

Sweetwater Creek Flood Risk Management Feasibility Study



Final Integrated Feasibility Report and Environmental Assessment

May 2019

U.S. Army Corps of Engineers
South Atlantic Division
Mobile District



Cobb County...Expect the Best!



US Army Corps
of Engineers ®
MOBILE DISTRICT

**FINDING OF NO SIGNIFICANT IMPACT
FOR
SWEETWATER CREEK FLOOD RISK MANAGEMENT STUDY
INTEGRATED FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT
SWEETWATER CREEK WATERSHED, COBB COUNTY, GEORGIA**

1. **PROPOSED ACTION.** The Recommended Plan consists of buying out and removing nine structures whose first floor elevations are lower than the anticipated water surface elevation (WSE) of the 10% Annual Chance of Exceedance (ACE) floodplain throughout Cobb County, the City of Austell, and the City of Powder Springs, Georgia. Two municipal parks would be constructed following the demolition of existing structures across five parcels.

2. **ALTERNATIVES.**

a. **No Action Alternative.** Also known as the future without project condition, the No Action Alternative (NAA) is the anticipated future for a given resource if no action is taken or implemented. The NAA for the Sweetwater Creek Flood Risk Management Study would not implement any structural or non-structural alternatives. Flooding within the study area would increase at a rate of less than 1% for the 1% ACE flood event in the NAA conditions.

b. **Alternative 2: Brown Road Detention Alternative.** Alternative 2 consists of an in-line dry detention facility on Sweetwater Creek, located just upstream of Brown Road in Cobb County, creating up to 9,000 acre-feet of flood storage. The facility would consist of a 1,400-foot long, 33-foot high structure built approximately perpendicular to Sweetwater Creek and its adjoining floodplain. The outlet works of the structure would consist of a multi-stage concrete slot with vertical side walls discharging into a stilling basin downstream of the structure.

c. **Alternative 4: Austell Channel Modification.** Alternative 4 consists of a channel modification from the C.H. James Parkway to the rapids in Sweetwater Creek State Park near the historic mill site (14.2 miles). The channel would be widened to 80 feet and would have 2V:1H side slopes. The length of the channel modification is approximately 74,000 linear feet and would remove approximately three million cubic yards (cy) of material from the channel. Dredged material would be placed at city approved disposal areas within four miles of the project.

d. **Alternative 5H: Multiple Detention Structures on Sweetwater Creek.** Alternative 5H consists of two in-line dry detention structures on Sweetwater Creek. The detention sites would be dry within 24 hours after an event. The first is a 10-foot high structure upstream of Bakers Bridge Road in Paulding County near the Douglas and Paulding County line. The second is a 33-foot high structure upstream of Brown Road in Cobb County near the Paulding County line. These structures would provide a combined 18,900 acre-feet of flood storage in the Sweetwater Creek Basin. The outlet works on each structure would consist of a multi-stage concrete slot with vertical side walls discharging into a stilling basin downstream of the structure.

e. Alternative 5D: Multi-Subbasin Detention. Alternative 5D consists of multiple in-line dry detention structures with three on Sweetwater Creek, one on Powder Springs Creek, one on Olley Creek, and one on Mill Creek. All the detention sites would be dry within 24 hours after an event. The first on Sweetwater Creek is a 24-foot high structure creating approximately a 400-acre detention upstream of Bakers Bridge Road in Paulding County near the Douglas and Paulding County line. The second on Sweetwater Creek is a 15-foot high structure creating approximately a 250-acre detention upstream of Highway 92 in Paulding County. The third on Sweetwater Creek is a 33-foot high structure creating approximately a 900-acre detention area upstream of Brown Road in Cobb County near the Paulding County line. The one on Powder Springs Creek is a 25-foot high structure creating approximately a 400-acre detention area upstream of C.H. James Parkway in Cobb County near the Cobb and Paulding County line. The structure on Olley Springs Creek is a 29-foot high structure creating approximately a 250-acre detention area upstream of Flint Hill Road Southwest in Cobb County. The structure on Mill Creek is a 20-foot high structure creating approximately a 300-acre detention upstream of Morningside Drive in Paulding County. These structures would provide a combined 25,040 acre-feet of flood storage. The outlet works on each structure would consist of a multi-stage concrete slot with vertical side walls discharging into a stilling basin downstream of the structure.

f. Alternative 5J: South Paulding High Detention Short. This alternative is an in-line dry detention facility on Sweetwater Creek, located approximately one mile upstream of Bakers Bridge Road in Paulding County, creating up to 7,660 acre-feet of flood storage. The structure would consist of a 1,500-foot long, 19-foot high structure built approximately perpendicular to Sweetwater Creek and its adjoining floodplain. The outlet works of the structure would consist of a multi-stage concrete slot with vertical side walls discharging into a stilling basin downstream of the structure.

3. FACTORS CONSIDERED IN DETERMINING THAT NO ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED. Based on the Integrated Feasibility Report and Environmental Assessment prepared for this project, it was determined that this flood risk management action does not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, the action does not require the preparation of a detailed statement under Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332). The U.S. Army Corps of Engineers (USACE), Mobile District's determination was made considering the following factors discussed in the Integrated Feasibility Report and Environmental Assessment to which this document is attached:

- a. The proposed action would have no effect on any Federally-listed threatened or endangered species potentially occurring in the project area.
- b. No significant cumulative or secondary impacts would result from implementation of this action.
- c. Mobile District conducted a thorough search of the existing records for prehistoric and historic use of the area of potential effect (APE), which is a fully developed residential and business area with listings on the National Register of Historic Places (NRHP), including historic properties listed on or eligible for the NRHP,

Georgia's Natural, Archaeological, and Historic Resources GIS, and previous project and cultural resources on file at the Mobile District Office. Additional investigation included visual inspections of locations, photographs of locations, familiarity with the residences and businesses in southern Cobb County, public meetings, and coordination with the SHPO. Based on these investigations, there is only one structure older than fifty years that will be affected by the Recommended Plan, and it has undergone modern renovations and is currently occupied as a residence. No other structures were constructed before 1972. There are previously recorded archaeological sites within a mile of each plan alternative and within a mile of each of the parcel locations identified in the Recommended Plan, but none are located on the parcels affected by the Recommended Plan. Consequently, the USACE concludes there will be no adverse effects to cultural resources. The USACE informed the SHPO that it will conduct further work (that is, a historic resources survey of the one property that is over fifty years old and any additional structures coordinated with the SHPO) and an archaeological survey of the demolition area. Any additional information that is obtained will be coordinated with the Georgia SHPO and any interested Federally Recognized Indian Tribes. If any cultural resources eligible for listing on the NRHP are identified as a result of the further surveys and in consultation with the SHPO and Tribes, a Memorandum of Agreement (MOA) will be developed to mitigate adverse effects on historic properties.

