Downstream of the confluence of Peacock Creek Tributary No.1	8.5	652	*	1,116	1,355	*	1,915
Peacock Creek	Upstream of the confluence of Peacock Creek Tributary No.1	5.5	495	*	855	1,040	*	1,478
Peacock Creek	Approximately 2,980 feet downstream of U.S. Highway 84/State Highway 38/State Highway 196/Oglethorpe Highway	2.9	333	*	580	709	*	1,015
Peacock Creek Tributary No. 1	Just upstream of the confluence with Peacock Creek	2.5	306	*	535	655	*	938
Porter Creek	At the confluence with Porter Creek Tributary No. 1	4.26	448	*	695	828	*	1,147
Porter Creek	At the confluence with Peacock Creek	5.57	568	*	823	970	*	1,355
Porter Creek Tributary No. 1	At the confluence with Porter Creek	1.1	264	*	412	492	*	685

Table10: Summary of Discharges - continued

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance Existing	1% Annual Chance Future	0.2% Annual Chance
Riceboro Creek	Approximately 210 feet upstream of the confluence with Peacock Creek	6.9	680	*	1,060	1,250	*	1,750
Riceboro Creek	Approximately 1,220 feet upstream of U.S. Highway 17/State Highway 25/South Coastal Highway	6.0	620	*	970	1,150	*	1,600

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this Flood Risk Project]

Table 11: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this Flood Risk Project]

Table 12: Stream Gage Information used to Determine Discharges

[Not Applicable to this Flood Risk Project]

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Pre-Countywide Analysis

Cross sections for the backwater analyses were obtained from aerial photographs flown in March 1979, at a scale of 1:4,800 (Abrams Aerial Survey Corporation, 1979). The below-water sections were obtained by field measurement. All bridges, dams, and culverts were field checked to obtain elevation data and structural geometry.

For Goshen Canal, water surface elevations (WSELs) of floods of the selected recurrence intervals were computed using the USACE's Hydrologic Engineering Center (HEC) HEC-2 computer program (HEC, 1984). Flood profiles were drawn (where required) showing computed WSELs for floods of the selected recurrence intervals. Starting WSELs were calculated using the slope-area method.

September 26, 2008 Initial Countywide FIS

For the approximate study streams of Porter Creek Tributary No. 2 and Taylors Creek, cross section data was obtained from two foot contours derived from a LiDAR generated digital terrain model (Laser Mapping Specialists Inc., 2006). Roads were modeled as weirs, using elevations from the topography. The studied streams listed in Table 2 were modeled using HEC-RAS Version 3.1.3 (HEC, 2004).

May 5, 2014 Countywide Revision

The two-dimensional XPSWMM-2D software package (version 2011) was utilized for both the hydrologic and hydraulic modeling tasks. One-dimensional channels were imbedded into the 2D model to represent the channel portion of the Limited Detail and Detail streams studied under the revised study. For Limited Detail streams, the survey team only measured the structure opening, not actual elevation data. This arrangement is slightly different than a typical HEC-RAS bridge geometry editor. For bridges that were surveyed, typically two components were entered into XP-

SWMM. First, the channel geometry was entered, including the bridge piers (if any). The second component would describe the bridge deck and low chord of the bridge.

In addition to bridges that were surveyed, a number of channel cross-sections were surveyed for the Detailed study streams, as well. Between surveyed cross-sections, we utilized a tool that linearly interpolates the five cross-section points that describe a channel within its banks. All model links within the 1D model without channel survey data were defined with channel cross-sections cut from the LIDAR data with interpolated channels.

The hydraulic modeling for Mill Creek and Mill Creek Tributary #2 was based on detailed, steady state, one dimensional model approach using the USACE, HEC-RAS software, version 4.1.0. 10' Digital Elevation Model (DEM) extracted from the Terrain dataset was used to extract cross-sections's stations data. To supplement the digital topography data field surveyed cross-section and road crossing data was incorporated in the hydraulics models. The hydraulic structures were assumed to be unobstructed. Known water surface elevations from the downstream effective study were utilized as a boundary condition for Black Creek model. Normal depth was used as a boundary condition for all other streams.

Countywide Revision

The two-dimensional XPSWMM-2D software package (version 2011) was utilized for both the hydrologic and hydraulic modeling tasks. One-dimensional channels were imbedded into the 2D model to represent the channel portion of the Limited Detail and Detail streams studied under the revised study. For Limited Detail streams, the survey team only measured the structure opening, not actual elevation data. This arrangement is slightly different than a typical HEC-RAS bridge geometry editor. For bridges that were surveyed, typically two components were entered into XP-SWMM. First, the channel geometry was entered, including the bridge piers (if any). The second component would describe the bridge deck and low chord of the bridge.

In addition to bridges that were surveyed, a number of channel cross-sections were surveyed for the Detailed study streams, as well. Between surveyed cross-sections, we utilized a tool that linearly interpolates the five cross-section points that describe a channel within its banks. All model links within the 1D model without channel survey data were defined with channel cross-sections cut from the LIDAR data with interpolated channels.

The hydraulic modeling for Alligator Canal, upstream portion of Cay Creek, Mallard Canal, Peacock Creek Tributary, Porter Creek, Porter Creek Tributary # 1was based on detailed, steady state, one dimensional model approach using the USACE, HEC-RAS software, version 4.1.0. 10' Digital Elevation Model (DEM) extracted from the Terrain dataset was used to extract cross-sections's stations data. To supplement the digital topography data field surveyed cross-section and road crossing data was incorporated in the hydraulics models. The hydraulic structures were assumed to be unobstructed. Known water surface elevations from the downstream effective study were utilized as a boundary condition for Black Creek model. Normal depth was used as a boundary condition for all other streams.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed on Table 24, "Floodway Data."

