

# FLOOD INSURANCE STUDY

## FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 3



### McINTOSH COUNTY, GEORGIA AND INCORPORATED AREAS

| COMMUNITY NAME                           | COMMUNITY NUMBER |
|--|------------------|
| DARIEN, CITY OF                          | 130131           |
| McINTOSH COUNTY,<br>UNINCORPORATED AREAS | 130130           |



# FEMA

**REVISED:**

**PRELIMINARY**  
**2/15/2016**

FLOOD INSURANCE STUDY NUMBER  
**13191CV001B**

Version Number 2.3.2.1

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**Published Separately**

Flood Insurance Rate Map (FIRM)

# FLOOD INSURANCE STUDY REPORT

## McINTOSH 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 McIntosh 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 |
|-----------------|--------|--------------------|---|--|
| Darien, City of | 130131 | 03070106           | 13191C0289E<br>13191C0290E<br>13191C0293E<br>13191C0377E<br>13191C0380E<br>13191C0381E<br>13191C0385E<br>13191C0395E<br>13191C0405E |  |

**Table 1: Listing of NFIP Jurisdictions - continued**

|  |               |                              |  |  |
|--|---------------|------------------------------|--|--|
| <p>McIntosh County,<br/>Unincorporated Areas</p> | <p>130130</p> | <p>03060204<br/>03070106</p> | <p>13191C0020E<br/>13191C0030E<br/>13191C0040E<br/>13191C0045E<br/>13191C0065E<br/>13191C0070E<br/>13191C0090E<br/>13191C0120E<br/>13191C0150E<br/>13191C0160E<br/>13191C0170E<br/>13191C0175E<br/>13191C0180E<br/>13191C0185E<br/>13191C0190E<br/>13191C0195E<br/>13191C0205E<br/>13191C0215E<br/>13191C0220E<br/>13191C0235E<br/>13191C0275E<br/>13191C0280E<br/>13191C0285E<br/>13191C0289E<br/>13191C0290E<br/>13191C0293E<br/>13191C0295E<br/>13191C0305E<br/>13191C0310E<br/>13191C0315E<br/>13191C0320E<br/>13191C0330E<br/>13191C0340E<br/>13191C0360E<br/>13191C0380E<br/>13191C0381E<br/>13191C0385E<br/>13191C0395E<br/>13191C0405E<br/>13191C0410E<br/>13191C0415E<br/>13191C0420E</p> |  |
|--|---------------|------------------------------|--|--|

## 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 McIntosh County became effective on March 16, 2009. 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:

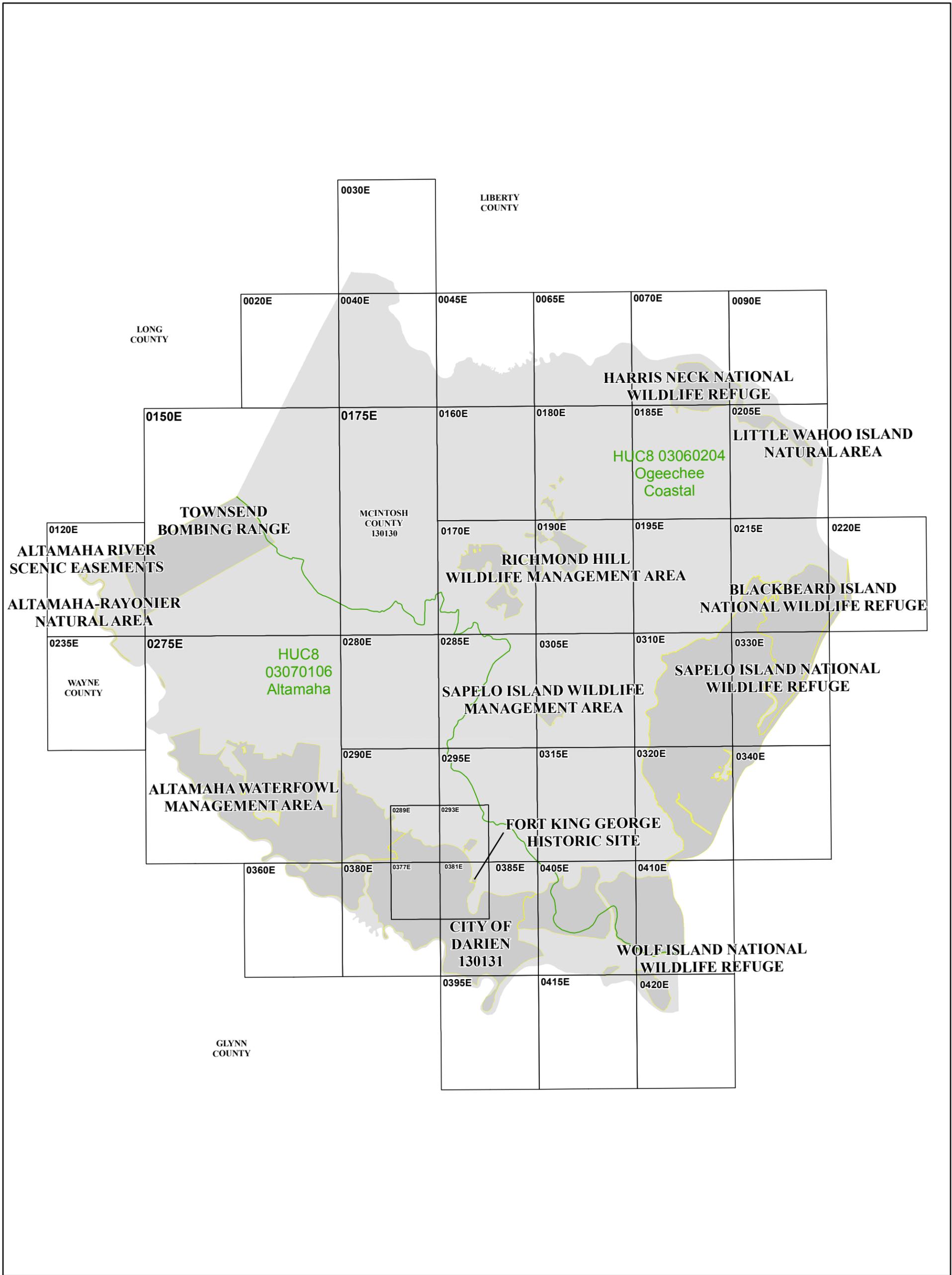
| <u>Old Zone</u> | <u>New Zone</u> |
|-----------------|-----------------|
| A1 through A30  | AE              |
| V1 through V30  | VE              |
| B               | X (shaded)      |
| C               | X (unshaded)    |

- 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](http://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](http://www.fema.gov/online-tutorials).

The FIRM Index in Figure 1 shows the overall FIRM panel layout within McIntosh 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 and flooding sources.



Map Projection:  
 Georgia State Plane 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](http://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION



**NATIONAL FLOOD INSURANCE PROGRAM**  
**FLOOD INSURANCE RATE MAP INDEX**

**MCINTOSH COUNTY, GEORGIA and Incorporated Areas**  
**PANELS PRINTED:**  
 0020E, 0030E, 0040E, 0045E, 0065E, 0070E, 0090E, 0120E, 0150E, 0160E, 0170E, 0175E, 0180E, 0185E, 0190E, 0195E, 0205E, 0215E, 0220E, 0235E, 0275E, 0280E, 0285E, 0289E, 0290E, 0293E, 0295E, 0305E, 0310E, 0315E, 0320E, 0330E, 0340E, 0360E, 0377E, 0380E, 0381E, 0385E, 0395E, 0405E, 0410E, 0415E, 0420E



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**2/15/2016**

MAP NUMBER  
 1319CIND0B  
 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](http://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/](http://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 this 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 McIntosh 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 McIntosh County, Georgia, effective February 15, 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/](http://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 McIntosh County.

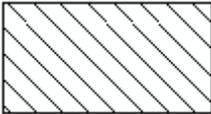
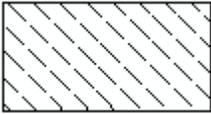
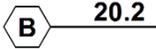
**Figure 3: Map Legend for FIRM**

|  |  |
|--|--|
| <p><b>SPECIAL FLOOD HAZARD AREAS:</b> <i>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.</i></p> |  |
|   | <p>Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)</p>   |
| 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**

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|   | <p>Regulatory Floodway determined in Zone AE.</p>  |
| <p><b>OTHER AREAS OF FLOOD HAZARD</b></p>   |  |
|   | <p>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.</p>  |
|   | <p>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.</p> |
| <p><b>OTHER AREAS</b></p>   |  |
|   | <p>Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.</p>  |
|   | <p>Unshaded Zone X: Areas of minimal flood hazard.</p>   |
| <p><b>FLOOD HAZARD AND OTHER BOUNDARY LINES</b></p>                                 |  |
|   | <p>Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)</p>  |
|   | <p>Limit of Study</p>  |
|   | <p>Jurisdiction Boundary</p>   |
|   | <p>Limit of Moderate Wave Action (LIMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet</p>   |
| <p><b>GENERAL STRUCTURES</b></p>  |  |
| <p><i>Aqueduct</i><br/><i>Channel</i><br/><i>Culvert</i><br/><i>Storm Sewer</i></p> | <p>Channel, Culvert, Aqueduct, or Storm Sewer</p>  |
| <p><i>Dam</i><br/><i>Jetty</i><br/><i>Weir</i></p>                                  | <p>Dam, Jetty, Weir</p>  |
|   | <p>Levee, Dike, or Floodwall</p>   |
| <p><i>Bridge</i></p>  | <p>Bridge</p>  |

**Figure 3: Map Legend for FIRM**

|  |  |
|--|--|
| <p><b>COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA):</b> <i>CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.</i></p> |  |
| <br><b>CBRS AREA</b><br>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.  |
| <br><b>OTHERWISE PROTECTED AREA</b><br>09/30/2009   | Otherwise Protected Area   |
| <p><b>REFERENCE MARKERS</b></p>  |  |
| <br>22.0  | River mile Markers   |
| <p><b>CROSS SECTION &amp; TRANSECT INFORMATION</b></p>   |  |
| <br>20.2   | Lettered Cross Section with Regulatory Water Surface Elevation (BFE)   |
| <br>21.1  | Numbered Cross Section with Regulatory Water Surface Elevation (BFE)   |
| <br>17.5  | Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)   |
| <br>8   | Coastal Transect   |
|   | 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. |
| <br>513   | Base Flood Elevation Line  |
| <b>ZONE AE</b><br>(EL 16)  | Static Base Flood Elevation value (shown under zone label)   |
| <b>ZONE AO</b><br>(DEPTH 2)  | Zone designation with Depth  |
| <b>ZONE AO</b><br>(DEPTH 2)<br>(VEL 15 FPS)  | Zone designation with Depth and Velocity   |