- d. The proposed action would result in no significant impacts to air or water quality.
- e. The proposed action would result in no significant adverse impact to fish and wildlife resources as described in the Fish and Wildlife Coordination Act Report (FWCAR).
- f. The proposed action will not cause any environmental health risks or safety risks that may disproportionately affect children and complies with Executive Order (EO) 13045, "Protection of Children from Environmental Health Risks and Safety Risks."
- g. The proposed action will not cause any disproportionately high and adverse human health or environmental effects on minority populations and low-income populations and complies with EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

4. CONCLUSIONS. The environmental analysis supports the conclusion that the Recommended Plan will not significantly impact healthy and the human environment; consequently, an Environmental Impact Statement is not required. The requirements of the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) regulation have been satisfied.

DATE: _____

Sebastien P. Joly
Colonel, U.S. Army
District Commander

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Acronyms

ACE	Annual Chance of Exceedance
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CFS	Cubic Feet per Second
CO ₂	Carbon Dioxide
CWA	Clean Water Act
CY	Cubic Yards
EC	Engineer Circular
ECB	Engineering and Construction Bulletin
EnSA	Environmental Site Assessment
EO	Executive Order
ER	Engineer Regulation
ESA	Endangered Species Act
EQ	Environmental Quality
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FRM	Flood Risk Management
FWCA	Fish and Wildlife Coordination Act
FWCAR	Fish and Wildlife Coordination Act Report
GEPD	Georgia Environmental Protection Division
GDNR	Georgia Department of Natural Resources
GHG	Greenhouse Gases
GIS	Geographic Information System
GNAHRGIS	Georgia's Natural, Archaeological, and Historic Resources GIS
GRP	Gross Regional Product
HEC-FDA	Hydrologic Engineering Center Flood Damage Reduction Analysis
HEC-RAS	Hydrologic Engineering Center River Analysis System
HTRW	Hazardous, Toxic, and Radioactive Waste
LERRD	Lands, Easements, Rights of Way, Relocations, and Disposal
MBTA	Migratory Bird Treaty Act
MOA	Memorandum of Agreement
NAA	No Action Alternative
NAAQS	National Ambient Air Quality Standards
NED	National Economic Development
NEPA	National Environmental Policy Act
NFS	Non-Federal Sponsor

NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
OSE	Other Social Effects
PDT	Planning Development Team
PED	Planning, Engineering, and Design
PL	Public Law
RECs	Recognized Environmental Conditions
RECONS	Regional Economic System
RED	Regional Economic Development
SCORP	State Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Officer
Sq. Ft	Square Feet
T & E	Threatened and endangered
TMDL	Total Maximum Daily Loads
USACE	U.S. Army Corps of Engineers
U.S.	United States
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRDA	Water Resources Development Act
WSE	Water Surface Elevation

1.0 Introduction

1.1 Study Area

The study area is located in Paulding, Douglas, and Cobb Counties, Georgia and encompasses approximately 264 square miles of the Sweetwater Creek Watershed (Figure 1). The main stem of Sweetwater Creek is 45.6 miles long and begins in Paulding County, Georgia. As the creek flows eastward towards Cobb County other tributaries join the main stem before it empties into the Chattahoochee River in Douglas County at the Fulton County line. The creek also passes through Sweetwater Creek State Park just before its confluence with the Chattahoochee River.



Figure 1: Study Area

The watershed is a mixed watershed that is mostly rural with multiple developed urban areas. The rural areas, which are mostly undeveloped cleared land and woodlands, make up most of the Sweetwater Creek headwaters. The rural area transitions into urban centers closer to Sweetwater Creek State Park in the southeastern portion of the watershed.

The primary urban areas experiencing flooding are located in Cobb County, Georgia, which includes the Cities of Austell and Powder Springs as well as a portion of unincorporated Cobb County, Georgia near those cities. Caraustar, a paper mill located just downstream of the Powder Spring and Sweetwater Creek confluence, is located in

Austell and is a major employer for the Austell area. The study area contains 14 public schools, 7 senior care facilities, 7 fire departments, 2 police departments and 1 hospital.

1.1.1 Non-Federal Sponsor and Municipal Stakeholders

Cobb County, Georgia is the Non-Federal Sponsor (NFS) for the Sweetwater Creek Flood Risk Management (FRM) Study. The Cities of Austell and Powder Springs are the municipalities experiencing routine flooding, and stakeholders that could be directly affected by the study results.

1.2 Purpose and Need

The purpose of the study, as identified by the Project Delivery Team (PDT), is to investigate the Federal interest and feasibility of a FRM project to address flooding in the Sweetwater Creek Watershed specifically, inside Cobb County, Georgia.

The need for the study was identified because in September 2009, catastrophic flooding impacted the Atlanta metropolitan area as a result of multiple days of prolonged rainfall. According to the rain gauge at Douglas County Water and Sewer Authority the maximum 24-hour rainfall total for September 20-21 was 21.03 inches, which represents a 0.01% annual chance of exceedance (ACE) rainfall event. Historic flash flooding resulted, with flooded river basins remaining swollen for weeks which resulted in numerous flood records being set. Some locations observed conditions exceeding the 0.2% chance of occurrence in a given year (NWS, 2014). Clarkdale Elementary School, in Austell, was flooded to the roof line while Austell Primary School was surrounded by water.