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 13. Roughness coefficients are provided in Table 14. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 13: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Alligator Canal	Confluence of Goshen Canal	Approximately 3,600 feet upstream of Old Hines Road	XPSSWMM-2D (version 2011), USGS regression equations	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012	AE	
Cay Creek	Confluence of Peacock Creek	Approximately 2,500 feet upstream of Ocean Highway	XPSSWMM-2D (version 2011), USACE's HEC-HMS	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012/LOMR	AE	Thomas and Hutton
Goshen Canal	Confluence with Peacock Creek	Approximately 100 feet upstream of Old Hines Road	Regional Analysis	HEC-2	1980 (redelineated in 2008 and 2012)	AE	USGS publication Open-File Report 76*511
Jerico River	Confluence of Jerico Creek	Approximately 7,200 feet downstream from State Highway 144	XPSSWMM-2D (version 2011)	XPSSWMM-2D (version 2011)	2012	AE	
Mallard Canal	Confluence of Alligator Canal	Oglethorpe Highway	XPSSWMM-2D (version 2011), USGS regression equations	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012	AE	
Mill Creek	Approximately 15,500 feet upstream of 18th Street	From Elma G Miles Pky	XPSSWMM-2D (version 2011), USACE's HEC-HMS	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012	AE	

Table 13: Summary of Hydrologic and Hydraulic Analyses - continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Mill Creek Tributary No. 2	Confluence of Mill Creek	From Debbie Drive	XPSSWMM-2D (version 2011), USACE's HEC-HMS	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012	AE	
Peacock Creek	Approximately 17,100 feet above I-95	Approximately 800 feet upstream of Joseph Martin Drive	XPSSWMM-2D (version 2011)	XPSSWMM-2D (version 2011)	2012	AE	
Peacock Creek Tributary No. 1	Confluence of Peacock Creek	Oglethorpe Highway	XPSSWMM-2D (version 2011), USGS regression equations	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012	AE	
Porter Creek	Confluence of Peacock Creek	Coastal Highway	XPSSWMM-2D (version 2011), USACE's HEC-HMS	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012/LOMR	AE	Thomas and Hutton
Porter Creek Tributary No. 1	Confluence of Porter Creek	Coastal Highway	XPSSWMM-2D (version 2011), USACE's HEC-HMS	XPSSWMM-2D (version 2011), HEC-RAS version 4.1.0	2012/LOMR	AE	Thomas and Hutton
Riceboro Creek	Approximately 6,000 feet upstream of confluence of Peacock Creek	Approximately 1,300 feet upstream of US Highway 17/State Highway 25 South Coastal Highway	XPSSWMM-2D (version 2011)	XPSSWMM-2D (version 2011)	2012	AE, A	

Table 13: Summary of Hydrologic and Hydraulic Analyses - continued

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Alligator Canal, Canoochee River, Cay Creek, Goshen Canal, Gress River, Jerico Creek, Jones Creek, Mount Hope Creek, Payne Creek, Peacock Creek Tributary No. 1, Raccoon Branch, Riceboro Creek, Riceboro Creek Tributary No. 6, Riceboro Creek Tributary No. 7, South Newport River	Refer to FIRM	Refer to FIRM	XPSSWMM-2D (version 2011)	XPSSWMM-2D (version 2011)	2012	A	
Porter Creek Tributary No. 2, Taylors Creek	Refer to FIRM	Refer to FIRM	rural regression equations for Georgia	HEC-RAS version 3.1.3	2007	A	

Table 14: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Alligator Canal	0.050	0.100
Cay Creek	0.033-0.060	0.033-0.010
Goshen Canal	0.015	0.200
Mallard Canal	0.050	0.100
Mill Creek	0.055	0.060-0.200
Mill Creek Tributary #2	0.055	0.060-0.200
Peacock Creek Tributary	0.050	0.100
Porter Creek	0.045	0.045-0.100
Porter Creek Tributary #1	0.050	0.070-0.100

5.3 Coastal Analyses

For the areas of Liberty County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to extreme tides and storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 15 summarizes the methods and/or models used for the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

Table 15: Summary of Coastal Analyses

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Storm Climatology Statistical Analyses	JPM-OS	11/1/2013
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Storm Surge including Regional Wave Setup	ADCIRC + SWAN	10/7/2013
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Stillwater Frequency Analysis	SURGESTAT (low frequency); Tidal Frequency Analysis (high frequency)	11/21/2013

Table 15: Summary of Coastal Analyses - continued

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Dune Erosion	FEMA's Erosion Assessment	12/18/2014
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Overland Wave Propagation	WHAFIS	12/18/2014
Atlantic Ocean	Entire coastline of Liberty County	Entire coastline of Liberty County	Wave Runup	RUNUP2.0	12/18/2014

5.3.1 Total Stillwater Elevations

The total stillwater elevations (stillwater including storm surge plus wave setup) for the 1% annual chance flood were determined for areas subject to coastal flooding. The models and methods that were used to determine storm surge and wave setup are listed in Table 15. The stillwater elevation that was used for each transect in coastal analyses is shown in Table 17, "Coastal Transect Parameters." Figure 8 shows the total stillwater elevations for the 1% annual chance flood that was determined for this coastal analysis.