**Figure 3: Map Legend for FIRM**

| <b>BASE MAP FEATURES</b>  |   |
|---|---|
|  <i>Missouri Creek</i> | River, Stream or Other Hydrographic Feature                           |
|                        | Interstate Highway  |
|                        | U.S. Highway  |
|                        | State Highway   |
|                        | County Highway  |
|  <b>MAPLE LANE</b>     | Street, Road, Avenue Name, or Private Drive if shown on Flood Profile |
|  <b>RAILROAD</b>       | Railroad  |
|                        | Horizontal Reference Grid Line  |
|                        | Horizontal Reference Grid Ticks                                       |
|                        | Secondary Grid Crosshairs   |
| <b>Land Grant</b>   | Name of Land Grant  |
| <b>7</b>  | Section Number  |
| <b>R. 43 W. T. 22 N.</b>  | Range, Township Number  |
| <b>4276<sup>000</sup>mE</b>   | Horizontal Reference Grid Coordinates (UTM)                           |
| <b>365000 FT</b>  | Horizontal Reference Grid Coordinates (State Plane)                   |
| <b>80° 16' 52.5"</b>  | 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 McIntosh 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 McIntosh 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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|--|--|--|---|----------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Atlantic Ocean (Flooding controlled by the Atlantic Ocean) | Darien, City of; McIntosh County, Unincorporated Areas | Entire Coastline                               | Entire Coastline  | 03060204<br>03070106 | 40.4                                |  | N              | VE, AE             | 04/2015          |
| Altamaha River   | Darien, City of; McIntosh County, Unincorporated Areas | Wayne/Glynn County Boundary                    | Long/McIntosh County Boundary   | 03070106             | 6.1                                 |  | N              | AE                 | 05/31/2012       |
| Big Mortar Swamp   | McIntosh County, Unincorporated Areas                  | Confluence with South Newport River            | 2.2 Miles Upstream of State Road 57   | N/A                  | 13.8                                |  | N              | A                  | 05/31/2012       |
| Big Mortar Swamp Tributary No. 1                           | McIntosh County, Unincorporated Areas                  | Confluence with Big Mortar Swamp               | 94th Road   | N/A                  | 0.9                                 |  | N              | A                  | 05/31/2012       |
| Buck Hill Swamp  | McIntosh County, Unincorporated Areas                  | Confluence with Sapelo River                   | 1.2 Miles Upstream of Interstate 95   | 03060204             | 5.4                                 |  | N              | A                  | 05/15/2012       |
| Cathead Creek Tributary No. 35                             | McIntosh County, Unincorporated Areas                  | SR-251   | 0.5 mi upstream of US-17/SR-25  | 03070106             | 9.4                                 |  | N              | A                  | 05/15/2012       |
| Cathead Creek Tributary No. 35                             | McIntosh County, Unincorporated Areas                  | Approximately 0.5 mi upstream of US-17/SR-25   | Approximately 2.9 miles upstream of North Way/State Highway 25/U.S. Highway 17      | 03070106             | N/A                                 |  | N              | A                  | 10/2007          |
| Cathead Creek Tributary No. 35.1                           | McIntosh County, Unincorporated Areas                  | Confluence with Cathead Creek Tributary No. 35 | Approximately 8,410 feet upstream of confluence with Cathead Creek Tributary No. 35 | 03070106             | 1.4                                 |  | N              | A                  | 10/2007          |
| Cathead Creek Tributary No. 35.2                           | McIntosh County, Unincorporated Areas                  | Confluence with Cathead Creek Tributary No. 35 | Approximately 11,100 feet upstream of North Way/State Highway 25/U.S. Highway 17    | 03070106             | 2.2                                 |  | N              | A                  | 10/2007          |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|----------------------------------|---------------------------------------|--|--|--------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Cathead Creek Tributary No. 35.3 | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek Tributary No. 35 | Approximately 10,800 feet upstream of confluence with Cathead Creek Tributary No. 35 | 03070106           | 1.8                                 |  | N              | A                  | 10/2007          |
| Cathead Creek Tributary No. 4    | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek                  | 0.2 mi upstream of Ocean Hwy (US-17/SR-25)   | 03070106           | 2.4                                 |  | N              | A                  | 05/15/2012       |
| Cedar Creek                      | McIntosh County, Unincorporated Areas | 1.6 mi downstream of Swamp Road                | 0.9 mi upstream of Swamp Road  | 03060204           | 2.5                                 |  | N              | A                  | 05/31/2012       |
| Jackie Camp Swamp                | McIntosh County, Unincorporated Areas | Confluence with Youngs Swamp                   | State Road 57  | 03070106           | 4.1                                 |  | N              | A                  | 05/31/2012       |
| McClendon Creek                  | McIntosh County, Unincorporated Areas | Intersection of Cox Road                       | 0.2 Miles South of Plum Orchard Cemetery Road  | 03070106           | 12.1                                |  | N              | A                  | 05/31/2012       |
| McClendon Creek Tributary No. 1  | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                | Approximately 8,000 feet upstream of confluence with McClendon Creek                 | 03070106           | N/A                                 |  | N              | A                  | 10/2007          |
| McClendon Creek Tributary No. 2  | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                | Approximately 2,930 feet upstream of confluence with McClendon Creek                 | 03070106           | N/A                                 |  | N              | A                  | 10/2007          |
| McClendon Creek Tributary No. 3  | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                | Approximately 9,500 feet upstream of confluence with McClendon Creek                 | 03070106           | N/A                                 |  | N              | A                  | 10/2007          |
| McClendon Creek Tributary No. 4  | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                | 3.8 Miles Upstream of McClendon Creek  | 03070106           | N/A                                 |  | N              | A                  | 05/31/2012       |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|---------------------------------------|---------------------------------------|---|---|--------------------|-------------------------------------|--|----------------|--------------------|------------------|
| McClendon Creek Tributary No. 4.1     | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek Tributary No. 4 | Approximately 4,020 feet upstream of Cox Road       | 03070106           | 1.3                                 |  | N              | A                  | 10/2007          |
| McClendon Creek Tributary No. 4.4     | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                 | 4.4 Miles Upstream of McClendon Creek               | 03070106           | 4.2                                 |  | N              | A                  | 05/31/2012       |
| McClendon Creek Tributary No. 6       | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek                 | 1.6 Miles Upstream of McClendon Creek               | 03070106           | N/A                                 |  | N              | A                  | 05/31/2012       |
| Sapelo River                          | McIntosh County, Unincorporated Areas | U.S. Highway 17                                 | 0.2 Miles Upstream of Old Townsend Road Northwest   | 03060204           | 1.2                                 |  | N              | A                  | 05/31/2012       |
| Snuff Box Swamp Creek (US)            | McIntosh County, Unincorporated Areas | 0.9 Miles West of GA HWY 57                     | 1.2 Miles Southwest of GA HWY 57                    | 03070106           | 2.0                                 |  | N              | A                  | 05/31/2012       |
| Snuff Box Swamp Creek (DS)            | McIntosh County, Unincorporated Areas | 0.4 Miles Southwest of Snuff Box Road           | 1.2 Miles Southwest of GA HWY 57                    | 03070106           | 5.6                                 |  | N              | A                  | 05/31/2012       |
| South Newport River                   | McIntosh County, Unincorporated Areas | 14.6 Miles Downstream of State Road 25          | State Road 25                                       | 03060204           | 14.6                                |  | N              | A                  | 05/31/2012       |
| South Newport River                   | McIntosh County, Unincorporated Areas | North Way/State Highway 25/U.S. Highway 17      | County Boundary                                     | 03060204           | 10.9                                |  | N              | A                  | 10/2007          |
| South Newport River Tributary No. 1   | McIntosh County, Unincorporated Areas | Confluence with South Newport River             | 0.6 Miles Upstream of Interstate 95                 | 03060204           | 5.5                                 |  | N              | A                  | 05/31/2012       |
| South Newport River Tributary No. 2   | McIntosh County, Unincorporated Areas | Confluence with South Newport River             | Approximately 2,740 feet upstream of Brickston Road | 03060204           | 5.6                                 |  | N              | A                  | 10/2007          |
| South Newport River Tributary No. 2.1 | McIntosh County, Unincorporated Areas | Confluence with Big Mortar Swamp                | 0.2 Miles Upstream of Horsepen Road                 | 03060204           | 1.5                                 |  | N              | A                  | 05/31/2012       |
| South Newport River Tributary No. 2.2 | McIntosh County, Unincorporated Areas | Confluence with Big Mortar Swamp                | 0.6 Miles Upstream of Coker Place Road              | 03060204           | 2.9                                 |  | N              | A                  | 05/31/2012       |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|---------------------------|---------------------------------------|-------------------------------------|--|--------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Unnamed Stream/Wetland 43 | McIntosh County, Unincorporated Areas | 0.3 Miles West of Cox Road          | 2.3 Miles Upstream of Cox Road                   | 03070106           | 2.0                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 47 | McIntosh County, Unincorporated Areas | Confluence with South Newport River | Jones Road Northwest                             | 03060204           | 2.7                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 48 | McIntosh County, Unincorporated Areas | Confluence with Big Mortar Swamp    | Howe Place Northwest                             | 03060204           | 4.0                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 49 | McIntosh County, Unincorporated Areas | Confluence with Wetland 50          | 0.7 Miles Upstream of Confluence with Wetland 50 | 03060204           | 0.7                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 50 | McIntosh County, Unincorporated Areas | Confluence with Wetland 55          | Long/McIntosh County Border                      | 03060204           | 7.0                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 51 | McIntosh County, Unincorporated Areas | Confluence with Wetland 50          | 0.7 Miles Upstream of Confluence with Wetland 50 | 03060204           | 0.7                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 52 | McIntosh County, Unincorporated Areas | Confluence with Wetland 50          | 2.0 Miles Upstream of Confluence with Wetland 50 | 03060204           | 2.0                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 53 | McIntosh County, Unincorporated Areas | Confluence with Wetland 55          | Long/McIntosh County Border                      | 03060204           | 1.5                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 54 | McIntosh County, Unincorporated Areas | Confluence with Wetland 50          | 0.9 Miles Upstream of Confluence with Wetland 50 | 03060204           | 0.9                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 55 | McIntosh County, Unincorporated Areas | Confluence with Big Mortar Swamp    | Long/McIntosh County Border                      | 03060204           | 4.2                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 56 | McIntosh County, Unincorporated Areas | Confluence with Wetland 55          | 0.9 Miles Upstream of Confluence with Wetland 55 | 03060204           | 0.9                                 |  | N              | A                  | 05/31/2012       |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|----------------------------|---------------------------------------|--|--|--------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Unnamed Stream/Wetland 58  | McIntosh County, Unincorporated Areas | Confluence with Wetland 55                 | 1.0 Miles Upstream of Confluence with Wetland 55               | 03060204           | 1.0                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 63  | McIntosh County, Unincorporated Areas | Confluence with Sapelo River T91           | 2.5 Miles Upstream of Interstate 95                            | 03060204           | 3.3                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 67  | McIntosh County, Unincorporated Areas | Confluence with South Newport River T2.2   | 0.6 Miles Upstream of Confluence with South Newport River T2.2 | 03060204           | 0.6                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 68  | McIntosh County, Unincorporated Areas | Confluence with Wetland 55                 | 0.5 Miles Upstream of Confluence with Wetland 55               | 03060204           | 0.5                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 83  | McIntosh County, Unincorporated Areas | Confluence with Wetland 43                 | 1.0 Miles Upstream of Confluence with Wetland 43               | 03070106           | 0.9                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 85  | McIntosh County, Unincorporated Areas | Confluence with Wetland 83                 | 0.5 Miles Upstream of Confluence with Wetland 83               | 03070106           | 0.5                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 101 | McIntosh County, Unincorporated Areas | Confluence with Youngs Swamp               | 0.4 Miles Upstream of Pasture Road                             | 03060204           | 1.8                                 |  | N              | A                  | 05/31/2012       |
| Unnamed Stream/Wetland 141 | McIntosh County, Unincorporated Areas | Confluence with McClendon Creek            | 1.1 Miles Upstream of McClendon Creek                          | 03070106           | 1.0                                 |  | N              | A                  | 05/15/2012       |
| Unnamed Stream/Wetland 142 | McIntosh County, Unincorporated Areas | Confluence with Wetland 141                | 0.3 Miles Upstream of Wetland 141                              | 03070106           | 0.3                                 |  | N              | A                  | 05/31/2012       |
| Wetland 92                 | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek Tributary 35 | 0.83 mi upstream of Cathead Cross Road                         | 03070106           | 2.5                                 |  | N              | A                  | 05/15/2012       |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|-----------------|---------------------------------------|--|--|----------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Wetland 93      | McIntosh County, Unincorporated Areas | Confluence with Wetland 92                 | 0.7 mi upstream of confluence with Wetland 92  | 03070106             | 0.7                                 |  | N              | A                  | 05/15/2012       |
| Wetland 95      | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek Tributary 4  | 0.7 mi upstream of confluence with Wetland 96  | 03070106             | 0.8                                 |  | N              | A                  | 05/15/2012       |
| Wetland 96      | McIntosh County, Unincorporated Areas | Confluence with Wetland 95                 | 0.4 mi upstream of confluence with Wetland 95  | 03070106             | 0.4                                 |  | N              | A                  | 05/15/2012       |
| Wetland 97      | McIntosh County, Unincorporated Areas | Confluence with Wetland 98                 | 2.7 mi upstream of confluence with Wetland 97  | 03060204<br>03070106 | 2.7                                 |  | N              | A                  | 05/15/2012       |
| Wetland 98      | McIntosh County, Unincorporated Areas | 347.9 If upstream of Brighton Road         | Blount Crossing Road                           | 03060204<br>03070106 | 4.3                                 |  | N              | A                  | 05/15/2012       |
| Wetland 99      | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek Tributary 4  | 1.5 mi upstream of confluence with Wetland 100 | 03060204<br>03070106 | 2.4                                 |  | N              | A                  | 05/15/2012       |
| Wetland 100     | McIntosh County, Unincorporated Areas | Confluence with Wetland 99                 | 1.1 mi upstream of confluence with Wetland 99  | 03070106             | 1.1                                 |  | N              | A                  | 05/15/2012       |
| Wetland 122     | McIntosh County, Unincorporated Areas | Confluence with Cathead Creek Tributary 35 | 0.6 mi upstream of Fountain Road               | 03070106             | 1.5                                 |  | N              | A                  | 05/15/2012       |
| Wetland 124     | McIntosh County, Unincorporated Areas | Confluence with Wetland 122                | 0.4 mi upstream of Fountain Road               | 03070106             | 0.7                                 |  | N              | A                  | 05/15/2012       |
| Wetland 125     | McIntosh County, Unincorporated Areas | Confluence with Wetland 130                | 1.8 mi upstream of Rossville Road              | 03060204             | 2.4                                 |  | N              | A                  | 05/15/2012       |

**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 <sup>2</sup> ) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|--|---------------------------------------|--|---|--------------------|-------------------------------------|--|----------------|--------------------|------------------|
| Wetland 126                            | McIntosh County, Unincorporated Areas | Confluence with Wetland 130                          | 0.4 mi upstream of confluence with Wetland 130          | 03060204           | 0.4                                 |  | N              | A                  | 05/15/2012       |
| Wetland 128                            | McIntosh County, Unincorporated Areas | Confluence with Wetland 130                          | 0.2 mi upstream of confluence with Wetland 131          | 03060204           | 0.2                                 |  | N              | A                  | 05/15/2012       |
| Wetland 129                            | McIntosh County, Unincorporated Areas | Confluence with Wetland 131                          | 0.4 mi upstream of confluence with Wetland 131          | 03060204           | 0.4                                 |  | N              | A                  | 05/15/2012       |
| Wetland 130                            | McIntosh County, Unincorporated Areas | 0.3 mi of SR-99                                      | 1.8 mi upstream of Rossville Road                       | 03060204           | 4.6                                 |  | N              | A                  | 05/15/2012       |
| Wetland 131                            | McIntosh County, Unincorporated Areas | Confluence with Wetland 99                           | 0.1 mi upstream of Swamp Road                           | 03060204           | 1.2                                 |  | N              | A                  | 05/15/2012       |
| White Chimney River Tributary No. 10   | McIntosh County, Unincorporated Areas | Confluence with White Chimney River                  | Approximately 2,280 feet upstream of Tram Road          | 03060204           | 2.1                                 |  | N              | A                  | 10/2007          |
| White Chimney River Tributary No. 10.1 | McIntosh County, Unincorporated Areas | Confluence with White Chimney River Tributary No. 10 | North Way/State Highway 25/U.S. Highway 17              | 03060204           | 3.7                                 |  | N              | A                  | 10/2007          |
| White Chimney River Tributary No. 10.2 | McIntosh County, Unincorporated Areas | Confluence with White Chimney River Tributary No. 10 | Tram Road   | 03060204           | 1.2                                 |  | N              | A                  | 10/2007          |
| Youngs Swamp                           | McIntosh County, Unincorporated Areas | 0.6 Miles Downstream of Interstate 95                | 2.4 Miles Upstream of Confluence with Jackie Camp Swamp | N/A                | 6.5                                 |  | N              | A                  | 05/31/2012       |