Further, the historic recorded crests of the U.S. Geological Survey (USGS) gauge on Sweetwater Creek below Austell, Georgia, from 1937 to 2015, as shown below, demonstrate an increase in flood event frequency. Major floods are 17-foot or greater crest, while moderate floods have a 13- to 17-foot crest, and minor floods have a 10- to 13-foot crest. The highest recorded crest is 30.82 feet, which occurred in September 2009, and had a stream flow of 31,500 cubic feet per second (cfs).

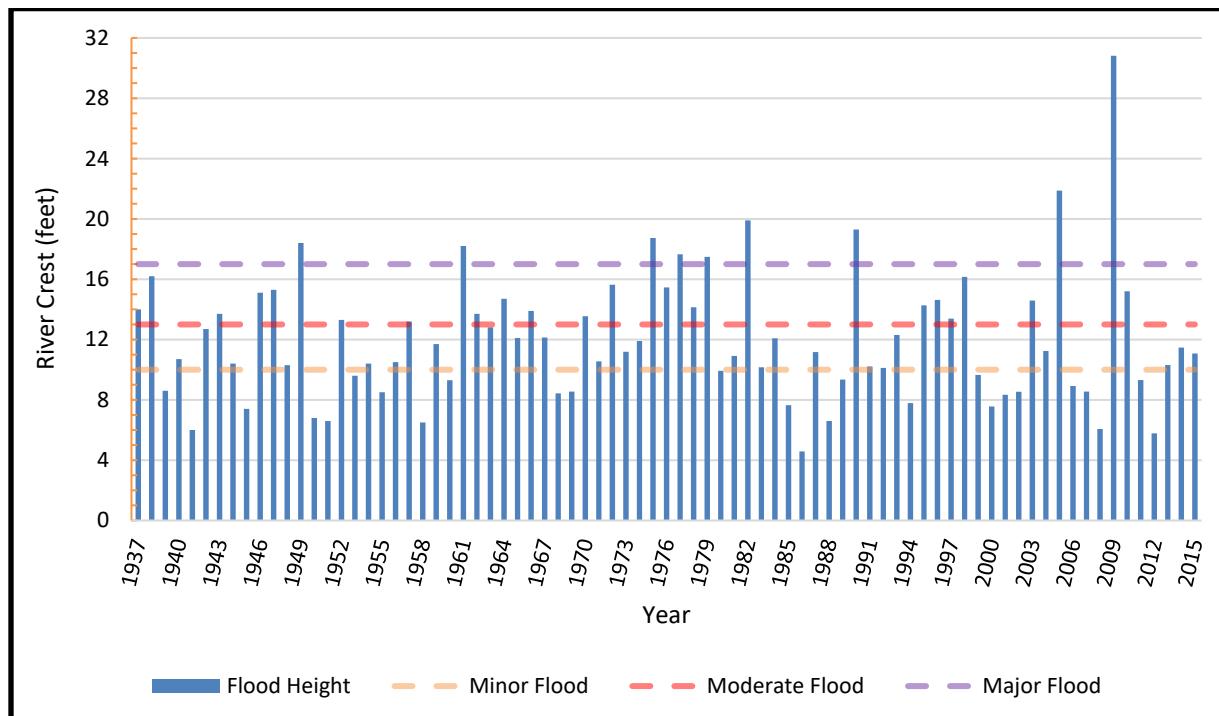


Figure 2: USGS Sweetwater below Austell, Georgia historic river crests

1.3 Study Authority

The project is authorized by House Resolution 2445 of the Committee on Public Works and Transportation of the United States House of Representatives adopted 28 September 1994 which reads:

*...the interest of environmental quality, water quality, water supply, **flood damage reduction**, and other purposes including a comprehensive, coordinated watershed master plan for metropolitan Atlanta, Georgia. Such studies should address water quality and flooding associated with stormwater runoff in Nancy Creek, Utoy Creek, North Peachtree Creek, South Peachtree Creek, and other watersheds in the Fulton, and DeKalb County area, including identification and evaluation of environmental infrastructure and resource protection needs; flood control needs of the Flint River Basin; and water supply needs of the northwest Georgia area.*

The study area is mostly in Cobb and Douglas Counties, Georgia which are part of the 10 counties that make up the Metropolitan Atlanta Master Plan, as set forth by the Atlanta Regional Commission. Further, any FRM effects would directly or indirectly impact a portion of one or both of these counties. This study is an interim response to the authority since it only addresses the FRM in the Sweetwater Creek Basin and does not assess FRM in other portions of the metropolitan Atlanta area.

1.4 Related Documents and Studies

The flood inundation maps for Sweetwater Creek from above the confluence of Powder Springs Creek to the Interstate 20 Bridge, Cobb and Douglas Counties, Georgia prepared by Cobb County with the U.S. Department of the Interior and USGS documented the extents of the September 2009 flood.

1.5 Other Projects and Actions in Study Area

In the last three years the Federal Emergency Management Agency (FEMA) flood maps for the three counties that comprise the Sweetwater Creek Basin have been updated. A Georgia Silver Jackets study created a real-time flood inundation map for the Cities of Austell and Powder Springs.

The Mobile District is aware that Cobb County is currently considering a code modification to 50 O.C.G.A. Section 50-75, which would widen the stream buffer requirement for Sweetwater Creek from 100-ft to 200-ft. The County's effort to increase the width of stream buffer zones throughout Cobb County is intended to put more land within the floodplain under the County's purview and thereby facilitate consistency in zoning of such lands proposed for development. Greater width in stream buffer zones would provide opportunity for additional review by the County to evaluate the safety and benefit of future proposed development within the floodplain. The stream buffer zone increase is a priority for the NFS.

1.6 Recommended Plan and Evaluated Alternatives

The Recommended Plan is to implement a relocation of the structures affected by the 10% ACE event. Other alternatives that were evaluated were dry retention sites, channel widening and deepening, bridge modification, levees, raising buildings, and channel diversions. More information on the evaluation of the alternatives is contained in Section 3.0.