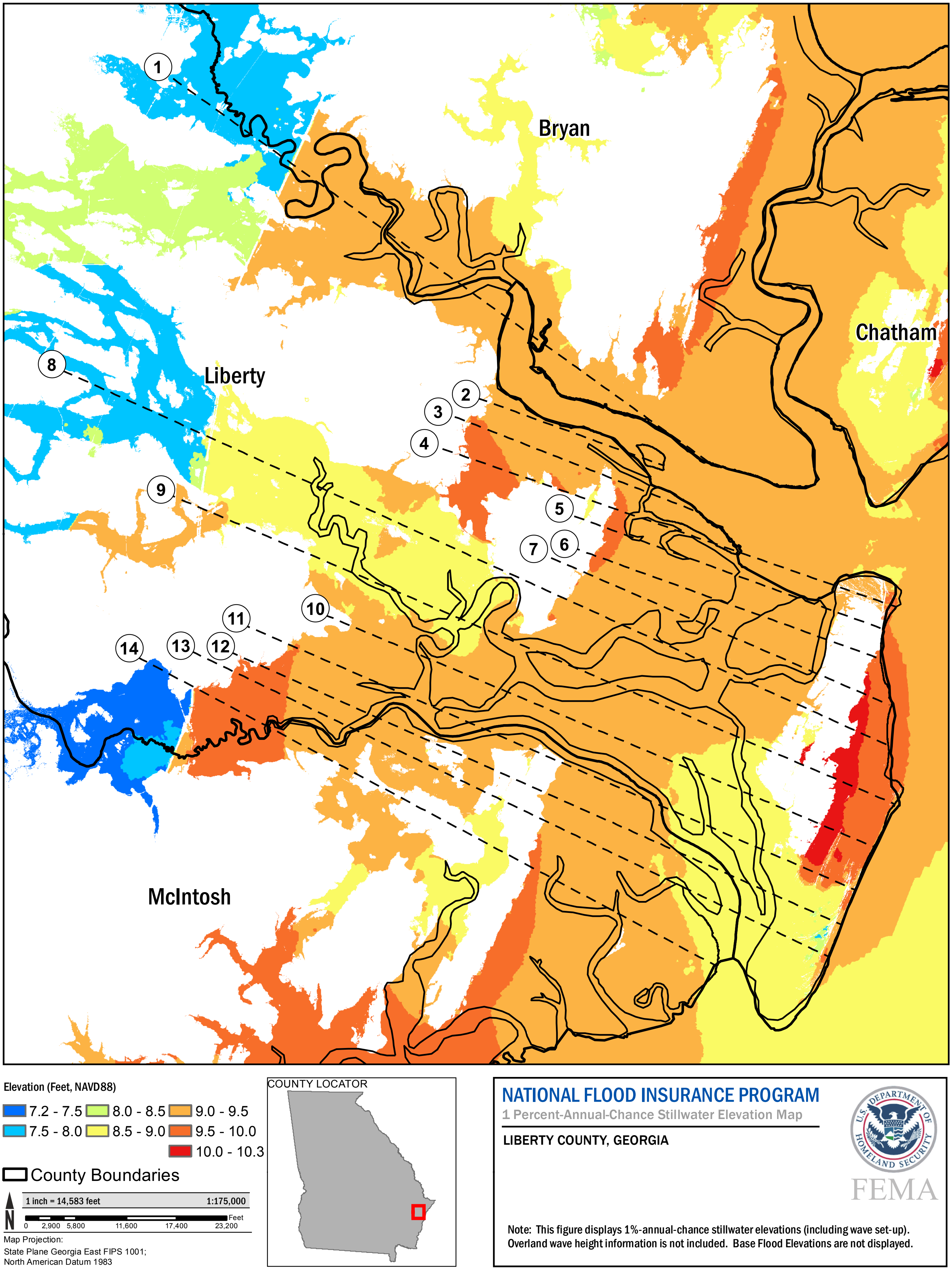


Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas

Astronomical Tide

Astronomical tidal statistics were generated directly from local tidal constituents by sampling the predicted tide at random times throughout the tidal epoch.

Storm Surge Statistics

Storm surge is modeled based on characteristics of actual storms responsible for significant coastal flooding. The characteristics of these storms are typically determined by statistical study of the regional historical record of storms or by statistical study of tidal gages.

When historic records are used to calculate storm surge, characteristics such as the strength, size, track, etc., of storms are identified by site. Storm data was used with hydrodynamic models to determine storm surge levels.

Statistical analyses were performed to determine the annual chance flood elevations for the GANEFL study. The study considered both high frequency (i.e., 50-, 25-, 10-, and 4-percent-annual-chance) events as well as low frequency (i.e., 2-, 1-, and 0.2-percent-annual-chance) events.

Flood estimates for the low frequency events were derived by simulating a large number of storm events using a coupling of hydrodynamic and wave models (i.e., the ADCIRC-ADvanced CIRCulation model and the SWAN-Simulating Waves Nearshore model). Key storm parameters (central pressure deficit, radius to maximum winds, forward speed, track heading, and the Holland's B parameter) were used to represent a population of historic and synthetic storm events. The Joint Probability Method with Optimal Sampling (JPM-OS), developed by Resio (2007) and Toro et. al. (2010), was applied to compute Stillwater Elevations (SWELs), which include the storm surge component and the wave setup component.

High frequency events were computed based on the approach described in the report "Tide Gage Analysis for the Atlantic and Gulf Open Coast" dated December 2, 2008 (Federal Emergency Management Agency, 2008). The methods from this previous study were applied to updated tide records, through the end of 2012, which added six years of additional data to the analysis. In addition, the regionalization of the tide gages from the previous study was re-evaluated and revised using the additional data and observations of revised statistical parameters.

Table 16: Tide Gage Analysis Specifics

Gage Name	Managing Agency of Tide Gage Record	Gage Type	Start Date	End Date	Statistical Methodology
Charleston - 8665530	NOAA	Tide	1899	Present	L-moments, GEV
Fort Pulaski - 8670870	NOAA	Tide	1935	Present	L-moments, GEV

Table 15: Tide Gage Analysis Specifics - continued

Gage Name	Managing Agency of Tide Gage Record	Gage Type	Start Date	End Date	Statistical Methodology
Fernandina Beach - 8720030	NOAA	Tide	1898	Present	L-moments, GEV
Mayport Ferry Depot - 8720220	NOAA	Tide	1928	2008	L-moments, GEV
St Augustine - 8720587	NOAA	Tide	1992	2004	L-moments, GEV
Daytona Beach Shores - 8721120	NOAA	Tide	1966	1984	L-moments, GEV
Trident Pier - 8721604	NOAA	Tide	1994	Present	L-moments, GEV
Lake Worth Pier - 8722670	NOAA	Tide	1970	Present	L-moments, GEV
Miami Beach - 8723170	NOAA	Tide	1931	1981	L-moments, GEV
Virginaia Key - 8713214	NOAA	Tide	1994	Present	L-moments, GEV

Combined Riverine and Tidal Effects

A combined probability analysis was conducted to compute a 1-percent-annual-chance BFE for areas subject to flooding by both coastal and riverine flooding mechanisms. Since riverine and coastal analyses were based on independent events, the resulting combined BFE would be higher than that of their individual occurrence. In other words, at the location where the computed 1-percent-annual-chance coastal flood level equals the computed 1-percent-annual-chance riverine flood level, there was a greater than 1-percent-annual-chance of this flood level being equaled or exceeded. In Liberty County, combined probability calculations were performed for Peacock Creek.

Wave Setup Analysis

Wave setup was computed during the storm surge modeling through the methods and models listed in Table 15 and included in the frequency analysis for the determination of the total stillwater elevations.

5.3.2 Waves

Offshore wave conditions were modeled as part of the regional hydrodynamic and wave modeling (ADCIRC + SWAN). The regional model results provided valuable information on the wave conditions that could be expected to occur during the types of extreme storm events that would produce storm surge elevations with 1- and 0.2-percent-annual-chance probabilities of occurrence. Wave heights and periods derived from the SWAN model results were used as inputs to the wave hazard analyses described in Section 5.4.3.