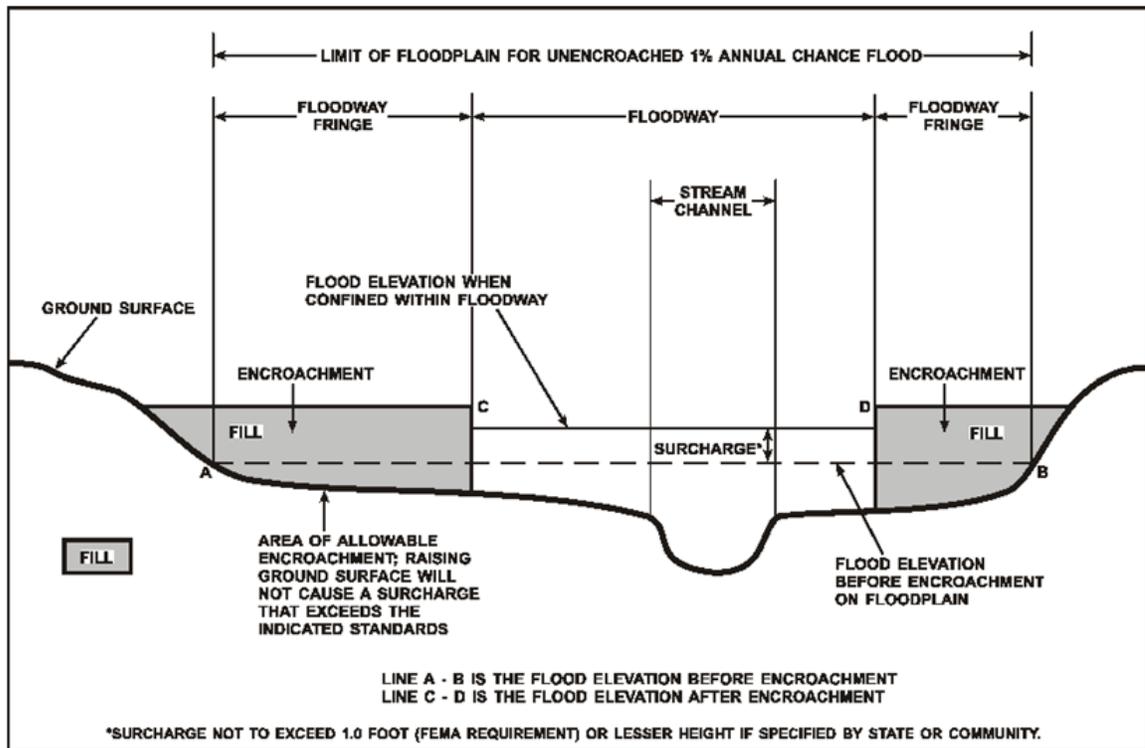
## 2.2 Floodways

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 1% 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. No floodway was computed within McIntosh County.

### **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.

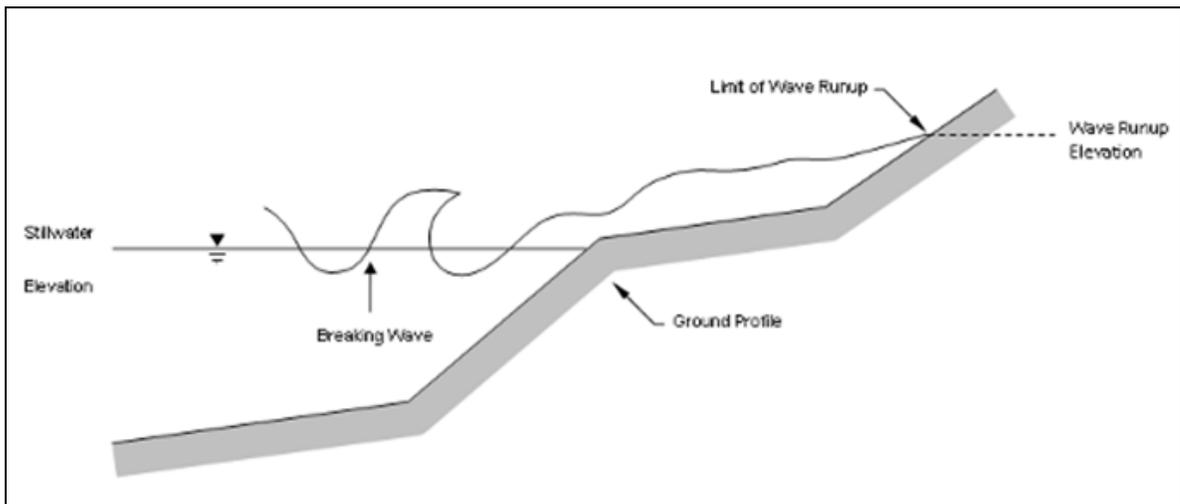
Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from 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 runoff, 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.

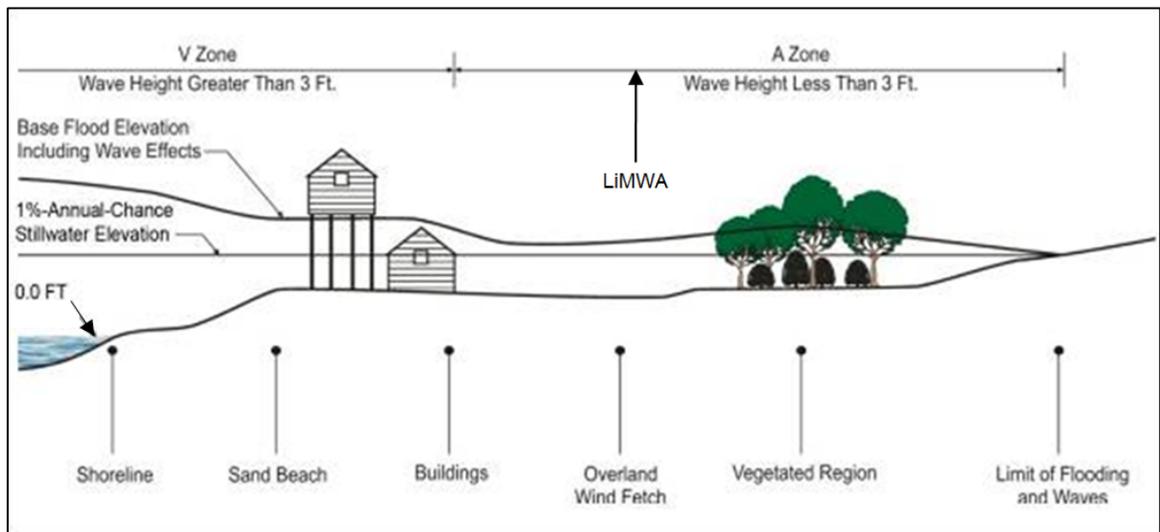
CHHAs are designated as “V” zones (for “velocity wave zones”) and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the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

**Table 3: Flood Zone Designations by Community**

| Community                             | Flood Zone(s) |
|---------------------------------------|---------------|
| Darien, City of                       | AE, VE, X     |
| McIntosh County, Unincorporated Areas | A, AE, VE, 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                 | 13191C0190E          |
|  |               |                            | 13191C0195E          |
|  |               |                            | 13191C0215E          |
|  |               |                            | 13191C0220E          |
|  |               |                            | 13191C0305E          |
|  |               |                            | 13191C0310E          |
|  |               |                            | 13191C0315E          |
|  |               |                            | 13191C0320E          |
|  |               |                            | 13191C0330E          |
|  |               |                            | 13191C0340E          |
|  |               |                            | 13191C0377E          |
|  |               |                            | 13191C0380E          |
|  |               |                            | 13191C0381E          |
|  |               |                            | 13191C0385E          |
|  |               |                            | 13191C0395E          |
|  |               |                            | 13191C0405E          |
|  |               |                            | 13191C0410E          |
| 13191C0415E  |               |                            |                      |
| 13191C0420E  |               |                            |                      |

## 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) |
|----------------------|------------------------|--|--|------------------------------|
| Altamaha             | 03070106               | Altamaha River   | Affecting the southern third of McIntosh County  | N/A                          |
| Ogeechee Coastal     | 03060204               | Atlantic Ocean (Flooding controlled by the Atlantic Ocean) | Largest watershed within McIntosh County, encompassing the northern 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 McIntosh County by flooding source.

**Table 6: Principal Flood Problems**

| Flooding Source  | Description of Flood Problems  |
|--|--|
| Atlantic Ocean (Flooding controlled by the Atlantic Ocean) | McIntosh County is subject to flooding from coastal storm surge tides in addition to rains induced by hurricanes, tropical storms, and other storms. Hurricanes and tropical storms normally occur in the summer and early fall months of the year. The area was affected by major hurricanes in 1824, October 1898, August 1911, July 1916, September 1927, September 1928, September 1929, August 1940, October 1944, September 1945, October 1947, September and October 1950, September 1953, August and September 1964 (Environmental Science Services Administration, 1970a). Tropical Storm Tammy also caused minor flooding in McIntosh County during landfall on October 6, 2005. |

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

**Table 7: Historic Flooding Elevations**

| Flooding Source | Location   | Historic Peak (Feet NAVD88) | Event Date | Approximate Recurrence Interval (years) | Source of Data |
|-----------------|--|-----------------------------|------------|---|----------------|
| Miscellaneous   | Darien, City of; McIntosh County, Unincorporated Areas | N/A                         | N/A        | N/A                                     | N/A            |

### 4.3 Non-Levee Flood Protection Measures

This section is not applicable to this Flood Risk Project.

**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. There are structures for flood protection purposes within McIntosh County on the south bank of the South Newport River, and along Butler River within the City of Darien. These structures do not provide protection against 1percent annual chance flood.

**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.

### March 2, 2009 Initial Countywide FIS

For streams studied by approximate methods, peak flows were determined using the rural regression equations for Georgia (Stamey and Hess 1993).

### Countywide Revision

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by limited detailed, detailed leverage and approximate methods. These reaches were studied using the U.S. Army Corps of Engineers' (USACE) Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) (version 3.5). The 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events were determined as part of this analysis (CDM Smith 2012a).

#### **Table 10: Summary of Discharges**

[Not Applicable to 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.

#### March 2, 2009 Initial Countywide FIS

For streams studied by approximate methods, cross section data was obtained from the topography. Roads were modeled as weirs, using elevations from topography. The studied streams were modeled using HEC-RAS version 3.1.3 (USACE 2005).

#### Countywide Revision

A steady state one-dimensional numeric hydraulic model for identified flooding sources throughout McIntosh County, Georgia. The modeling results simulate flooding concerns during FEMA chosen synthetic rainfall events. All existing features of the McIntosh County were incorporated in the model. Peak outflows were generated from HEC-HMS or Regression Analysis and entered into this model to be routed through the system.

The models were verified by routing a series of hypothetical storm events through the hydraulic models and comparing the results to previously developed FIRM maps or other watershed models developed by the Corps. Once the model was verified a series of synthetic frequency rainfall events were routed to determine the extent of the floodplain.

#### *Limited Detail Studies*

Preprocessing utilized HEC-GeoRAS (version 4.2.93), which is a set of tools designed to process geospatial data to use with HEC-RAS. The extension is used to create a HEC-RAS import file containing geometric attribute data from an existing DEM as well as other data sets. The stream centerlines, cross section cutlines, flowpaths, and bank stations were developed in HEC-GeoRAS and attributed. Elevation data was extracted from the four-foot digital elevation models (DEM) developed by PhotoScience and Furgo EarthData. The HEC-GeoRAS output could then be imported into a geometry file to be used in the HEC-RAS software program.

The stream centerline was developed using the 2-foot contours and the aerial photographs. The stream was digitized at a scale of 1 inch = 6,000 feet. Stream centerline data was attributed using HEC-GeoRAS.

Model cross sections for the detailed reaches were developed using the 2-foot contour information. Cross sections were cut left to right looking downstream, and were placed approximately 500-feet apart. Cross sections were oriented perpendicular to the main channel and perpendicular to the edge of floodplain contours as much as possible. Four cross sections were included at all structures, assuming approximately 1:1 contraction and 2:1 expansion. For the cross sections representing

structures, care was taken when placing the cross sections to not capture the road embankment. Model cross sections were placed at all survey locations (CDM Smith 2012b).

To define the low flow channel for the cross sections, Excel was used to combine the contour information with the survey data. The following approach was used to define the low flow channels.

- Moving from upstream to downstream, the river was divided into sections based on surveyed cross sections. Each section division was defined by a surveyed cross section on either end.
- The thalweg elevation was calculated by interpolation. The slope was calculated by using the distance between surveyed cross sections. This slope was then assumed to be constant between the two surveyed cross sections. The low flow channel thalweg elevations were then simply interpolated based on the distance to the surveyed cross section.
- The shape of the channel bottom was held constant from the upstream bounding surveyed cross section until the next downstream surveyed cross section.

The stream centerline was assigned as the center flowpath using HEC-GeoRAS. Flowpaths were drawn on the left and right overbanks by approximating a path halfway between the top of bank and the edge of the floodplain. The edge of the floodplain was estimated using the 4-contours and the aerial photographs.

Bank stations were selected in GIS based on the contour and aerial information. They were then refined in HEC-RAS to match individual cross section information.

This reach of the Altamaha did not include any bridges or culverts.

Manning's "n" values were developed at each cross section using survey and aerial photographs. The coefficients were manually inputted into the HEC-RAS model.

The starting water surface elevation for all limited detailed reaches was obtained by determining the normal depth.

For this study, the ineffective flow feature was utilized for modeling depressions that do not actively convey flow, near bridges and culverts where areas of stillwater are expected, and at other locations where impediments to flow likely produce areas with a velocity at or near zero (CDM Smith 2012b).

#### *Approximate Studies*

Model cross sections were placed, oriented, and cut in the same fashion as detailed reaches. However, accurate channel invert information was not available. Therefore, for the approximate reaches the channel invert was only defined by the 4-foot DEM; a channel bottom was typically not defined. It should be noted that the DEM can define elevations down to the water surface of the stream.