1.7 National Environmental Policy Act (NEPA) Considerations

Environmental conditions evaluated during the FRM study included water, biological, and cultural resources. Resources of concern in relation to this study centered on water quality, Federally protected species, and cultural resources. See Section 2.0 and Section 5.0.

2.0 Affected Environment (Existing Condition) and No Action Alternative (Future Without Project Condition)

The affected environment or existing condition is a baseline from which all of the future conditions are built. The No Action Alternative (NAA), which is also known as the future without project condition, is the anticipated future for a given resource if no action is taken or implemented.

Conditions described here focus on summarizing technical evaluations of the NEPA resources that drive the National Economic Development (NED) as appropriate. When not discussed separately it is assumed the existing conditions for each location and resources are similar. While all NEPA resources are significant to various institutions, this section discusses only those resources that would be impacted by the proposed alternatives. Details on both the existing and NAA condition are detailed in the following sections. For details on the environmental impact of the recommended plan see Section 5.0 of this document.

2.1 Climate

According to the U.S. climate data website for the Atlanta metro region, based on climate data between the years of 1981 and 2010 the average annual high temperature is 71.9 degrees Fahrenheit, the average annual low temperature is 53.2 degrees Fahrenheit, and the average annual precipitation is 49.74 inches. See Figure 3 for climate trends.

Atlanta Climate Graph - Georgia climograph

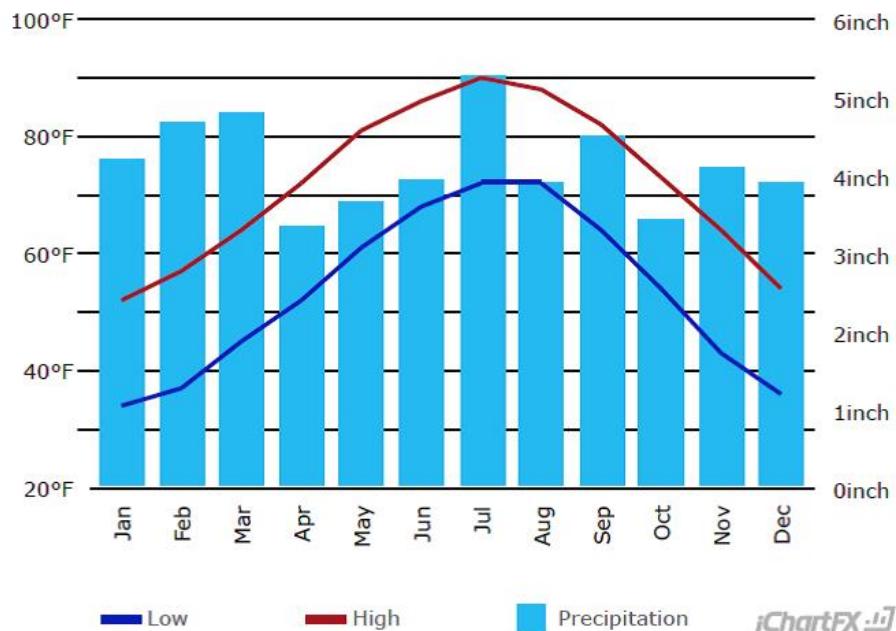


Figure 3: U.S. Climate Data for the Atlanta Metro Region

There are several greenhouse gases (GHG), but the two that have the most direct impact on climate change are carbon dioxide (CO₂) and methane. Federal agencies, states, and local communities address climate change by preparing GHG inventories and adopting policies that will result in a decrease of GHG emissions. These GHG have increased steadily as a percentage of the atmosphere and have dispersed globally since the preindustrial era. From the preindustrial era (ending about 1750) to 2004,

concentrations of CO₂ increased globally by 35%. Since 1900, the Earth's average surface air temperature has increased by about 1.2–1.4° Fahrenheit. The warmest global average temperatures on record have all occurred within the past 10 years. (USEPA 2007). Sea level potentially changes as a result of climate change and USACE projects can be impacted as a consequence.

2.1.1 No Action Alternative

No action alternative conditions are anticipated to remain consistent with existing levels.

2.1.2 Climate Change

A qualitative analysis of historical climate trends, as well as assessment of future projections was provisioned by Engineering and Construction Bulletin (ECB) 2016-25. Even if climate change does not appear to be an impact for a particular region of interest, the formal analysis outlined in ECB 2016-25 results in better informed planning and engineering decisions. The qualitative climate change assessment showed an increase in flooding frequency at a rate of less than 1% change in flows for the 1% ACE event (Appendix B); however, a literature review on climate change in the southeast indicates the potential for more extreme storms in the future.

2.2 Air Quality and Greenhouse Gases

The US Environmental Protection Agency (USEPA) sets National Ambient Air Quality Standards (NAAQS) in accordance with the Clean Air Act (CAA) "for pollutants considered harmful to public health and the environment." The CAA identifies two types of NAAQS: primary and secondary. Primary standards provide public health protection and secondary standards provide public welfare protection. The USEPA has set NAAQS for six principal pollutants, which are called criteria air pollutants: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and particulate matter (PM10 and PM2.5).

The General Conformity Rule published by the USEPA on November 30, 1993 designates and implements Section 176(c) of the CAA for geographic areas in CAA non-attainment areas for criteria pollutants and in those attainment areas subject to maintenance plans required by CAA Section 175(a). The CAA General Conformity Rule applies to Federal actions. The study area is not located in any designated non-attainment areas for any criteria air pollutants.

Greenhouse gases (GHG) are components of the atmosphere that contribute to the greenhouse effect and climate change. Some GHGs occur naturally in the atmosphere, while others result from human activities such as burning fossil fuels. Federal agencies, states, and local communities address climate change by preparing GHG inventories and adopting policies that will result in a decrease of greenhouse gases emissions. The major GHGs are carbon dioxide and methane. These GHGs have increased steadily as a percentage of the atmosphere and have dispersed globally in recent geological time. Sea level potentially changes as a result of climate change which consequently can have an impact on USACE projects. In accordance with the guidance provided in USACE Engineer Circular (EC) 1165-2-212 (USACE 2011), the first step in determining

impacts is to decide whether the project would occur in a coastal/tidal/estuarine zone or in an area bordering such zones. The Sweetwater Creek Watershed is not located in or adjacent to any coastal/tidal/estuarine zones.