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced erosion was evaluated to determine the modification to existing topography that is expected to be associated with flooding events. Erosion was evaluated using the methods listed in Table 15. The post-event eroded profile was used for the subsequent transect-based onshore wave hazard analyses.

5.3.4 Wave Hazard Analyses

Overland wave hazards were evaluated to determine the combined effects of ground elevation, vegetation, and physical features on overland wave propagation and wave runup. These analyses were performed at representative transects along all shorelines for which waves were expected to be present during the floods of the selected recurrence intervals. The results of these analyses were used to determine elevations for the 1% annual chance flood.

Transect locations were chosen with consideration given to the physical land characteristics as well as development type and density so that they would closely represent conditions in their locality. Additional consideration was given to changes in the total stillwater elevation. Transects were spaced close together in areas of complex topography and dense development or where total stillwater elevations varied. In areas having more uniform characteristics, transects were spaced at larger intervals. Transects shown in Figure 9, "Transect Location Map," are also depicted on the FIRM. Table 17 provides the location, stillwater elevations, and starting wave conditions for each transect evaluated for overland wave hazards. In this table, "starting" indicates the parameter value at the beginning of the transect.

Wave Height Analysis

Wave height analyses were performed to determine wave heights and corresponding wave crest elevations for the areas inundated by coastal flooding and subject to overland wave propagation hazards. Refer to Figure 6 for a schematic of a coastal transect evaluated for overland wave propagation hazards.

Wave heights and wave crest elevations were modeled using the methods and models listed in Table 15, "Summary of Coastal Analyses".

Wave Runup Analysis

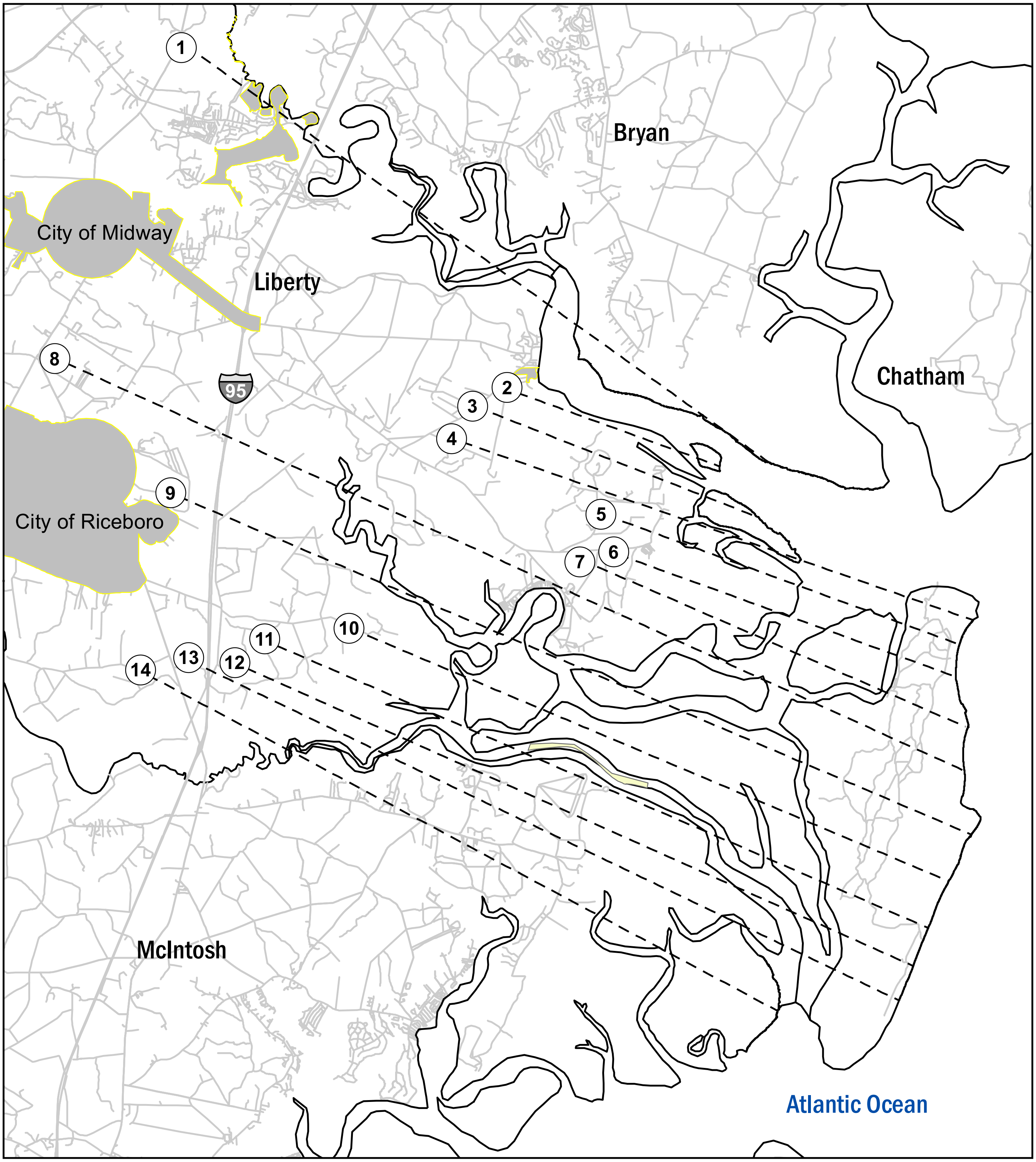
Wave runup analyses were performed to determine the height and extent of runup beyond the limit of stillwater inundation for the 1% annual chance flood. Wave runup elevations were modeled using the methods and models listed in Table 15.