There were a few cases in which the HEC-RAS model was producing an erroneous water surface profile due to a lack of channel invert information. In these cases, engineering judgment was used to estimate and manually insert an appropriate channel into the model.

In most cases, this involved examining the top surface width (as determined from the aerial photograph) and the expected 100-year discharge.

Only the center flowpath was defined for the approximate reaches. The left and right flowpaths were set equal to the centerline value in HEC-RAS.

Bridge and culvert openings were modeled by placing a model cross-section down the center of the road by examining the aerial photograph. Therefore, a structure was not modeled in HEC-RAS for the approximate reaches. A bridge/culvert opening was manually inserted between the bank stations of the cross section. The bridge/culvert opening was estimated based on the aerial photograph and the invert was estimated based on the inverts of the surrounding cross sections.

Manning's "n" values were developed at each cross section in the same method as the detailed reaches.

Normal depth was used as the starting water surface elevation for the approximate models.

Bridges and culverts were not modeled as structures, as described previously. However, expansion and contraction coefficients were still used as described below.

| <u>Stream</u>          | <u>Contraction</u> | <u>Expansion</u> |
|------------------------|--------------------|------------------|
| Gradual Transitions    | 0.1                | 0.3              |
| Typical Bridge/Culvert | 0.3                | 0.5              |

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 (CDM Smith 2012b).

**Table 13: Summary of Hydrologic and Hydraulic Analyses**

| Flooding Source                        | Study Limits<br>Downstream Limit                     | Study Limits<br>Upstream Limit   | Hydrologic<br>Model or<br>Method Used  | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|--|--|--|--|--------------------------------------|-------------------------------|--------------------------|--|
| Altamaha River                         | Wayne/Glynn<br>County Boundary                       | Long/McIntosh<br>County Boundary   | Gage Data &<br>Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | AE                       | Ice jam analysis evaluated by Modified<br>Indirect Method (CRREL 2004). Flood Profile<br>reflects results of ice jam analysis. |
| Big Mortar<br>Swamp                    | Confluence with<br>South Newport<br>River            | 2.2 Miles Upstream<br>of State Road 57   | HEC-HMS 3.5  | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model.   |
| Big Mortar<br>Swamp Tributary<br>No. 1 | Confluence with<br>Big Mortar Swamp                  | 94th Road  | HEC-HMS 3.5  | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model.   |
| Buck Hill Swamp                        | Confluence with<br>Sapelo River                      | 1.2 Miles Upstream<br>of Interstate 95   | HEC-HMS 3.5  | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model.   |
| Cathead Creek<br>Tributary No. 35      | SR-251   | 0.5 mi upstream of<br>US-17/SR-25  | USGS Rural<br>Regression<br>Equations –<br>Region 3                                      | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model.   |
| Cathead Creek<br>Tributary No. 35      | Approximately 0.5<br>mi upstream of US-<br>17/SR-25  | Approximately 2.9<br>miles upstream of<br>North Way/State<br>Highway 25/U.S.<br>Highway 17         | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                                 | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| Cathead Creek<br>Tributary No.<br>35.1 | Confluence with<br>Cathead Creek<br>Tributary No. 35 | Approximately<br>8,410 feet<br>upstream of<br>confluence with<br>Cathead Creek<br>Tributary No. 35 | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                                 | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source                        | Study Limits<br>Downstream Limit                     | Study Limits<br>Upstream Limit  | Hydrologic<br>Model or<br>Method Used                                     | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|--|--|---|---|--------------------------------------|-------------------------------|--------------------------|--|
| Cathead Creek<br>Tributary No.<br>35.2 | Confluence with<br>Cathead Creek<br>Tributary No. 35 | Approximately<br>11,100 feet<br>upstream of North<br>Way/State<br>Highway 25/U.S.<br>Highway 17     | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| Cathead Creek<br>Tributary No.<br>35.3 | Confluence with<br>Cathead Creek<br>Tributary No. 35 | Approximately<br>10,800 feet<br>upstream of<br>confluence with<br>Cathead Creek<br>Tributary No. 35 | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| Cathead Creek<br>Tributary No. 4       | Confluence with<br>Cathead Creek                     | 0.2 mi upstream of<br>Ocean Hwy (US-<br>17/SR-25)   | USGS Rural<br>Regression<br>Equations –<br>Region 3                       | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Cedar Creek                            | 1.6 mi downstream<br>of Swamp Road                   | 0.9 mi upstream of<br>Swamp Road  | USGS Rural<br>Regression<br>Equations –<br>Region 3                       | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Jackie Camp<br>Swamp                   | Confluence with<br>Youngs Swamp                      | State Road 57   | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| McClendon<br>Creek                     | Intersection of Cox<br>Road                          | 0.2 Miles South of<br>Plum Orchard<br>Cemetery Road   | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| McClendon<br>Creek Tributary<br>No. 1  | Confluence with<br>McClendon Creek                   | Approximately<br>8,000 feet<br>upstream of<br>confluence with<br>McClendon Creek                    | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source                         | Study Limits<br>Downstream Limit                      | Study Limits<br>Upstream Limit   | Hydrologic<br>Model or<br>Method Used                                     | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|---|---|--|---|--------------------------------------|-------------------------------|--------------------------|--|
| McClendon<br>Creek Tributary<br>No. 2   | Confluence with<br>McClendon Creek                    | Approximately<br>2,930 feet<br>upstream of<br>confluence with<br>McClendon Creek | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| McClendon<br>Creek Tributary<br>No. 3   | Confluence with<br>McClendon Creek                    | Approximately<br>9,500 feet<br>upstream of<br>confluence with<br>McClendon Creek | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| McClendon<br>Creek Tributary<br>No. 4   | Confluence with<br>McClendon Creek                    | 3.8 Miles Upstream<br>of McClendon<br>Creek                                      | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| McClendon<br>Creek Tributary<br>No. 4.1 | Confluence with<br>McClendon Creek<br>Tributary No. 4 | Approximately<br>4,020 feet<br>upstream of Cox<br>Road                           | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| McClendon<br>Creek Tributary<br>No. 4.4 | Confluence with<br>McClendon Creek                    | 4.4 Miles Upstream<br>of McClendon<br>Creek                                      | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| McClendon<br>Creek Tributary<br>No. 6   | Confluence with<br>McClendon Creek                    | 1.6 Miles Upstream<br>of McClendon<br>Creek                                      | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Sapelo River                            | U.S. Highway 17                                       | 0.2 Miles Upstream<br>of Old Townsend<br>Road Northwest                          | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source                             | Study Limits<br>Downstream Limit                 | Study Limits<br>Upstream Limit                               | Hydrologic<br>Model or<br>Method Used                                     | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|---|--|--|---|--------------------------------------|-------------------------------|--------------------------|--|
| Snuff Box<br>Swamp Creek<br>(US)            | 0.9 Miles West of<br>GA HWY 57                   | 1.2 Miles<br>Southwest of GA<br>HWY 57                       | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Snuff Box<br>Swamp Creek<br>(DS)            | 0.4 Miles<br>Southwest of Snuff<br>Box Road      | 1.2 Miles<br>Southwest of GA<br>HWY 57                       | Regression –<br>Rural Equation,<br>USGS Fact<br>Sheet 169-98,<br>Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| South Newport<br>River                      | 14.6 Miles<br>Downstream of<br>State Road 25     | State Road 25  | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| South Newport<br>River                      | North Way/State<br>Highway 25/U.S.<br>Highway 17 | County Boundary  | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| South Newport<br>River Tributary<br>No. 1   | Confluence with<br>South Newport<br>River        | 0.6 Miles Upstream<br>of Interstate 95                       | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| South Newport<br>River Tributary<br>No. 2   | Confluence with<br>South Newport<br>River        | Approximately<br>2,740 feet<br>upstream of<br>Brickston Road | Rural<br>regression<br>equations<br>(Stamey and<br>Hess)                  | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| South Newport<br>River Tributary<br>No. 2.1 | Confluence with<br>Big Mortar Swamp              | 0.2 Miles Upstream<br>of Horsepen Road                       | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| South Newport<br>River Tributary<br>No. 2.2 | Confluence with<br>Big Mortar Swamp              | 0.6 Miles Upstream<br>of Coker Place<br>Road                 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source           | Study Limits<br>Downstream Limit    | Study Limits<br>Upstream Limit                   | Hydrologic<br>Model or<br>Method Used                         | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations  |
|---------------------------|-------------------------------------|--|---|--------------------------------------|-------------------------------|--------------------------|---|
| Unnamed Stream/Wetland 43 | 0.3 Miles West of Cox Road          | 2.3 Miles Upstream of Cox Road                   | Regression – Rural Equation, USGS Fact Sheet 169-98, Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 47 | Confluence with South Newport River | Jones Road Northwest                             | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 48 | Confluence with Big Mortar Swamp    | Howe Place Northwest                             | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 49 | Confluence with Wetland 50          | 0.7 Miles Upstream of Confluence with Wetland 50 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 50 | Confluence with Wetland 55          | Long/McIntosh County Border                      | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 51 | Confluence with Wetland 50          | 0.7 Miles Upstream of Confluence with Wetland 50 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 52 | Confluence with Wetland 50          | 2.0 Miles Upstream of Confluence with Wetland 50 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 53 | Confluence with Wetland 55          | Long/McIntosh County Border                      | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 54 | Confluence with Wetland 50          | 0.9 Miles Upstream of Confluence with Wetland 50 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source           | Study Limits<br>Downstream Limit         | Study Limits<br>Upstream Limit                                 | Hydrologic<br>Model or<br>Method Used                         | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations  |
|---------------------------|--|--|---|--------------------------------------|-------------------------------|--------------------------|---|
| Unnamed Stream/Wetland 55 | Confluence with Big Mortar Swamp         | Long/McIntosh County Border                                    | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 56 | Confluence with Wetland 55               | 0.9 Miles Upstream of Confluence with Wetland 55               | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 58 | Confluence with Wetland 55               | 1.0 Miles Upstream of Confluence with Wetland 55               | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 63 | Confluence with Sapelo River T91         | 2.5 Miles Upstream of Interstate 95                            | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 67 | Confluence with South Newport River T2.2 | 0.6 Miles Upstream of Confluence with South Newport River T2.2 | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 68 | Confluence with Wetland 55               | 0.5 Miles Upstream of Confluence with Wetland 55               | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 85 | Confluence with Wetland 83               | 0.5 Miles Upstream of Confluence with Wetland 83               | Regression – Rural Equation, USGS Fact Sheet 169-98, Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 83 | Confluence with Wetland 43               | 1.0 Miles Upstream of Confluence with Wetland 43               | Regression – Rural Equation, USGS Fact Sheet 169-98, Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source            | Study Limits<br>Downstream Limit           | Study Limits<br>Upstream Limit                | Hydrologic<br>Model or<br>Method Used                         | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations  |
|----------------------------|--|---|---|--------------------------------------|-------------------------------|--------------------------|---|
| Unnamed Stream/Wetland 101 | Confluence with Youngs Swamp               | 0.4 Miles Upstream of Pasture Road            | HEC-HMS 3.5   | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 142 | Confluence with Wetland 141                | 0.3 Miles Upstream of Wetland 141             | Regression – Rural Equation, USGS Fact Sheet 169-98, Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Unnamed Stream/Wetland 141 | Confluence with McClendon Creek            | 1.1 Miles Upstream of McClendon Creek         | Regression – Rural Equation, USGS Fact Sheet 169-98, Aug 1999 | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Wetland 92                 | Confluence with Cathead Creek Tributary 35 | 0.83 mi upstream of Cathead Cross Road        | USGS Rural Regression Equations – Region 3                    | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Wetland 93                 | Confluence with Wetland 92                 | 0.7 mi upstream of confluence with Wetland 92 | USGS Rural Regression Equations – Region 3                    | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Wetland 95                 | Confluence with Cathead Creek Tributary 4  | 0.7 mi upstream of confluence with Wetland 96 | USGS Rural Regression Equations – Region 3                    | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |
| Wetland 96                 | Confluence with Wetland 95                 | 0.4 mi upstream of confluence with Wetland 95 | USGS Rural Regression Equations – Region 3                    | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source | Study Limits<br>Downstream Limit                 | Study Limits<br>Upstream Limit                       | Hydrologic<br>Model or<br>Method Used               | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|-----------------|--|--|---|--------------------------------------|-------------------------------|--------------------------|--|
| Wetland 97      | Confluence with<br>Wetland 98                    | 2.7 mi upstream of<br>confluence with<br>Wetland 97  | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 98      | 347.9 lf upstream<br>of Brighton Road            | Blount Crossing<br>Road                              | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 99      | Confluence with<br>Cathead Creek<br>Tributary 4  | 1.5 mi upstream of<br>confluence with<br>Wetland 100 | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 100     | Confluence with<br>Wetland 99                    | 1.1 mi upstream of<br>confluence with<br>Wetland 99  | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 122     | Confluence with<br>Cathead Creek<br>Tributary 35 | 0.6 mi upstream of<br>Fountain Road                  | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 124     | Confluence with<br>Wetland 122                   | 0.4 mi upstream of<br>Fountain Road                  | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 126     | Confluence with<br>Wetland 130                   | 0.4 mi upstream of<br>confluence with<br>Wetland 130 | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 125     | Confluence with<br>Wetland 130                   | 1.8 mi upstream of<br>Rossville Road                 | USGS Rural<br>Regression<br>Equations –<br>Region 3 | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source                              | Study Limits<br>Downstream Limit                              | Study Limits<br>Upstream Limit                          | Hydrologic<br>Model or<br>Method Used                    | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|--|---|---|--|--------------------------------------|-------------------------------|--------------------------|--|
| Wetland 128                                  | Confluence with<br>Wetland 130                                | 0.2 mi upstream of<br>confluence with<br>Wetland 131    | USGS Rural<br>Regression<br>Equations –<br>Region 3      | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 129                                  | Confluence with<br>Wetland 131                                | 0.4 mi upstream of<br>confluence with<br>Wetland 131    | USGS Rural<br>Regression<br>Equations –<br>Region 3      | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 130                                  | 0.3 mi of SR-99   | 1.8 mi upstream of<br>Rossville Road                    | USGS Rural<br>Regression<br>Equations –<br>Region 3      | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| Wetland 131                                  | Confluence with<br>Wetland 99                                 | 0.1 mi upstream of<br>Swamp Road                        | USGS Rural<br>Regression<br>Equations –<br>Region 3      | HEC-RAS 4.1                          | 05/15/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |
| White Chimney<br>River Tributary<br>No. 10   | Confluence with<br>White Chimney<br>River                     | Approximately<br>2,280 feet<br>upstream of Tram<br>Road | Rural<br>regression<br>equations<br>(Stamey and<br>Hess) | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| White Chimney<br>River Tributary<br>No. 10.1 | Confluence with<br>White Chimney<br>River Tributary No.<br>10 | North Way/State<br>Highway 25/U.S.<br>Highway 17        | Rural<br>regression<br>equations<br>(Stamey and<br>Hess) | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |
| White Chimney<br>River Tributary<br>No. 10.2 | Confluence with<br>White Chimney<br>River Tributary No.<br>10 | Tram Road   | Rural<br>regression<br>equations<br>(Stamey and<br>Hess) | HEC-RAS<br>3.1.3                     | 10/2007                       | A                        |  |