2.2.1 No Action Alternative

Local air quality will naturally fluctuate following current trends, but overall would remain consistent with current levels.

2.3 Topography, Geology, and Soils

2.3.1 Topography

Since 1987 the USEPA has defined ecoregions throughout the conterminous United States (U.S.) for the use of classifying habitat ecosystems based on physiological characteristics such as varying topography, geology, and soils (Omernik 1987). As shown in Figure 4, Sweetwater Creek Watershed lies within the Southern Inner Piedmont portion of the Piedmont Ecoregion of the State of Georgia. The Piedmont Ecoregion is considered non-mountainous foothills of the Appalachian Mountain Range and transitions to the relatively flat coastal plain in the direction of northeast to southwest. It is comprised of numerous shallow streams, granite outcrops, flat to rolling terrain, and narrow valleys.

2.3.2 Geology

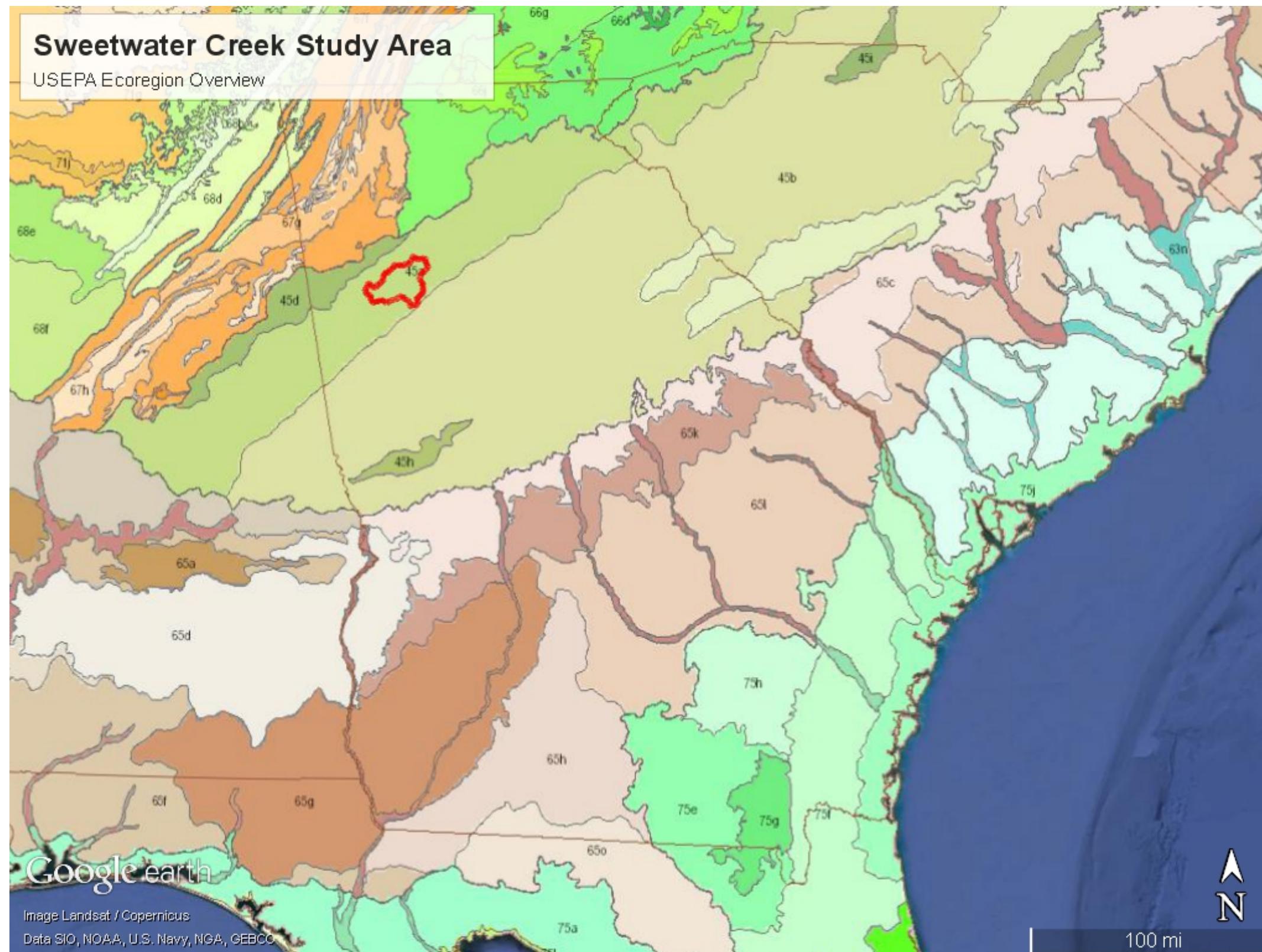
Sweetwater Creek Watershed is a tributary to the Chattahoochee River which runs parallel to the Brevard Fault Zone which a prominent geologic feature of the Southeast U.S. formed through seismic activity (Vauchez 1987). Bedrock in the USEPA defined Piedmont Ecoregion consists of Precambrian and Paleozoic metamorphic and igneous rocks such as granite, gneiss, and marble (GWRD 2001).

2.3.3 Soils

Soils of the USEPA defined Piedmont Ecoregion are comprised of fine grained saprolites and ultisols which are chemically weathered rocks and leached acidic sandy or loams soils, respectively. Ultisols of the Piedmont Ecoregion range in color from bright red or reddish-yellow to orange or pale yellow-brown. Due to 19th century farming practices, topsoil erosion has led to the exposure of these soils which were formed through the weathering of igneous and metamorphic bedrock.

2.3.4 No Action Alternative

No changes to topography would occur under NAA project conditions.