Table 17: Coastal Transect Parameters

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	1	17.5	12.0	6.0 4.5 - 6.1	6.5 4.8 - 6.5	8.0 6.0 - 8.1	9.2 7.7 - 9.3	13.9 10.6 - 14.3
Atlantic Ocean	2	17.5	11.4	6.1 6.0 - 6.2	6.5 6.5 - 6.6	8.1 8.0 - 8.2	9.3 9.3 - 9.5	14.1 14.0 - 14.5
Atlantic Ocean	3	17.9	11.8	6.1 6.1 - 6.2	6.5 6.5 - 6.6	8.1 7.8 - 8.3	9.3 9.2 - 9.6	13.9 13.9 - 14.6
Atlantic Ocean	4	17.8	11.7	6.2 6.0 - 6.3	6.6 6.5 - 6.8	8.3 7.7 - 8.4	9.6 8.7 - 9.7	14.1 12.9 - 14.8
Atlantic Ocean	5	17.6	11.4	6.2 6.0 - 6.4	6.7 6.5 - 6.9	8.4 8.0 - 8.5	9.6 8.7 - 9.7	14.4 12.9 - 15.0
Atlantic Ocean	6	17.6	11.4	6.3 6.0 - 6.6	6.8 6.5 - 7.0	8.4 8.0 - 8.6	9.7 9.1 - 9.9	14.5 12.8 - 14.8
Atlantic Ocean	7	17.5	12.0	6.4 6.0 - 6.6	6.9 6.5 - 7.0	8.5 7.9 - 8.7	9.7 9.1 - 10.1	14.4 12.7 - 14.9

Table 17: Coastal Transect Parameters - continued

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance		Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)				
		Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	8	17.7	11.5	6.3 4.4 - 6.6	6.8 4.7 - 7.1	8.5 5.8 - 8.8	9.7 7.7 - 10.1	14.4 10.6 - 15.0
Atlantic Ocean	9	17.5	11.8	6.2 5.3 - 6.7	6.6 5.7 - 7.2	8.3 7.1 - 8.9	9.4 8.9 - 10.3	13.7 11.3 - 15.3
Atlantic Ocean	10	17.4	12.3	6.2 5.9 - 6.7	6.6 6.3 - 7.2	8.2 7.4 - 8.9	9.4 8.8 - 10.2	13.6 12.3 - 14.7
Atlantic Ocean	11	17.6	12.5	6.1 5.6 - 6.6	6.5 5.9 - 7.1	8.3 7.2 - 8.8	9.4 8.6 - 10.0	13.4 12.3 - 14.0
Atlantic Ocean	12	17.6	12.6	6.1 5.6 - 6.2	6.5 5.9 - 6.6	8.2 6.8 - 8.2	9.4 8.3 - 9.7	13.2 11.8 - 14.2
Atlantic Ocean	13	18.0	12.4	6.1 5.2 - 6.3	6.5 5.6 - 6.8	8.5 6.8 - 8.5	9.0 8.4 - 9.8	13.0 11.9 - 14.3
Atlantic Ocean	14	17.8	12.2	5.8 5.7 - 6.2	6.3 6.1 - 6.6	7.9 5.5 - 8.2	8.9 7.2 - 9.9	12.3 9.9 - 14.3



1 inch = 14,583 feet 1:175,000

N

0 2,900 5,800 11,600 17,400 23,200 Feet

Map Projection:
State Plane Georgia East FIPS 1001;
North American Datum 1983

COUNTY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Transect Locator Map

LIBERTY COUNTY, GEORGIA

U.S. DEPARTMENT OF HOMELAND SECURITY

FEMA

Figure 9: Transect Location Map

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 18: Summary of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

Table 19: Results of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey (NGS) at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Liberty County are provided in Table 20.

Table 20: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Glissons Millpond	SE	32.00	-81.75	-0.840
Willi	SE	32.00	-81.62	-0.889
Letford	SE	32.00	-81.50	-0.912

Table 20: Countywide Vertical Datum Conversion - continued

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Glennville NE	SE	31.87	-81.75	-0.886
Taylors Creek	SE	31.88	-81.62	-0.955
Trinit	SE	31.88	-81.50	-0.988
Limerick	SE	31.88	-81.37	-0.978
Walthourville	SE	31.75	-81.63	-0.945
Hinesville	SE	31.75	-81.50	-0.971
Dorchester	SE	31.75	-81.38	-0.948
Limerick	SE	31.75	-81.25	-0.955
Riceboro	SE	31.62	-81.37	-0.978
Seabrook	SE	31.62	-81.25	-1.004
Saint Catherines Sound	SE	31.62	-81.13	-0.994
Average Conversion from NGVD29 to NAVD88 = -0.946 feet				

Table 21: Stream-Based Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 22.

Table 22: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Digital Orthophoto	USDA NAIP	2015	1 meter	Digital Orthophotography

Table 22: Base Map Sources - continued

Data Type	Data Provider	Data Date	Data Scale	Data Description
Political boundaries	Georgia Department of Transportation	2007	1:100,000	Municipal and county boundaries
Transportation Features	Georgia Department of Transportation	2011	1:100,000	Roads
Hydrography	Georgia Department of Transportation	1996	1:100,000	Water bodies
Stream Centerlines	GA DNR	February 2008 or later	1”=6,000’	Developed using 2-foot contours and aerial photographs

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23. For each coastal flooding source studied as part of this FIS Report, the mapped floodplain boundaries on the FIRM have been delineated using the flood and wave elevations determined at each transect; between transects, boundaries were delineated using land use and land cover data, the topographic elevation data described in Table 23, and knowledge of coastal flood processes. In ponding areas, flood elevations were determined at each junction of the model; between junctions, boundaries were interpolated using the topographic elevation data described in Table 23.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1% annual chance flood elevations at selected cross sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1% annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 23. All topographic data used for modeling or mapping has been converted as necessary to NAVD88. The 1% annual chance elevations for selected cross sections along these flooding sources, along with their non-encroachment widths, if calculated, are shown in Table 25, "Flood Hazard and Non-Encroachment Data for Selected Streams."

Table 23: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	$Accuracy_z$	Citation
Entire Coastline of Liberty County	Atlantic Ocean	LiDAR	N/A	N/A	9 cm	17.64 cm	LMSI 2006a
Flemington, City of; Liberty County, Unincorporated Areas	Alligator Canal	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Midway, City of; Liberty County, Unincorporated Areas	Cay Creek	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Flemington, City of; Liberty County, Unincorporated Areas	Goshen Canal	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Liberty County, Unincorporated Areas	Jerico River	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Flemington, City of; Liberty County, Unincorporated Areas	Mallard Canal	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Hinesville, City of; Liberty County, Unincorporated Areas	Mill Creek	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Hinesville, City of; Liberty County, Unincorporated Areas	Mill Creek Tributary No. 2	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b