**Table 13: Summary of Hydrologic and Hydraulic Analyses - continued**

| Flooding Source | Study Limits<br>Downstream Limit            | Study Limits<br>Upstream Limit                                   | Hydrologic<br>Model or<br>Method Used | Hydraulic<br>Model or<br>Method Used | Date<br>Analyses<br>Completed | Flood<br>Zone on<br>FIRM | Special Considerations   |
|-----------------|---|--|---------------------------------------|--------------------------------------|-------------------------------|--------------------------|--|
| Youngs Swamp    | 0.6 Miles<br>Downstream of<br>Interstate 95 | 2.4 Miles Upstream<br>of Confluence with<br>Jackie Camp<br>Swamp | HEC-HMS 3.5                           | HEC-RAS 4.1                          | 05/31/2012                    | A                        | Effects of hydraulic structures were not<br>considered in the model. |

**Table 14: Roughness Coefficients**

| Flooding Source                   | Channel “n” | Overbank “n” |
|-----------------------------------|-------------|--------------|
| Altamaha River                    | 0.035       | 0.09         |
| Big Mortar Swamp                  | 0.050       | 0.080-0.150  |
| Big Mortar Swamp Tributary No. 1  | 0.050-0.075 | 0.150        |
| Buck Hill Swamp                   | 0.050-0.075 | 0.060-0.150  |
| Cathead Creek Tributary No. 35    | 0.075       | 0.080-0.13   |
| Cathead Creek Tributary No. 35.1  | N/A         | N/A          |
| Cathead Creek Tributary No. 35.2  | N/A         | N/A          |
| Cathead Creek Tributary No. 35.3  | N/A         | N/A          |
| Cathead Creek Tributary No. 4     | 0.075       | 0.080-0.13   |
| Cedar Creek                       | 0.075       | 0.080-0.13   |
| Jackie Camp Swamp                 | 0.050-0.075 | 0.060-0.150  |
| McClendon Creek Tributary No. 1   | N/A         | N/A          |
| McClendon Creek Tributary No. 2   | N/A         | N/A          |
| McClendon Creek Tributary No. 3   | N/A         | N/A          |
| McClendon Creek Tributary No. 4   | 0.050-0.075 | 0.060-0.150  |
| McClendon Creek Tributary No. 4.1 | N/A         | N/A          |
| McClendon Creek Tributary No. 4.4 | 0.050       | 0.060-0.150  |
| McClendon Creek Tributary No. 6   | 0.075       | 0.090-0.120  |
| McClendon Creek                   | 0.050-0.075 | 0.060-0.150  |
| Sapelo River                      | 0.050-0.075 | 0.060-0.150  |
| Sapelo River Tributary No. 91     | 0.050-0.100 | 0.060-0.150  |
| Snuff Box Swamp Creek (US)        | 0.050-0.075 | 0.060-0.120  |
| Snuff Box Swamp Creek (DS)        | 0.060-0.075 | 0.050-0.120  |
| South Newport River               | 0.050       | 0.070-0.150  |

**Table 14: Roughness Coefficients - continued**

| Flooding Source                       | Channel "n" | Overbank "n" |
|---------------------------------------|-------------|--------------|
| South Newport River Tributary No. 1   | 0.050-0.075 | 0.080-0.150  |
| South Newport River Tributary No. 2   | N/A         | N/A          |
| South Newport River Tributary No. 2.1 | 0.050       | 0.060-0.150  |
| South Newport River Tributary No. 2.2 | 0.050-0.075 | 0.060-0.150  |
| Unnamed Stream/Wetland 101            | 0.050-0.075 | 0.060-0.120  |
| Unnamed Stream/Wetland 47             | 0.050-0.075 | 0.080-0.150  |
| Unnamed Stream/Wetland 48             | 0.050-0.075 | 0.070-0.150  |
| Unnamed Stream/Wetland 49             | 0.050       | 0.120-0.150  |
| Unnamed Stream/Wetland 50             | 0.050-0.075 | 0.011-0.150  |
| Unnamed Stream/Wetland 50.1           | 0.050       | 0.080-0.150  |
| Unnamed Stream/Wetland 51             | 0.050       | 0.120-0.150  |
| Unnamed Stream/Wetland 52             | 0.075       | 0.120        |
| Unnamed Stream/Wetland 53             | 0.075       | 0.120        |
| Unnamed Stream/Wetland 54             | 0.075       | 0.120        |
| Unnamed Stream/Wetland 55             | 0.050-0.075 | 0.080-0.150  |
| Unnamed Stream/Wetland 56             | 0.050-0.075 | 0.150        |
| Unnamed Stream/Wetland 58             | 0.050       | 0.120-0.150  |
| Unnamed Stream/Wetland 63             | 0.050-0.075 | 0.060-0.150  |
| Unnamed Stream/Wetland 67             | 0.050-0.075 | 0.080-0.150  |
| Unnamed Stream/Wetland 68             | 0.050-0.075 | 0.060-0.150  |
| Unnamed Stream/Wetland 85             | 0.050-0.075 | 0.100-0.120  |
| Unnamed Stream/Wetland 83             | 0.050-0.075 | 0.120-0.150  |
| Unnamed Stream/Wetland 43             | 0.050-0.075 | 0.060-0.150  |
| Unnamed Stream/Wetland 142            | 0.050       | 0.090-0.120  |
| Unnamed Stream/Wetland 141            | 0.050       | 0.090-0.120  |
| Wetland 92                            | 0.075       | 0.080-0.13   |
| Wetland 122                           | 0.075       | 0.080-0.13   |
| Wetland 93                            | 0.075       | 0.080-0.13   |
| Wetland 124                           | 0.075       | 0.080-0.13   |
| Wetland 100                           | 0.075       | 0.090-0.13   |

**Table 14: Roughness Coefficients - continued**

| Flooding Source                        | Channel “n” | Overbank “n” |
|--|-------------|--------------|
| Wetland 99                             | 0.075       | 0.090-0.13   |
| Wetland 95                             | 0.075       | 0.080-0.13   |
| Wetland 96                             | 0.075       | 0.10-0.13    |
| Wetland 97                             | 0.075       | 0.080-0.13   |
| Wetland 98                             | 0.075       | 0.080-0.13   |
| Wetland 126                            | 0.075       | 0.13         |
| Wetland 125                            | 0.075       | 0.080-0.13   |
| Wetland 128                            | 0.075       | 0.13         |
| Wetland 129                            | 0.075       | 0.13         |
| Wetland 130                            | 0.075       | 0.080-0.13   |
| Wetland 131                            | 0.075       | 0.13         |
| Youngs Swamp                           | 0.050-0.075 | 0.060-0.150  |
| White Chimney River Tributary No. 10   | N/A         | N/A          |
| White Chimney River Tributary No. 10.1 | N/A         | N/A          |
| White Chimney River Tributary No. 10.2 | N/A         | N/A          |

### **5.3 Coastal Analyses**

For the areas of McIntosh 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.

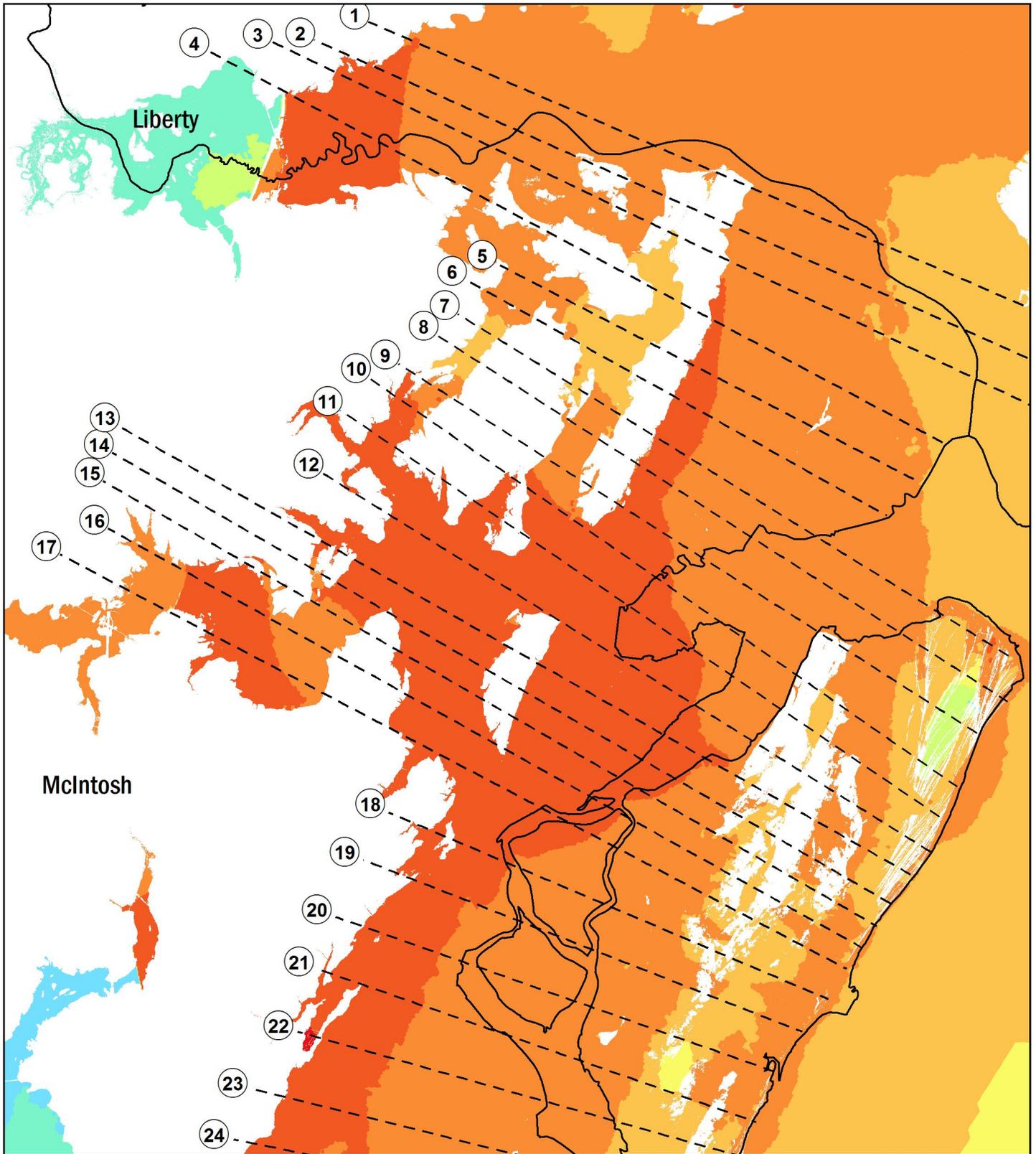
The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation. Table 15 summarizes the methods and/or models used for the coastal analyses. Refer 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 McIntosh County | Entire coastline of McIntosh County | Storm Climatology Statistical Analyses    | JPM-OS  | 10/7/2013                   |
| Atlantic Ocean  | Entire coastline of McIntosh County | Entire coastline of McIntosh County | Storm Surge including Regional Wave Setup | ADCIRC + SWAN   | 10/7/2013                   |
| Atlantic Ocean  | Entire coastline of McIntosh County | Entire coastline of McIntosh County | Stillwater Frequency Analysis             | SURGESTAT (low frequency); Regional Tidal Frequency Analysis (high frequency) | 11/21/2013                  |
| Atlantic Ocean  | Entire coastline of McIntosh County | Entire coastline of McIntosh County | Dune Erosion                              | FEMA's Erosion Assessment   | 2/2/2015                    |
| Atlantic Ocean  | Entire coastline of McIntosh County | Entire coastline of McIntosh County | Overland Wave Propagation                 | WHAFIS  | 2/2/2015                    |
| Atlantic Ocean  | Entire coastline of McIntosh County | Entire coastline of McIntosh County | Wave Runup                                | RUNUP2.0  | 2/2/2015                    |

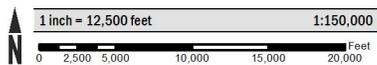
**5.3.1 Total Stillwater Elevations**

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.