Legend
USEPA Level IV Ecoregion

45a Southern Inner Piedmont
45b Southern Outer Piedmont
45h Pine Mountain Ridges
45i Kings Mountain
63n Mid-Atlantic Floodplains and Low Terraces
65a Blackland Prairie
65c Sand Hills
65d Southern Hilly Gulf Coastal Plain
65f Southern Pine Plains and Hills
65g Dougherty Plain
65h Tifton Upland
65l Atlantic Southern Loam Plains
65o Tallahassee Hills/Valdosta Limesink
66d Southern Crystalline Ridges and Mountains
66g Southern Metasedimentary Mountains
67g Southern Shale Valleys
67h Southern Sandstone Ridges
68b Sequatchie Valley
68d Southern Table Plateaus
68e Dissected Plateau
68f Shale Hills
71j Little Mountain
75a Gulf Coast Flatwoods
75e Okefenokee Plains
75f Sea Island Flatwoods
75g Okefenokee Swamp
75h Bacon Terraces
75j Sea Islands/Coastal Marsh

Figure 4: USEPA Level IV Ecoregions of the continental U.S.

2.4 Land Use

In June 2017, parcels within the 500-year floodplain for Sweetwater Creek and its tributaries within Cobb, Douglas and Paulding Counties were surveyed for use in a FRM study. Parcel data was obtained by each county's tax assessor's office and used to build a geographic information system (GIS) database for identifying which parcels were located within the FEMA 500-year floodplain. The structure inventory survey identified 2,230 structures within 1,902 parcels not including vacant lots. More details on the structure inventory and how it was used can be found in Appendix A.

The setting of the Sweetwater Creek study area is mostly rural and suburban with small cities such as Austell and Powder Springs, which have developed near the floodplains of Sweetwater Creek and Powder Springs Creek respectively. Data obtained from the Multi-Resolution Land Characteristics Consortium 2011 National Land Cover Database (NLCD), depicted in Figure 5, provides a visual representation of the land use overview throughout the entire study area. The rural areas are wooded in various types of forest while the urban areas are mostly residential. At the confluence of Powder Springs Creek and Sweetwater Creek is a CSX intermodal facility. There is limited industrial development in the area and is in the urban centers.

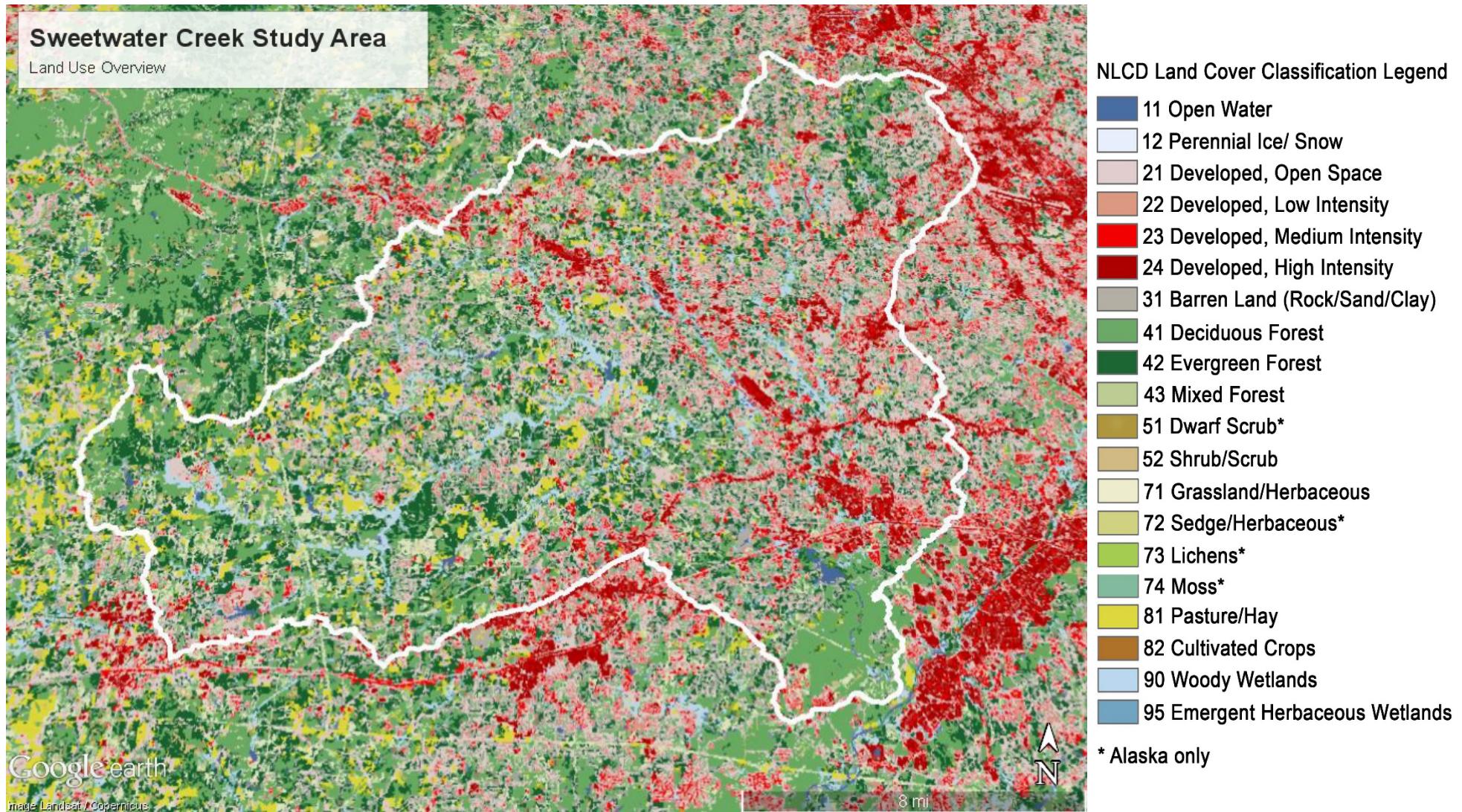
2.4.1 No Action Alternative

According to Georgia residential population projections, the population of the counties within the study area (Cobb, Douglas and Paulding) are expected to increase by approximately 34.89% by the year 2050.