Table 23: Summary of Topographic Elevation Data used in Mapping - continued

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	$Accuracy_z$	Citation
Flemington, City of; Hinesville, City of; Liberty County, Unincorporated Areas	Peacock Creek	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Flemington, City of; Hinesville, City of	Peacock Creek Tributary No. 1	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Midway, City of; Liberty County, Unincorporated Areas	Porter Creek	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Liberty County, Unincorporated Areas	Porter Creek Tributary No. 1	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Riceboro, City of; Liberty County, Unincorporated Areas	Riceboro Creek	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b
Multiple - Refer to FIRM	Alligator Canal, Canoochee River, Cay Creek, Goshen Canal, Gress River, Jerico Creek, Jones Creek, Mount Hope Creek, Payne Creek, Peacock Creek Tributary No. 1, Raccoon Branch, Riceboro Creek, Riceboro Creek Tributary No. 6, Riceboro Creek Tributary No. 7, South Newport River	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b

Table 23: Summary of Topographic Elevation Data used in Mapping - continued

Community	Flooding Source	Source for Topographic Elevation Data					
		Description	Scale	Contour Interval	$RMSE_z$	$Accuracy_z$	Citation
Multiple - Refer to FIRM	Porter Creek Tributary No. 2, Taylors Creek	Topographic Maps	1:4,800 and 1:9,600	2 ft	N/A	N/A	Abrams Aerial Survey Corporation 1979
Flemington, City of; Liberty County, Unincorporated Areas	Alligator Canal	Contours derived from LiDAR	N/A	2 ft	N/A	N/A	LMSI 2006b

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations.

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	3,488	556	2,096	0.4	18.1	18.1	19.0	0.9
B	3,577	543	2,179	0.4	18.1	18.1	19.0	0.9
C	5,041	397	1,269	0.6	18.6	18.6	19.3	0.7
D	6,531	332	1,175	0.5	18.8	18.8	19.6	0.8
E	6,643	330	1,566	0.4	18.9	18.9	19.6	0.7
F	7,665	251	886	0.7	18.9	18.9	19.8	0.9

[1] Feet above confluence with Goshen Canal

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: ALLIGATOR CANAL

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	36,162	800	3,607	0.3	7.6	7.6	8.4	0.8
B	41,206	213	1,104	1.0	7.7	7.7	8.6	0.9
C	41,379	312	1,476	0.8	7.8	7.8	8.6	0.8
D	42,963	333	1,566	0.7	7.8	7.8	8.7	0.9
E	43,167	167	926	1.2	7.9	7.9	8.8	0.9

[1] Feet above mouth.

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY, GA

AND INCORPORATED AREAS

FLOODWAY DATA

CAY CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY[2]	WITH FLOODWAY	INCREASE
A	269	53	73	4.6	18.0	14.1	14.3	0.2
B	345	90	336	1.0	18.0	15.5	16.0	0.5
C	1,107	90	230	1.4	18.0	15.9	16.6	0.7
D	2,253	130	259	1.3	18.0	16.8	17.7	0.9

[1] Feet above confluence with Alligator Canal

[2] Elevation computed without consideration of backwater effects from Alligator Canal

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: MALLARD CANAL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
MILL CREEK								
A	0	43	333	6.8	56.6	56.6	57.6	1.0
B	1,740	374	2,128	1.1	59.9	59.9	60.8	0.9
C	3,230	280	1,557	1.5	61.1	61.1	61.8	0.7
D	7,500	372	1,768	1.3	64.4	64.4	64.9	0.5
E	9,280	490	8,832	0.3	66.6	66.6	66.6	0.0
F	9,360	490	1,983	1.1	66.6	66.6	66.6	0.0
G	12,165	1,300	6,654	0.3	67.1	67.1	67.3	0.2
H	13,530	1,000	4,658	0.5	67.9	67.9	68.2	0.3
I	15,210	800	2,322	1.0	68.8	68.8	69.2	0.4
J	15,705	440	1,963	1.2	69.3	69.3	69.7	0.4
K	19,255	127	742	2.2	71.0	71.0	71.5	0.5
L	20,771	605	1,797	0.5	71.5	71.5	72.4	0.9
M	24,076	46	346	1.3	72.0	72.0	72.8	0.8
N	26,617	37	214	2.0	72.8	72.8	73.5	0.7
O	27,539	33	170	2.5	73.5	73.5	74.3	0.8

[1] Feet above 18th Street

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
MILL CREEK TRIBUTARY NO. 2								
A	457	219	710	0.7	71.8	71.8	72.7	0.9
B	2,097	177	489	1.0	71.8	71.8	72.8	1.0
C	3,424	29	156	3.2	73.8	73.8	74.2	0.4
D	3,620	58	507	1.0	77.4	77.4	78.2	0.8
E	7,440	121	451	1.1	77.4	77.4	78.4	1.0
F	8,381	93	299	1.6	78.1	78.1	78.8	0.7
G	8,571	93	363	1.3	80.0	80.0	80.6	0.6
H	9,689	355	1,058	0.5	80.3	80.3	80.9	0.6
I	10,816	555	1,481	0.3	80.8	80.8	81.8	1.0

[1] Feet above the confluence with Mill Creek

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK TRIBUTARY NO.2

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	0	1,327	8,123	0.5	9.9	9.9	10.8	0.9
B	1,700	2,494	15,123	0.3	10.2	10.2	11.0	0.8
C	5,750	2,761	17,739	0.2	11.3	11.3	12.2	0.9
D	11,250	1,394	8,210	0.5	11.8	11.8	12.7	0.9
E	17,315	1,235	8,256	0.5	13.3	13.3	14.1	0.8
F	19,200	1,723	10,576	0.4	14.4	14.4	14.6	0.2
G	25,870	1,185	9,491	0.4	15.0	15.0	15.4	0.4
H	30,320	1,773	9,898	0.4	15.9	15.9	16.4	0.5
I	37,373	2,855	17,869	0.2	16.2	16.2	16.8	0.6
J	43,475	979	5,999	0.2	16.3	16.3	17.0	0.7
K	49,330	326	1,757	0.6	16.6	16.6	17.3	0.7
L	53,797	479	606	1.2	17.8	17.8	18.3	0.5
M	56,521	70	216	3.5	18.8	18.8	19.5	0.7
N	56,768	650	2,530	0.3	20.7	20.7	21.5	0.8
O	60,898	407	1,262	0.6	25.1	25.1	25.0	-0.1
P	61,698	310	938	0.8	25.4	25.4	25.9	0.5