Elevation (Feet, NAVD88)

|           |           |             |
|-----------|-----------|-------------|
| < 6.5     | 7.5 - 8.0 | 9.0 - 9.5   |
| 6.5 - 7.0 | 8.0 - 8.5 | 9.5 - 10.0  |
| 7.0 - 7.5 | 8.5 - 9.0 | 10.0 - 10.5 |



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

COUNTY LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

1 Percent-Annual-Chance Stillwater Elevation Map

McINTOSH COUNTY, GEORGIA

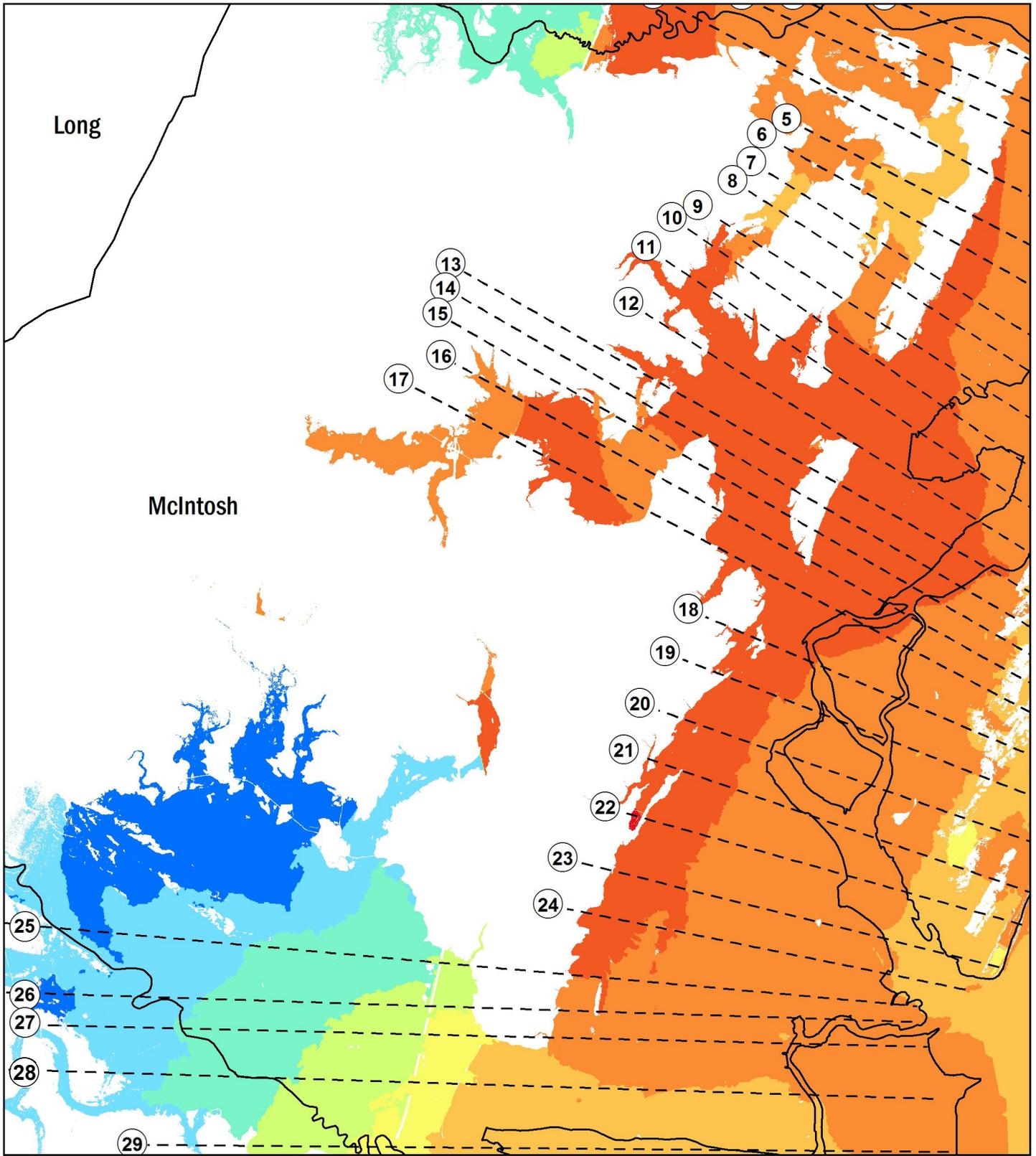
Sheet 1 of 2



FEMA

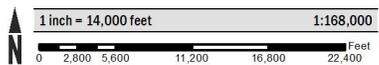
Note: This figure displays 1%-annual-chance stillwater elevations (including wave set-up). Overland wave height information is not included. Base Flood Elevations are not displayed.

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



Elevation (Feet, NAVD88)

|  |           |  |           |  |             |
|--|-----------|--|-----------|--|-------------|
|  | < 6.5     |  | 7.5 - 8.0 |  | 9.0 - 9.5   |
|  | 6.5 - 7.0 |  | 8.0 - 8.5 |  | 9.5 - 10.0  |
|  | 7.0 - 7.5 |  | 8.5 - 9.0 |  | 10.0 - 10.5 |



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

COUNTY LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

1 Percent-Annual-Chance Stillwater Elevation Map

McINTOSH COUNTY, GEORGIA

Sheet 2 of 2



FEMA

Note: This figure displays 1%-annual-chance stillwater elevations (including wave set-up). Overland wave height information is not included. Base Flood Elevations are not displayed.

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 representative 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.

Tidal gages can be used instead of historic records of storms when the available tidal gage record for the area represents both the astronomical tide component and the storm surge component. Table 16 provides the gage name, managing agency, gage type, gage identifier, start date, end date, and statistical methodology applied to each gage used to determine the stillwater elevations.

**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 16: 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          |
| Virginiaia Key - 8713214       | NOAA                                | Tide      | 1994       | Present  | L-moments, GEV          |

**Combined Riverine and Tidal Effects**

A combined probability analysis is 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 are 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 is a greater than 1-percent-annual-chance of this flood level being equaled or exceeded. In McIntosh County combined probability was not scoped as there are no detailed riverine studies present within the county.

### 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 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. 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 runoff. 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)<br>Range of Stillwater Elevations (ft NAVD88) |                  |                  |                   |                     |
|----------------|------------------|---|--|--|------------------|------------------|-------------------|---------------------|
|                |                  | Significant Wave Height<br>H <sub>s</sub> (ft)    | Peak Wave Period<br>T <sub>p</sub> (sec) | 10% Annual Chance  | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance  | 0.2% Annual Chance  |
| Atlantic Ocean | 1                | 17.6  | 12.5                                     | 6.1<br>5.6 - 6.6   | 6.5<br>5.9 - 7.1 | 8.3<br>7.2 - 8.8 | 9.4<br>8.6 - 10.0 | 13.4<br>12.3 - 14.0 |
| Atlantic Ocean | 2                | 17.6  | 12.6                                     | 6.1<br>5.6 - 6.2   | 6.5<br>5.9 - 6.6 | 8.2<br>6.8 - 8.2 | 9.4<br>8.2 - 9.6  | 13.2<br>11.8 - 14.2 |
| Atlantic Ocean | 3                | 18.0  | 12.4                                     | 6.1<br>5.2 - 6.3   | 6.5<br>5.6 - 6.8 | 8.5<br>6.8 - 8.5 | 9.0<br>8.4 - 9.7  | 13.0<br>11.9 - 14.3 |
| Atlantic Ocean | 4                | 17.8  | 12.2                                     | 5.8<br>5.7 - 6.2   | 6.3<br>6.1 - 6.6 | 7.9<br>5.5 - 8.2 | 8.9<br>7.2 - 9.9  | 12.3<br>9.9 - 14.3  |
| Atlantic Ocean | 5                | 17.4  | 11.9                                     | 6.0<br>5.6 - 6.2   | 6.4<br>6.1 - 6.6 | 7.9<br>7.5 - 8.2 | 9.1<br>8.9 - 9.7  | 12.6<br>12.6 - 14.1 |
| Atlantic Ocean | 6                | 17.4  | 12.3                                     | 6.0<br>5.4 - 6.2   | 6.4<br>5.8 - 6.7 | 7.9<br>7.3 - 8.3 | 9.1<br>8.9 - 9.7  | 12.7<br>12.6 - 14.2 |
| Atlantic Ocean | 7                | 18.1  | 11.8                                     | 6.0<br>5.1 - 6.2   | 6.4<br>5.4 - 6.7 | 8.0<br>6.5 - 8.3 | 9.2<br>8.9 - 9.7  | 12.9<br>12.4 - 14.2 |

**Table 17: Coastal Transect Parameters - continued**

| Flood Source   | Coastal Transect | Starting Wave Conditions for the 1% Annual Chance |  | Starting Stillwater Elevations (ft NAVD88)<br>Range of Stillwater Elevations (ft NAVD88) |                  |                  |                  |                     |
|----------------|------------------|---|--|--|------------------|------------------|------------------|---------------------|
|                |                  | Significant Wave Height<br>H <sub>s</sub> (ft)    | Peak Wave Period<br>T <sub>p</sub> (sec) | 10% Annual Chance  | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance  |
|                |                  |   |  |  |                  |                  |                  |                     |
| Atlantic Ocean | 8                | 17.7  | 11.8                                     | 6.0<br>5.1 - 6.2   | 6.4<br>5.4 - 6.7 | 8.0<br>6.6 - 8.3 | 9.1<br>8.0 - 9.7 | 12.8<br>12.2 - 14.2 |
| Atlantic Ocean | 9                | 17.8  | 12.4                                     | 6.0<br>5.2 - 6.2   | 6.4<br>5.6 - 6.7 | 8.1<br>6.8 - 8.3 | 9.3<br>7.6 - 9.6 | 12.9<br>12.4 - 14.4 |
| Atlantic Ocean | 10               | 17.1  | 12.4                                     | 6.0<br>4.5 - 6.2   | 6.4<br>4.8 - 6.7 | 8.1<br>6.0 - 8.3 | 9.2<br>7.6 - 9.7 | 13.1<br>12.3 - 14.3 |
| Atlantic Ocean | 11               | 17.2  | 12.7                                     | 5.9<br>4.5 - 6.0   | 6.4<br>4.8 - 6.7 | 8.0<br>6.0 - 8.3 | 9.2<br>8.9 - 9.7 | 13.0<br>12.2 - 14.5 |
| Atlantic Ocean | 12               | 17.3  | 12.7                                     | 5.9<br>5.2 - 6.3   | 6.4<br>5.6 - 6.8 | 7.9<br>6.9 - 8.4 | 9.1<br>8.7 - 9.8 | 12.7<br>12.2 - 14.5 |
| Atlantic Ocean | 13               | 17.4  | 12.7                                     | 5.9<br>5.8 - 6.4   | 6.4<br>6.2 - 6.9 | 7.8<br>7.7 - 8.5 | 9.1<br>8.8 - 9.9 | 12.7<br>12.3 - 14.5 |
| Atlantic Ocean | 14               | 17.5  | 12.4                                     | 5.9<br>5.4 - 6.4   | 6.4<br>5.8 - 6.9 | 7.8<br>7.0 - 8.5 | 9.1<br>8.7 - 9.9 | 12.8<br>12.5 - 14.2 |

**Table 17: Coastal Transect Parameters - continued**

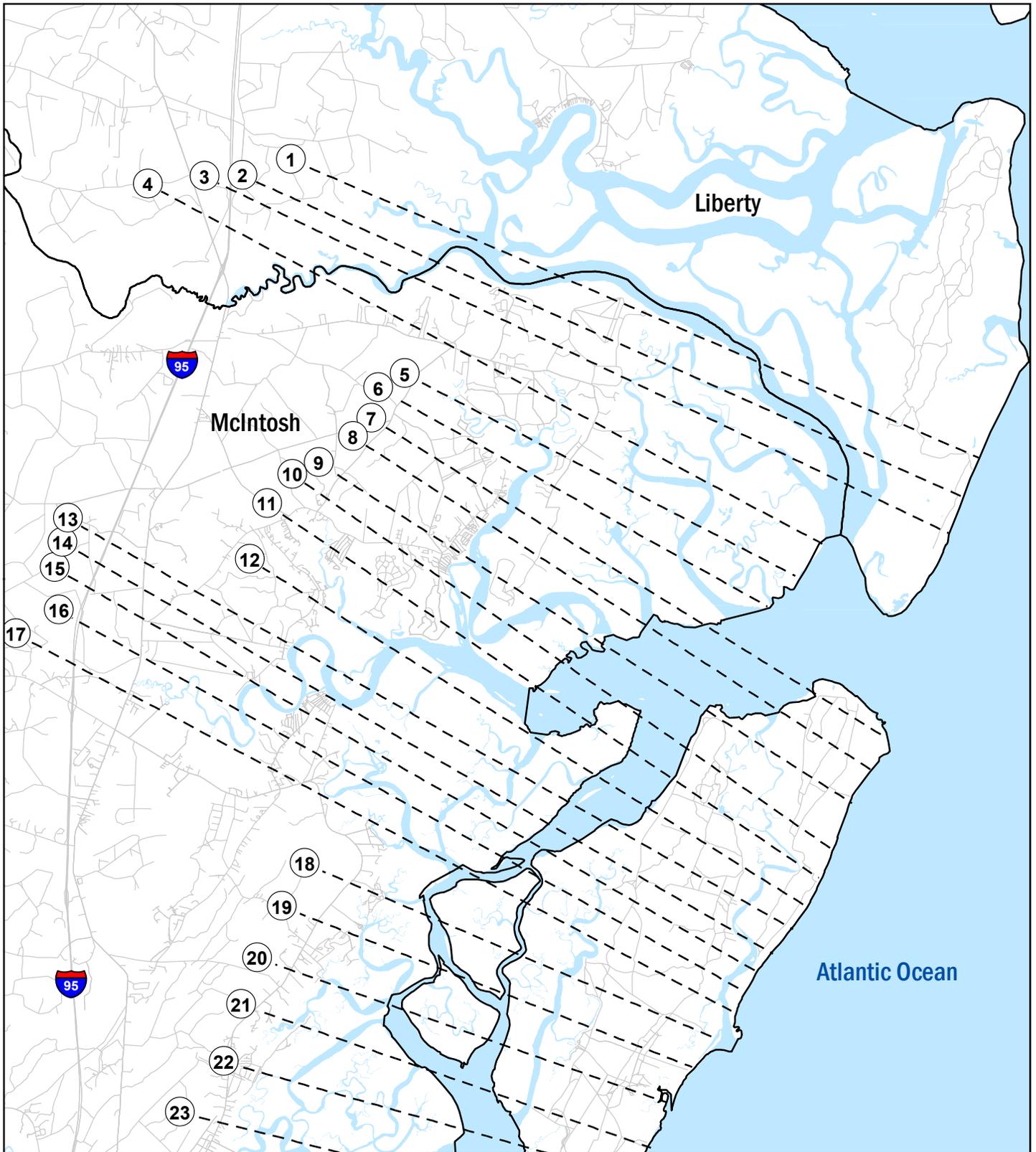
| Flood Source   | Coastal Transect | Starting Wave Conditions for the 1% Annual Chance |  | Starting Stillwater Elevations (ft NAVD88)<br>Range of Stillwater Elevations (ft NAVD88) |                  |                  |                  |                     |
|----------------|------------------|---|--|--|------------------|------------------|------------------|---------------------|
|                |                  | Significant Wave Height<br>H <sub>s</sub> (ft)    | Peak Wave Period<br>T <sub>p</sub> (sec) | 10% Annual Chance  | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance  |
|                |                  |   |  |  |                  |                  |                  |                     |
| Atlantic Ocean | 15               | 17.6  | 12.2                                     | 5.9<br>5.3 - 6.4   | 6.4<br>5.7 - 6.9 | 7.9<br>7.1 - 8.5 | 9.0<br>8.7 - 9.9 | 12.7<br>12.6 - 14.5 |
| Atlantic Ocean | 16               | 17.5  | 11.9                                     | 5.9<br>4.4 - 6.3   | 6.4<br>4.8 - 6.8 | 7.9<br>5.9 - 8.4 | 9.1<br>8.9 - 9.9 | 13.0<br>12.6 - 14.5 |
| Atlantic Ocean | 17               | 17.7  | 11.8                                     | 5.9<br>4.7 - 6.4   | 6.4<br>5.0 - 6.9 | 7.9<br>6.3 - 8.5 | 9.1<br>8.7 - 9.9 | 12.9<br>12.6 - 14.5 |
| Atlantic Ocean | 18               | 17.6  | 11.8                                     | 5.9<br>5.6 - 6.3   | 6.4<br>6.1 - 6.8 | 8.0<br>7.0 - 8.4 | 9.3<br>8.6 - 9.8 | 13.1<br>12.5 - 14.9 |
| Atlantic Ocean | 19               | 17.9  | 12.0                                     | 5.9<br>5.7 - 6.2   | 6.3<br>6.1 - 6.7 | 8.0<br>7.1 - 8.3 | 9.2<br>8.8 - 9.9 | 13.2<br>12.5 - 15.0 |
| Atlantic Ocean | 20               | 17.7  | 12.2                                     | 5.9<br>5.3 - 6.2   | 6.3<br>5.7 - 6.7 | 8.0<br>7.0 - 8.3 | 9.3<br>8.6 - 9.8 | 13.4<br>12.6 - 15.1 |
| Atlantic Ocean | 21               | 17.5  | 12.6                                     | 6.0<br>5.6 - 6.4   | 6.5<br>6.0 - 6.9 | 8.0<br>6.4 - 8.5 | 9.3<br>8.5 - 9.9 | 13.4<br>12.6 - 15.5 |