The average household size in the State of Georgia is 2.73 persons. Dividing the percent increase by 2.73 estimates that the expected increase in households by the year 2050 is 12.78%. This is represented by the addition of 213 residential structures in the 2050 analysis year, located above the 1% ACE event WSE and floodplain. These structures were added to the year 2050 structure inventory in proportion to the number of structures within each reach. The number of structures used in an economics analysis differs from overall structure count due to counting multi-structure parcels as one, resulting in a difference of 286. It is assumed that by the year 2050 the floodplain will be fully developed and no future development will occur.

Table 1: Future Structure Counts

Reach	Analysis Year 2020 Number of Structures	Percent of Residential Structures	Future Structures Added	Analysis Year 2070 number of structures
Buttermilk	46	2.75%	6	52
Mill	62	3.71%	8	70
Noses	589	35.2%	75	664
Olley	116	6.93%	15	131
Powder Springs	189	11.30%	24	213
Sweetwater	671	40.11%	85	756
Total:	1,673	100%	213	1,886



2.5 Water Resources

2.5.1 Sweetwater Creek and Tributaries

The Sweetwater Creek Watershed encompasses 264 square miles in Paulding, Douglas, and Cobb Counties, Georgia. The main stem of Sweetwater Creek is 45.6 miles long and begins in Paulding County in sparsely developed floodplain. Urban development increases as it flows eastward towards Cobb County. Other tributaries join the main stem before it empties into the Chattahoochee River in Douglas County at the Fulton County line. The creek passes through Sweetwater Creek State Park just before its confluence with the Chattahoochee River. The study area encompasses the entire Sweetwater Creek Watershed; however, the portion within Cobb County, Georgia is the intended area of flood risk improvement. The Cobb County portion includes the Cities of Marietta, Austell and Powder Springs as well as a portion of unincorporated Cobb County, Georgia.

Buttermilk Creek, Mill Creek, Noses Creek, Olley Creek, and Powder Springs Creek are all tributaries of Sweetwater Creek and are predominantly located in Cobb County, Georgia. See Figure 1 for the location of each tributary.

2.5.1.1 No Action Alternative

Flooding within the study area would increase at a rate of less than 1% for the 1% ACE flood event in the NAA conditions.

2.5.2 Surface Water Quality

Section 401 of the Clean Water Act (CWA) regulates the discharge of any pollutant into navigable waters of the U.S. The USEPA delegates authority under this act to the states for monitoring and maintaining clean water standards.

Every two years the USEPA will review and approve the state's listing of impaired or threatened bodies of water (e.g., stream/river segments, lakes), termed a 303(d) list. States are required to submit their list for USEPA approval every two years. For each waterbody on the list, the state identifies the pollutant causing the impairment when known. In addition, the state assigns a priority for development of Total Maximum Daily Loads (TMDL) based on the severity of the pollution and the sensitivity of the uses to be made of the waters among other factors (40 Code of Federal Regulations (CFR) §130.7(b)(4)).

The nearest 303(d) listed bodies of water within or near the study area are Buttermilk Creek, Olley Creek, and a portion of Sweetwater Creek. Those reaches identified within Buttermilk and Olley Creeks are located in the headwaters to Sweetwater Creek in Cobb County. All locations are listed as not supporting its designated use either due to Fecal Coliform Bacteria, Urban Runoff/Urban Effects, and/or Biota Impacted Fish or Macroinvertebrate Community.

See Table 2 and Figure 6 for listed streams not supporting designated uses within the study area obtained from the Georgia Department of Natural Resources, Environmental Protection Division (GEPD) 2014 303(d) listed waters for streams and rivers.

Table 2: 2014 303(d) Listed Waters

Reach Name/ID	Reach Location / County	Use	Cause / Source	Size
Buttermilk Creek / R031300020209	Headwaters to Sweetwater Creek / Cobb	Fishing	FC/UR	4 miles
Olley Creek/ R031300020204	Headwaters to Sweetwater Creek / Cobb	Fishing	Bio M, FC/UR	11 miles
Sweetwater Creek / R031300020217	Unnamed Tributary approximately 0.25 miles upstream of I-20 to the Chattahoochee River / Douglas	Fishing	FC/UR	8 miles
Tributary to Mud Creek/ R031300020207	Cobb County / Cobb	Fishing	FC/UR	3 miles
Mud Creek / R031300020202	Georgia. Hwy. 120 to Noses Creek / Cobb	Fishing	FC/UR	5 miles
Noses Creek / R031300020215	Headwaters to Ward Creek / Cobb	Fishing	Bio F / NP	7 miles
Ward Creek / R031300020208	Headwaters to Noses Creek / Cobb	Fishing	FC, Bio F / UR	6 miles
Cracker Creek / R031300020210	Headwaters to Gothard's Creek / Douglas	Fishing	FC/UR	3 miles

Key 2: Bio M = Biota Impacted (Macroinvertebrate Community); Bio F = Biota Impacted (Fish Community); FC = Fecal Coliform Bacteria; NP = Nonpoint Sources/Unknown Sources; UR = Urban Runoff/Urban Effects