[1] Feet above1,300 feet downstream of U.S. Highway 17

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: PEACOCK CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	3,121	82	416	1.6	16.5	16.5[2]	16.5	0.0
B	5,118	103	270	2.4	18.2	18.2	18.2	0.0
C	6,383	179	471	1.4	19.3	19.3	19.9	0.6
D	7,574	225	561	1.2	20.7	20.7	21.5	0.8
E	9,224	134	253	2.6	24.4	24.4	25.3	0.9
F	10,352	29	107	6.1	30.1	30.1	30.1	0.0
G	10,967	30	106	6.2	33.4	33.4	33.6	0.2
H	11,348	17	81	8.1	36.3	36.3	36.7	0.4
I	11,469	41	286	2.3	38.4	38.4	38.7	0.3

[1] Feet above confluence with Peacock Creek

[2] Elevation computed without consideration of backwater effects from Peacock Creek

TABLE 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

LIBERTY COUNTY, GA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: PEACOCK CREEK TRIBUTARY NO. 1

Table 25: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not Applicable to this Flood Risk Project]

6.4 Coastal Flood Hazard Mapping

Flood insurance zones and BFEs including the wave effects were identified on each transect based on the results from the onshore wave hazard analyses. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and knowledge of coastal flood processes to determine the aerial extent of flooding. Sources for topographic data are shown in Table 23.

Zone VE is subdivided into elevation zones and BFEs are provided on the FIRM.

The limit of Zone VE shown on the FIRM is defined as the farthest inland extent of any of these criteria (determined for the 1% annual chance flood condition):

- The *primary frontal dune zone* is defined in 44 CFR Section 59.1 of the NFIP regulations. The primary frontal dune represents a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes that occur immediately landward and adjacent to the beach. The primary frontal dune zone is subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune zone occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

- The *wave runup zone* occurs where the (eroded) ground profile is 3.0 feet or more below the 2-percent wave runup elevation.

- The *wave overtopping splash zone* is the area landward of the crest of an overtopped barrier, in cases where the potential 2-percent wave runup exceeds the barrier crest elevation by 3.0 feet or more.

- The *breaking wave height zone* occurs where 3-foot or greater wave heights could occur (this is the area where the wave crest profile is 2.1 feet or more above the total stillwater elevation).

- The *high-velocity flow zone* is landward of the overtopping splash zone (or area on a sloping beach or other shore type), where the product of depth of flow times the flow velocity squared (hv^2) is greater than or equal to 200 ft^3/sec^2. This zone may only be used on the Pacific Coast.

The SFHA boundary indicates the limit of SFHAs shown on the FIRM as either “V” zones or “A” zones.

Table 26 indicates the coastal analyses used for floodplain mapping and the criteria used to determine the inland limit of the open-coast Zone VE and the SFHA boundary at each transect.

Table 26: Summary of Coastal Transect Mapping Considerations

Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
		Zone Designation and BFE (ft NAVD88)	Zone Designation and BFE (ft NAVD88)		
1		N/A	VE 12 AE 7-11	Wave Height	SWEL
2		N/A	VE 12-14 AE 10-11	Wave Height	SWEL
3		N/A	VE 12-14 AE 9-11	Wave Height	SWEL
4	✓	N/A	VE 11-14 AE 9-11	PFD	SWEL
5		VE 11	VE 12-15 AE 9-11	PFD	SWEL
6	✓	N/A	VE 11-15 AE 9-11	Wave Height	SWEL
7		N/A	VE 11-15 AE 9-11	Wave Height	SWEL
8	✓	N/A	VE 11-15 AE 8-11	Wave Height	SWEL
9	✓	N/A	VE 11-14 AE 9-11	Wave Height	SWEL
10	✓	N/A	VE 11-14 AE 9-11	Wave Height	SWEL
11	✓	N/A	VE 11-14 AE 9-11	Wave Height	SWEL
12	✓	N/A	VE 11-14 AE 9-11	PFD	SWEL
13	✓	N/A	VE 11-14 AE 9-11	Wave Height	SWEL
14		N/A	VE 12 AE 7-12	Wave Height	SWEL

A LiMWA boundary has also been added in coastal areas subject to wave action for use by local communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave.

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 31, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA. A LOMA cannot be issued for properties located on the PFD (primary frontal dune).

To obtain an application for a LOMA, visit www.fema.gov/floodplain-management/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/floodplain-management/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Map Information eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Liberty County FIRM are listed in Table 27. Please note that this table only includes LOMCs that have been issued on the FIRM panels updated by this map revision. For all other areas within this county, users should be aware that revisions to the FIS Report made by prior LOMRs may not be reflected herein and users will need to continue to use the previously issued LOMRs to obtain the most current data.

Table 27: Incorporated Letters of Map Change

Case Number	Effective Date	Flooding Source	FIRM Panel(s)
11-04-7324P	04/09/2012	Cay Creek, Porter Creek and Porter Creek Tributary No.1	13179C0262F 13179C0265F 13179C0266F 13179C0270F 13179C0360F

6.5.4 Physical Map Revisions

Physical Map Revisions (PMRs) are an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Liberty County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 28, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 28 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the

PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Liberty County FIRMs in countywide format was 09/26/2008.

Table 28: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Allenhurst, Town of	02/03/1978	02/03/1978	None	06/17/1986	09/26/2008 05/05/2014
Flemington, City of	10/18/1974	10/18/1974	10/17/1975 05/17/1982	05/17/1982	09/30/1988 09/26/2008 05/05/2014
Gumbranch, City of	09/26/2008	09/26/2008	None	09/26/2008	05/05/2014
Hinesville, City of	02/25/1977	02/25/1977	None	09/16/1982	02/04/1987 09/26/2008 05/05/2014
Liberty County, Unincorporated Areas	10/08/1976	10/08/1976	None	12/01/1983	10/16/1992 09/26/2008 05/05/2014
Midway, City of	04/04/1975	04/04/1975	None	09/30/1981	09/26/2008
Riceboro, City of	05/10/1974	05/10/1974	01/30/1976	11/04/1981	09/26/2008
Walthourville, City of	10/08/1976?	10/08/1976	None	10/16/1992	05/05/2014