**Table 17: Coastal Transect Parameters - continued**

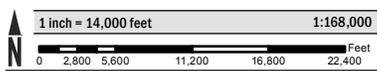
| Flood Source   | Coastal Transect | Starting Wave Conditions for the 1% Annual Chance |  | Starting Stillwater Elevations (ft NAVD88)<br>Range of Stillwater Elevations (ft NAVD88) |                  |                  |                   |                     |
|----------------|------------------|---|--|--|------------------|------------------|-------------------|---------------------|
|                |                  | Significant Wave Height<br>H <sub>s</sub> (ft)    | Peak Wave Period<br>T <sub>p</sub> (sec) | 10% Annual Chance  | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance  | 0.2% Annual Chance  |
|                |                  |   |  |  |                  |                  |                   |                     |
| Atlantic Ocean | 22               | 17.5  | 12.5                                     | 5.9<br>5.0 - 6.4   | 6.4<br>5.6 - 6.9 | 7.9<br>6.9 - 8.3 | 9.2<br>8.7 - 10.1 | 13.3<br>12.6 - 15.5 |
| Atlantic Ocean | 23               | 17.8  | 11.8                                     | 5.9<br>4.9 - 6.2   | 6.3<br>5.3 - 6.6 | 7.9<br>6.4 - 8.2 | 8.9<br>8.5 - 9.7  | 12.9<br>12.3 - 15.4 |
| Atlantic Ocean | 24               | 17.9  | 11.7                                     | 5.9<br>5.8 - 6.2   | 6.3<br>6.0 - 6.6 | 7.8<br>7.0 - 8.2 | 9.0<br>8.9 - 9.7  | 12.7<br>12.4 - 15.4 |
| Atlantic Ocean | 25               | 17.6  | 12.4                                     | 6.0<br>4.1 - 6.2   | 6.5<br>4.4 - 6.7 | 7.8<br>5.2 - 8.1 | 9.0<br>6.5 - 9.6  | 12.8<br>8.7 - 15.2  |
| Atlantic Ocean | 26               | 17.5  | 12.6                                     | 6.0<br>4.1 - 6.1   | 6.5<br>4.4 - 6.5 | 8.0<br>5.1 - 8.3 | 9.2<br>6.5 - 9.6  | 13.1<br>8.8 - 14.9  |
| Atlantic Ocean | 27               | 17.6  | 12.3                                     | 6.1<br>4.2 - 6.1   | 6.5<br>4.5 - 6.5 | 8.0<br>5.2 - 8.0 | 9.2<br>6.6 - 9.4  | 13.2<br>8.8 - 14.6  |
| Atlantic Ocean | 28               | 17.8  | 11.6                                     | 6.1<br>4.8 - 6.1   | 6.5<br>5.2 - 6.5 | 8.1<br>5.3 - 8.1 | 9.3<br>6.7 - 9.3  | 13.4<br>9.2 - 13.9  |

**Table 17: Coastal Transect Parameters - continued**

| Flood Source   | Coastal Transect | Starting Wave Conditions for the 1% Annual Chance |  | Starting Stillwater Elevations (ft NAVD88)<br>Range of Stillwater Elevations (ft NAVD88) |                  |                  |                  |                     |
|----------------|------------------|---|--|--|------------------|------------------|------------------|---------------------|
|                |                  | Significant Wave Height<br>H <sub>s</sub> (ft)    | Peak Wave Period<br>T <sub>p</sub> (sec) | 10% Annual Chance  | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance | 0.2% Annual Chance  |
| Atlantic Ocean | 29               | 17.9  | 11.6                                     | 5.8<br>5.3 - 5.9   | 6.2<br>5.7 - 6.3 | 8.1<br>5.5- 8.1  | 9.3<br>6.9 - 9.3 | 13.4<br>9.5 - 13.6  |
| Atlantic Ocean | 30               | 17.4  | 11.9                                     | 6.0<br>4.1 - 6.2   | 6.5<br>4.4 - 6.7 | 7.7<br>6.9 - 7.8 | 9.0<br>8.7 - 9.0 | 12.8<br>12.6 - 13.6 |



Elevation (Feet, NAVD88)



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



**NATIONAL FLOOD INSURANCE PROGRAM**

Transect Location Map

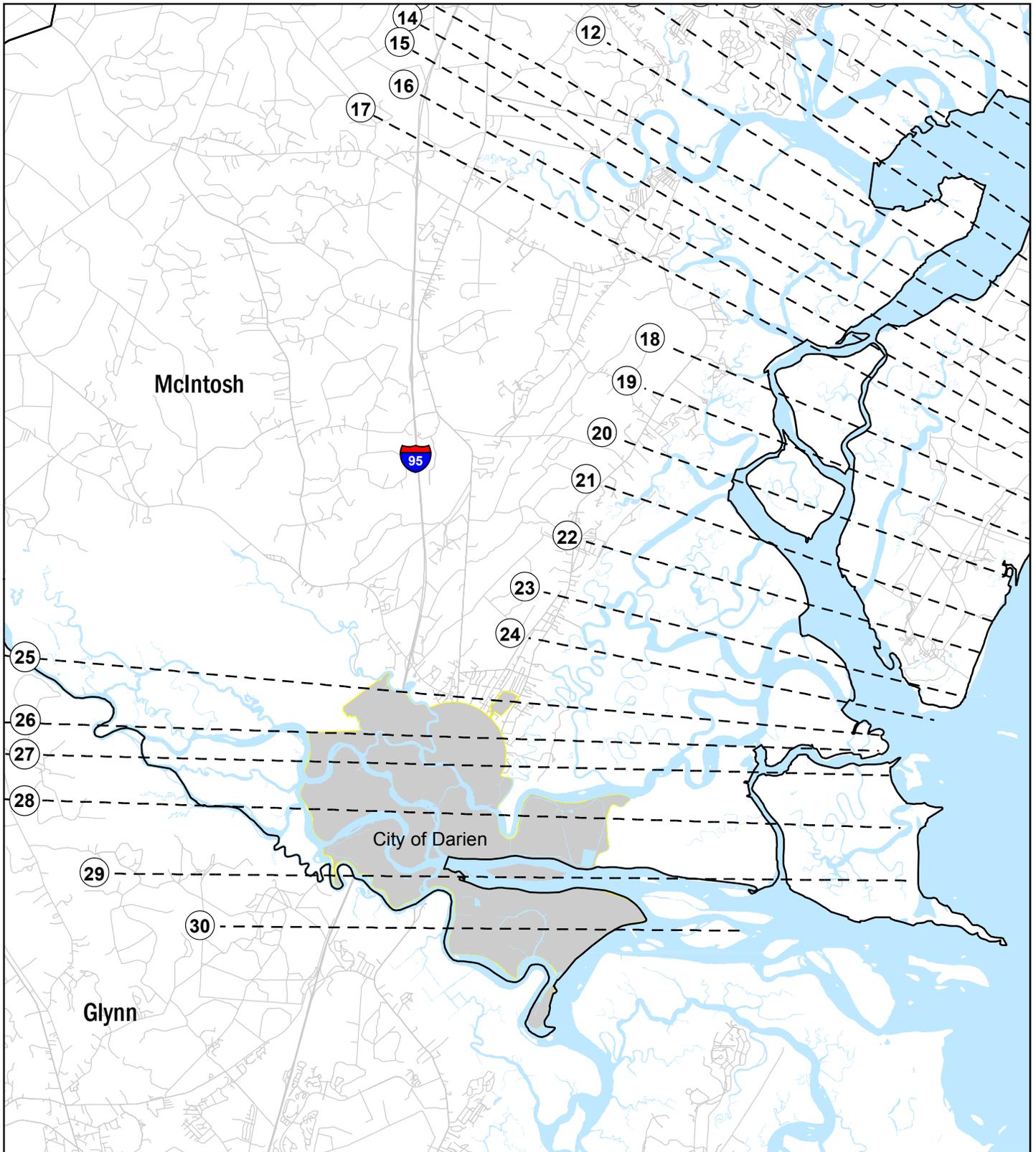
McINTOSH COUNTY, GEORGIA

Sheet 1 of 2

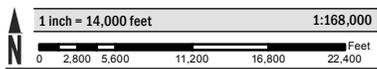


FEMA

Figure 9: Transect Location Map



Elevation (Feet, NAVD88)



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



**NATIONAL FLOOD INSURANCE PROGRAM**  
Transect Location Map

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McINTOSH COUNTY, GEORGIA  
**Sheet 2 of 2**



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](http://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](http://www.ngs.noaa.gov).

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

**Table 20: Countywide Vertical Datum Conversion**

| Quadrangle Name  | Quadrangle Corner | Latitude | Longitude | Conversion from NGVD29 to NAVD88 (feet) |
|--|-------------------|----------|-----------|---|
| Townsend   | SW                | 31.500   | -81.625   | -0.951                                  |
| Eulonia  | NW                | 31.625   | -81.500   | -0.958                                  |
| Eulonia  | NE                | 31.625   | -81.375   | -0.978                                  |
| Eulonia  | SW                | 31.500   | -81.500   | -0.971                                  |
| Eulonia  | SE                | 31.500   | -81.375   | -0.981                                  |
| Shellman Bluff   | NE                | 31.625   | -81.250   | -1.004                                  |
| Shellman Bluff   | SE                | 31.500   | -81.250   | -0.994                                  |
| Ridgeville   | SW                | 31.375   | -81.500   | -0.978                                  |
| Doboy Sound  | SE                | 31.375   | -81.250   | -0.991                                  |
| Doboy Sound  | SW                | 31.375   | -81.375   | -0.988                                  |
| Average Conversion from NGVD29 to NAVD88 = -0.979 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](http://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                               |
| 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 24 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 <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| Darien, City of; McIntosh County, Unincorporated Areas | Atlantic Ocean (Flooding controlled by the Atlantic Ocean) | LiDAR   | N/A       | N/A              | 18 cm             | 35.28 cm              | Photo Science & Fugro 2010     |
| Darien, City of; McIntosh County, Unincorporated Areas | Altamaha River   | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas                  | Big Mortar Swamp   | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas                  | Big Mortar Swamp Tributary No. 1                           | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas                  | Buck Hill Swamp  | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas                  | Cathead Creek Tributary No. 35                             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas                  | Cathead Creek Tributary No. 35                             | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |

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

| Community                             | Flooding Source                  | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|----------------------------------|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |                                  | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | Cathead Creek Tributary No. 35.1 | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | Cathead Creek Tributary No. 35.2 | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | Cathead Creek Tributary No. 35.3 | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | Cathead Creek Tributary No. 4    | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Cedar Creek                      | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Jackie Camp Swamp                | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | McClendon Creek                  | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 1  | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 2  | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 3  | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 4  | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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

| Community                             | Flooding Source                       | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|---------------------------------------|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |                                       | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 4.1     | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 4.4     | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | McClendon Creek Tributary No. 6       | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Sapelo River                          | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Snuff Box Swamp Creek (US)            | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Snuff Box Swamp Creek (DS)            | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | South Newport River                   | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | South Newport River                   | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | South Newport River Tributary No. 1   | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | South Newport River Tributary No. 2   | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | South Newport River Tributary No. 2.1 | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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

| Community                             | Flooding Source                       | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|---------------------------------------|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |                                       | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | South Newport River Tributary No. 2.2 | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 43             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 47             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 48             | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 49             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 50             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 51             | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 52             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 53             | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 54             | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 55             | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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

| Community                             | Flooding Source            | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|----------------------------|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |                            | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 56  | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 58  | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 63  | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 67  | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 68  | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 83  | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 85  | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 101 | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 141 | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Unnamed Stream/Wetland 142 | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 92                 | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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

| Community                             | Flooding Source | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|-----------------|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |                 | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | Wetland 93      | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 95      | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 96      | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 97      | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 98      | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 99      | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 100     | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 122     | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 124     | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 125     | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 126     | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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

| Community                             | Flooding Source                        | Source for Topographic Elevation Data         |           |                  |                   |                       |                                |
|---------------------------------------|--|---|-----------|------------------|-------------------|-----------------------|--------------------------------|
|                                       |  | Description                                   | Scale     | Contour Interval | RMSE <sub>z</sub> | Accuracy <sub>z</sub> | Citation                       |
| McIntosh County, Unincorporated Areas | Wetland 128                            | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 129                            | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 130                            | (Digital Elevation Model (DEM) based on LiDAR | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | Wetland 131                            | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |
| McIntosh County, Unincorporated Areas | White Chimney River Tributary No. 10   | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | White Chimney River Tributary No. 10.1 | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | White Chimney River Tributary No. 10.2 | USGS Quadrangle Series                        | 1:4,800   | 5 ft             | N/A               | N/A                   | USGS                           |
| McIntosh County, Unincorporated Areas | Youngs Swamp                           | Digital Elevation Model (DEM) based on LiDAR  | 1"=6,000' | 4 ft             | N/A               | N/A                   | PhotoScience & Furgo EarthData |

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.

**Table 24: Floodway Data**

[Not applicable to this Flood Risk Project]

**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 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                                   | N/A                                  | VE 11-13<br>AE 9-11                  | Wave Height   | Wave Height   |
| 2                | N/A                                   | N/A                                  | VE 11-13<br>AE 9-11                  | PFD           | Wave Height   |
| 3                | N/A                                   | N/A                                  | VE 11-13<br>AE 9-11                  | Wave Height   | Wave Height   |
| 4                | N/A                                   | N/A                                  | VE 11-14<br>AE 9-12                  | Wave Height   | Wave Height   |
| 5                | N/A                                   | N/A                                  | VE 11-14<br>AE 9-12                  | Wave Height   | SWEL          |
| 6                | N/A                                   | N/A                                  | VE 11-14<br>AE 9-12                  | Wave Height   | SWEL          |
| 7                | N/A                                   | N/A                                  | VE 11-14<br>AE 9-12                  | Wave Height   | SWEL          |
| 8                | ✓                                     | N/A                                  | VE 11-14<br>AE 8-11                  | PFD           | SWEL          |
| 9                | ✓                                     | N/A                                  | VE 11-14<br>AE 8-12                  | PFD           | SWEL          |
| 10               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-12                  | PFD           | SWEL          |
| 11               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-12                  | PFD           | SWEL          |
| 12               | ✓                                     | N/A                                  | VE 12-14<br>AE 9-12                  | PFD           | SWEL          |
| 13               | ✓                                     | N/A                                  | VE 12-14<br>AE 9-12                  | PFD           | SWEL          |
| 14               | ✓                                     | N/A                                  | VE 12-14<br>AE 9-12                  | PFD           | SWEL          |
| 15               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-12                  | PFD           | SWEL          |
| 16               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-12                  | PFD           | SWEL          |
| 17               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-12                  | PFD           | SWEL          |
| 18               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-11                  | PFD           | SWEL          |

**Table 26: Summary of Coastal Transect Mapping Considerations - continued**

| 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) |               |               |
| 19               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-11                  | PFD           | SWEL          |
| 20               | ✓                                     | N/A                                  | VE 11-14<br>AE 8-11                  | PFD           | SWEL          |
| 21               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-11                  | PFD           | SWEL          |
| 22               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-11                  | PFD           | SWEL          |
| 23               | ✓                                     | N/A                                  | VE 11-14<br>AE 9-11                  | PFD           | Wave Height   |
| 24               | N/A                                   | N/A                                  | VE 11-14<br>AE 10-11                 | Wave Height   | SWEL          |
| 25               | ✓                                     | N/A                                  | VE 11-14<br>AE 7-11                  | Wave Height   | SWEL          |
| 26               | ✓                                     | N/A                                  | VE 11-14<br>AE 8-11                  | Wave Height   | SWEL          |
| 27               | ✓                                     | N/A                                  | VE 11-14<br>AE 8-11                  | Wave Height   | SWEL          |
| 28               | N/A                                   | N/A                                  | VE 11-14<br>AE 9-11                  | Wave Height   | SWEL          |
| 29               | N/A                                   | N/A                                  | VE 11-14<br>AE 10-11                 | Wave Height   | SWEL          |
| 30               | N/A                                   | N/A                                  | VE 11-13<br>AE 10-11                 | 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](http://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](http://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](http://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](http://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](http://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 McIntosh County FIRM are listed in Table 27.

### **Table 27: Incorporated Letters of Map Change**

[Not applicable to this Flood Risk Project]

#### **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](http://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](http://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 McIntosh 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 McIntosh County FIRMs in countywide format was 03/16/2009.

**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) |
|---------------------------------------|-----------------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|
| Darien, City of                       | 05/10/1974                  | 05/10/1974                  | 02/13/1976            | 07/02/1981                  | 06/03/1988            |
| McIntosh County, Unincorporated Areas | 04/09/1976                  | 04/09/1976                  | N/A                   | 05/15/1984                  | 10/16/1992            |

## 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 (Flooding controlled by the Atlantic Ocean) |                  | BakerAECOM | HSFEHQ-09-D-0368<br>Task Order: HSFE04-10-J-0075 | 04/2015             | Darien, City of; McIntosh County, Unincorporated Areas |
| Altamaha River   |                  | GA DNR     | EMA-2001-CA-5144                                 | 5/31/2012           | Darien, City of; McIntosh County, Unincorporated Areas |
| Big Mortar Swamp   |                  | GA DNR     | EMA-2001-CA-5144                                 | 5/31/2012           | McIntosh County, Unincorporated Areas                  |
| Big Mortar Swamp Tributary No. 1                           |                  | GA DNR     | EMA-2001-CA-5144                                 | 5/31/2012           | McIntosh County, Unincorporated Areas                  |
| Buck Hill Swamp  |                  | GA DNR     | EMA-2001-CA-5144                                 | 5/31/2012           | McIntosh County, Unincorporated Areas                  |
| Cathead Creek Tributary No. 35                             |                  | GA DNR     | EMA-2001-CA-5144                                 | 5/31/2012           | McIntosh County, Unincorporated Areas                  |
| Cathead Creek Tributary No. 35                             | 03/16/2009       | PBS&J      | EMA-2006-CA-5615                                 | 10/2007             | McIntosh County, Unincorporated Areas                  |
| Cathead Creek Tributary No. 35.1                           | 03/16/2009       | PBS&J      | EMA-2006-CA-5615                                 | 10/2007             | McIntosh County, Unincorporated Areas                  |
| Cathead Creek Tributary No. 35.2                           | 03/16/2009       | PBS&J      | EMA-2006-CA-5615                                 | 10/2007             | McIntosh County, Unincorporated Areas                  |
| Cathead Creek Tributary No. 35.3                           | 03/16/2009       | PBS&J      | EMA-2006-CA-5615                                 | 10/2007             | McIntosh County, Unincorporated Areas                  |

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

| Flooding Source                   | FIS Report Dated | Contractor | Number           | Work Completed Date | Affected Communities                  |
|-----------------------------------|------------------|------------|------------------|---------------------|---------------------------------------|
| Cathead Creek Tributary No. 4     |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Cedar Creek                       |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Jackie Camp Swamp                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| McClendon Creek                   |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 1   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 2   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 3   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 4   |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 4.1 | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 4.4 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| McClendon Creek Tributary No. 6   |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Sapelo River                      |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Snuff Box Swamp Creek (US)        |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |

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

| Flooding Source                       | FIS Report Dated | Contractor | Number           | Work Completed Date | Affected Communities                  |
|---------------------------------------|------------------|------------|------------------|---------------------|---------------------------------------|
| Snuff Box Swamp Creek (DS)            |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| South Newport River                   |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| South Newport River                   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| South Newport River Tributary No. 1   |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| South Newport River Tributary No. 2   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| South Newport River Tributary No. 2.1 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| South Newport River Tributary No. 2.2 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 43             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 47             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 48             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 49             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 50             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 51             |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |

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

| Flooding Source            | FIS Report Dated | Contractor | Number           | Work Completed Date | Affected Communities                  |
|----------------------------|------------------|------------|------------------|---------------------|---------------------------------------|
| Unnamed Stream/Wetland 52  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 53  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 54  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 55  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 56  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 58  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 63  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 67  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 68  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 85  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 83  |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 101 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Unnamed Stream/Wetland 142 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |

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

| Flooding Source            | FIS Report Dated | Contractor | Number           | Work Completed Date | Affected Communities                  |
|----------------------------|------------------|------------|------------------|---------------------|---------------------------------------|
| Unnamed Stream/Wetland 141 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 92                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 93                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 95                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 96                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 97                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 98                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 99                 |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 100                |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 122                |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 124                |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 126                |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 125                |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |

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

| Flooding Source                        | FIS Report Dated | Contractor | Number           | Work Completed Date | Affected Communities                  |
|--|------------------|------------|------------------|---------------------|---------------------------------------|
| Wetland 128                            |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 129                            |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 130                            |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| Wetland 131                            |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |
| White Chimney River Tributary No. 10   | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| White Chimney River Tributary No. 10.1 | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| White Chimney River Tributary No. 10.2 | 03/16/2009       | PBS&J      | EMA-2006-CA-5615 | 10/2007             | McIntosh County, Unincorporated Areas |
| Youngs Swamp                           |                  | GA DNR     | EMA-2001-CA-5144 | 5/31/2012           | McIntosh County, Unincorporated Areas |

## 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  |
|--|------------------|-----------------|--------------|--|
| McIntosh County and Incorporated Areas   |                  | 08/19/2015      | Workmap      | FEMA, Georgia DNR, CDM Smith, BakerAECOM, LLC, and community officials |
|  |                  |                 | CCO Meeting  | FEMA, Georgia DNR, CDM Smith, BakerAECOM, LLC, and community officials |
| Darien, City of                          | 01/02/1981       | May 1978        | CCO Meeting  | FEMA, the community, and the study contractor                          |
|  |                  | 08/29/1980      | CCO Meeting  | FEMA, the community, and the study contractor                          |
| McIntosh County and Unincorporated Areas | 03/16/2009       | 12/08/2005      | Scoping      | FEMA, Georgia DNR, PBS&J and the community                             |
|  |                  | 12/08/2005      | CCO Meeting  | FEMA, Georgia DNR, PBS&J and the community                             |
| McIntosh County (Unincorporated Areas)   | 11/15/1983       | May 1978        | CCO Meeting  | FEMA, the community, and the study contractor                          |
|  |                  | 05/25/1983      | CCO Meeting  | FEMA, the community, and the study contractor                          |

## 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](http://www.fema.gov).

Table 31 is a list of the locations where FIRMs for McIntosh 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 |
|--|---|--------|-------|----------|
| Darien, City of                          | Building Inspector's Office,<br>1200 Northway | Darien | GA    | 31305    |
| McIntosh County,<br>Unincorporated Areas | Building Inspector's Office,<br>1200 Northway | Darien | GA    | 31305    |

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 | <a href="http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library">www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library</a> |
| NFIP website                              | <a href="http://www.fema.gov/national-flood-insurance-program">www.fema.gov/national-flood-insurance-program</a>   |
| NFHL Dataset                              | <a href="http://msc.fema.gov">msc.fema.gov</a>   |
| FEMA Region IV                            | Federal Emergency Management Agency, 3003 Chamblee Tucker Road, Atlanta, Georgia 30341   |
| Other Federal Agencies                    |  |
| USGS website                              | <a href="http://www.usgs.gov">www.usgs.gov</a>   |

**Table 32: Additional Information - continued**

|                                      |  |
|--------------------------------------|--|
| Hydraulic Engineering Center website | <a href="http://www.hec.usace.army.mil">www.hec.usace.army.mil</a>   |
| State Agencies and Organizations     |  |
| State NFIP Coordinator               | Tom Shillock, CFM<br>Dept. of Natural Resources<br>Environmental Protection Division<br>2 Martin Luther King Jr. Drive<br>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                          | <i>Coastal Hazard Analysis TSDN, McIntosh County, Georgia – Intermediate Data Submittals 4 &amp; 5</i>                        | BakerAECOM                    |                      | April 2015                         |      |
| CDM Smith 2012a            | CDM Smith                           | <i>Hydrology Deliverable, McIntosh County, GA – Technical Support Data Notebook</i>   | CDM Smith                     | Boston, MA           | February 29, 2012                  |      |
| CDM Smith 2012b            | CDM Smith                           | <i>Hydraulics Deliverable, McIntosh County, GA – Technical Support Data Notebook</i>  | CDM Smith                     | Boston, MA           | May 31, 2012                       |      |
| FEMA 2009                  | Federal Emergency Management Agency | <i>Flood Insurance Study – McIntosh County, Georgia and Incorporated Areas</i>  | FEMA                          | Washington, D.C.     | March 16, 2009                     |      |
| Photo Science & Fugro 2010 | Photo Science & Fugro               | <i>LiDAR</i>  | Photo Science & Fugro         |                      | 2010                               |      |
| Stamey and Hess 1993       | USGS                                | <i>Techniques for Estimating Magnitude and Frequency of Floods in Rural Basins of Georgia – Investigations Report 93-4016</i> | Stamey, T.C. and G.W. Hess    |                      | 1993                               |      |
| USACE 2005                 | USACE                               | <i>HEC-RAS River Analysis System</i>  | Hydrologic Engineering Center | Davis, California    | May 2005                           |      |