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 29 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 29: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Atlantic Ocean		BakerAECOM	HSFEHQ-09-D-0368 Task Order: HSFE04-10-J-0075	2015	Liberty County, Unincorporated Areas
Alligator Canal		GA DNR	EMA-2001-CA-5144	2012	Flemington, City of; Liberty County, Unincorporated Areas
Cay Creek		GA DNR	EMA-2001-CA-5144	2012	Midway, City of; Liberty County, Unincorporated Areas
Goshen Canal	6/1/1983	Post, Buckley, Schuh & Jernigan, Inc.	H-4778	1980	Flemington, City of; Liberty County, Unincorporated Areas
Jerico River		GA DNR	EMA-2001-CA-5144	2012	Liberty County, Unincorporated Areas
Mallard Canal		GA DNR	EMA-2001-CA-5144	2012	Flemington, City of; Liberty County, Unincorporated Areas
Mill Creek	5/5/2014	Dewberry and Davis, LLC	Not Available	2012	Hinesville, City of; Liberty County, Unincorporated Areas
Mill Creek Tributary No. 2	5/5/2014	Dewberry and Davis, LLC	Not Available	2012	Hinesville, City of; Liberty County, Unincorporated Areas
Peacock Creek		GA DNR	EMA-2001-CA-5144	2012	Flemington, City of; Hinesville, City of; Liberty County, Unincorporated Areas
Peacock Creek Tributary No. 1		GA DNR	EMA-2001-CA-5144	2012	Flemington, City of; Hinesville, City of

Table 29: Summary of Contracted Studies Included in this FIS Report - continued

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Porter Creek		GA DNR	EMA-2001-CA-5144	2012	Midway, City of; Liberty County, Unincorporated Areas
Porter Creek Tributary No. 1		GA DNR	EMA-2001-CA-5144	2012	Liberty County, Unincorporated Areas
Riceboro Creek		GA DNR	EMA-2001-CA-5144	2012	Riceboro, City of; Liberty County, Unincorporated Areas
Alligator Canal, Canoochee River, Cay Creek, Goshen Canal, Gress River, Jerico Creek, Jones Creek, Mount Hope Creek, Payne Creek, Peacock Creek Tributary No. 1, Raccoon Branch, Riceboro Creek, Riceboro Creek Tributary No. 6, Riceboro Creek Tributary No. 7, South Newport River	5/5/2014	GA DNR	EMA-2001-CA-5144	2012	Multiple - Refer to FIRM
Porter Creek Tributary No. 2, Taylors Creek	9/26/2008	PBS&J	EMA-2006-CA-5615	2007	Multiple - Refer to FIRM

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 30. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 30: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Liberty County and Incorporated Areas			Workmap	FEMA, Georgia DNR, CDM Smith, BakerAECOM, LLC, and community officials
			CCO Meeting	FEMA, Georgia DNR, CDM Smith, BakerAECOM, LLC, and community officials
Liberty County and Incorporated Areas	05/05/2014	11/09/2010	CCO Meeting	FEMA, Georgia Coastal Regional Commission, community officials, other agencies and affected groups
		11/16/2010	Scoping	FEMA, Georgia DNR, CDM Smith, BakerAECOM, LLC, and community officials
Liberty County and Incorporated Areas	09/26/2008	09/30/2004	Scoping	FEMA, Georgia DNR, PBS&J, and community officials
		11/15/2007	CCO Meeting	FEMA, Georgia DNR, PBS&J, and community officials
Flemington, City of	05/17/1982	05/01/1978	CCO Meeting	FEMA and community officials
		01/10/1984	CCO Meeting	FEMA and community officials
Flemington, City of	09/30/1988	N/A	CCO Meeting	N/A
Hinesville, City of	02/04/1987	N/A	CCO Meeting	N/A
		02/13/1986	CCO Meeting	FEMA and community officials
Liberty County Unincorporated Areas	06/01/1983	05/01/1978	CCO Meeting	FEMA and community officials
		12/12/1982	CCO Meeting	FEMA and community officials
Midway, City of	03/03/1981	05/01/1978	CCO Meeting	FEMA and community officials
		08/28/1980	CCO Meeting	FEMA and community officials
Riceboro, City of	05/04/1981	05/01/1978	CCO Meeting	FEMA and community officials
		08/28/1980	CCO Meeting	FEMA and community officials

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

The additional data that was used for this project includes the FIS Report and FIRM that were previously prepared for Liberty County (FEMA 2014).

Table 31 is a list of the locations where FIRMs for Liberty County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 31: Map Repositories

Community	Address	City	State	Zip Code
Allenhurst, Town of	315 Sheppard Drive	Hinesville	GA	31313
Flemington, City of	Flemington City Hall, 156 Old Sunbury Road, P.O. Box 46	Hinesville	GA	31310
Gumbranch, City of	5334 Ga. Hwy. 196 W.	Hinesville	GA	31313
Hinesville, City of	City of Hinesville 115 East M.L. King, Jr. Drive	Hinesville	GA	31313
Liberty County, Unincorporated Areas	100 Main Street, Court House Annex, Room 201	Hinesville	GA	31313
Midway, City of	150 Butler Avenue Unit D P. O. Box 125	Midway	GA	31320
Riceboro, City of	City of Riceboro P. O. Box 269	Riceboro	GA	31323
Walthourville, City of	222 Busbee Road P.O. Box K	Walthourville	GA	31333

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 32.

Table 32 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 32: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region IV	Federal Emergency Management Agency, 3003 Chamblee Tucker Road, Atlanta, Georgia 30341
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Tom Shillock, CFM Dept. of Natural Resources Environmental Protection Division 2 Martin Luther King Jr. Drive Atlanta, Georgia 30334
State GIS Coordinator	Not Applicable

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 33 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 33: Bibliography and References

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
BakerAECOM 2015	BakerAECOM	*Coastal Hazard Analysis TSDN, Liberty County, Georgia – Intermediate Data Submittals 4 & 5*	BakerAECOM		March 2015	
FEMA 2014	Federal Emergency Management Agency	*Flood Insurance Study, Liberty County, Georgia, and Incorporated Areas*		Washington, D.C.	05/05/2014	FEMA Flood Map Service Center msc.fema.gov
LMSI 2006a	Laser Mapping Specialists Inc	*LiDAR*			2006	
LMSI 2006b	Laser Mapping Specialists Inc	*2-ft contours derived from LiDAR*			2006	
Stamey and Hess 1993	USGS	*Techniques for Estimating Magnitude and Frequency of Floods in Rural Basins of Georgia – Investigations Report 93-4016*	Stamey, T.C. and G.W. Hess		1993	