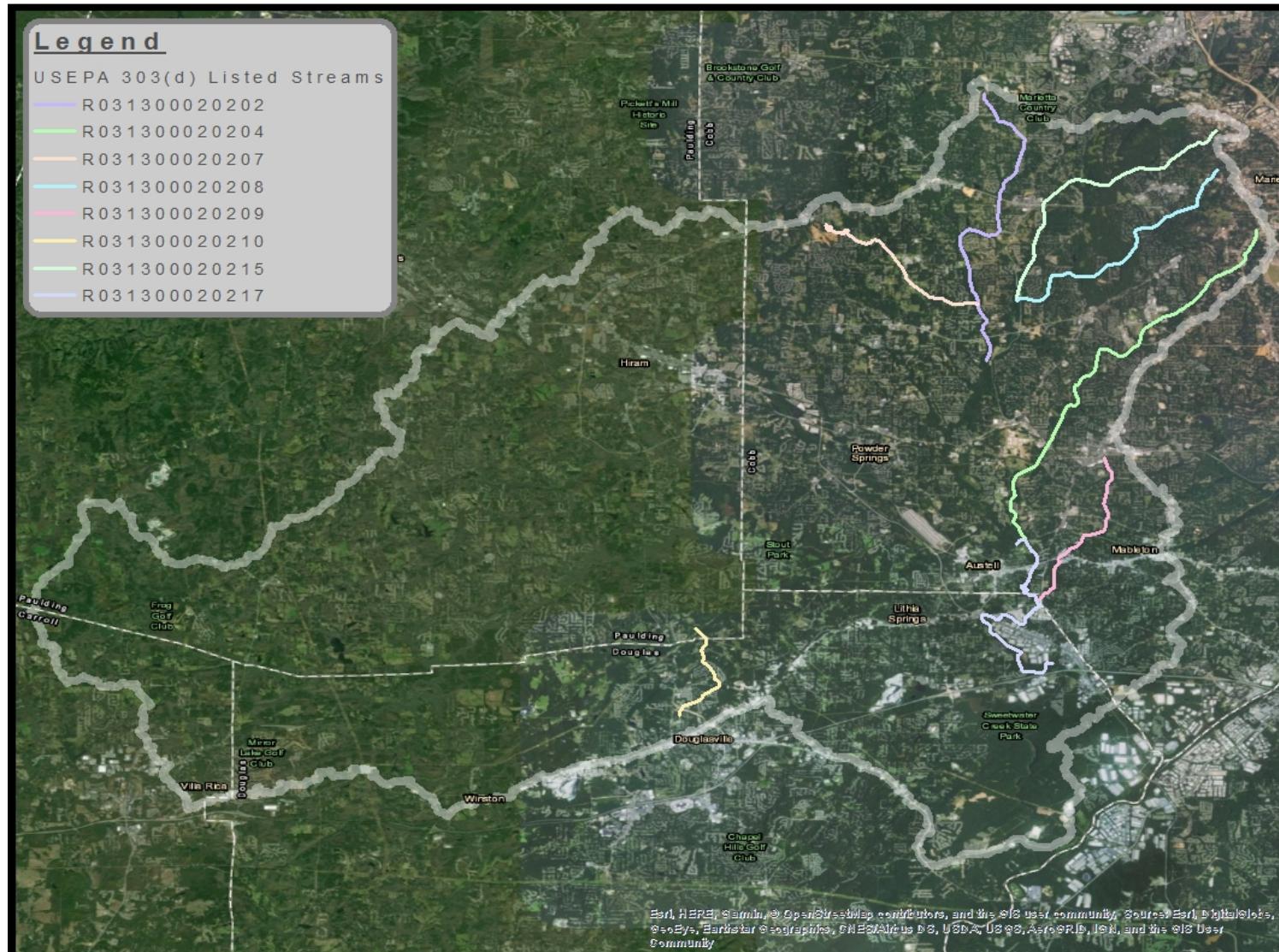


Figure 6: USEPA Listed Impaired Waters within the Study Area

Cobb County Water System maintains a stream monitoring program which evaluates chemical conditions, fish and macroinvertebrate diversity, as well as geomorphology to determine habitat quality. The county has collected this data for over 30 years. Recent data collections obtained from Cobb County Water System and personnel communications are included in Appendix E.

The USEPA requires that “State Waters” are maintained and regulated by State Governments for the protection and conservation of land and water resources through the use of riparian/stream buffer zones. These buffer zones have been shown to reduce nitrogen leaching into groundwaters and streams (Mayer et. al 2005). The GEPD *Field Guide for Determining the Presence of State Waters That Require a Buffer* defines “State Waters” as

Any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, and other bodies of surface or subsurface water, natural and artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation, except as may be defined in O.C.G.A. 12-7-17(8) (O.C.G.A. 12-7-3(16)).

The GEPD requires a 25-foot buffer zone for warm water streams and a 50-foot buffer zone for trout streams. Additionally, Cobb County maintains a more restrictive local ordinance for stream buffer zones with provisions for up to a 200-foot buffer zone. Cobb County is currently proposing to increase their stream buffer length; however, at the time of the study, the applicable size would be a 100-foot buffer zone.

Stream buffer zones are measured from the point of “wrested vegetation” based on stream type. “Wrested vegetation” is defined as: “the point at which visible demarcation between vegetation and water flow”. No extensive surveys have been completed to identify stream characteristics within the study area.

2.5.2.1 No Action Alternative

The NAA conditions show an increase of less than 1% increase in flooding for the 1% ACE flood event. Continued localized flooding would lead to decreased water quality, as sediments and debris runoff enter waters.

2.5.3 Groundwater

Groundwater recharge potential within the Piedmont region, in which the Sweetwater Creek Watershed lies, is low due to the geology of the region. Sporadic groundwater sources in the crystalline rocks of the Piedmont Physiographic Province inhibits the use of groundwater as a major water supply (USGS 2017). However, the GEPD Watershed Protection Branch is evaluating the potential to supplement water supply sources in this region by using groundwater (GEPD 2017). Additionally, the USGS is studying how regional water availability is affected by water withdrawals in areas where ground water resources exist.

2.5.3.1 No Action Alternative

Groundwater supply would remain consistent with existing levels under the NAA conditions.

2.6 Biological Resources

2.6.1 Vegetation

The U.S. Forest Service (USFS) has defined ecological regions of the U.S. through a hierachal assessment of domains, divisions, and provinces. Based on the USFS Ecoregion Map provided in Figure 7, the study area lies within the southeastern mixed forest province of the continental U.S. (Bailey 1995).

Since extensive cultivation practices during the 19th century, much of the Piedmont Ecoregion has reverted to pine and hardwood woodlands. Vegetation within the Southern Mixed Forest Province ranges from medium to tall forests of broadleaf deciduous trees and evergreen pine trees (Bailey 1995). Existing habitat within the study area ranges from heavily disturbed areas to forested riparian settings. Dominant native plant species throughout the study area include tulip poplar (*Liriodendron tulipifera*), white oak (*Quercus alba*), northern red oak (*Q. rubra*), black oak (*Q. velutina*), post oak (*Q. stellata*), hickories (*Carya glabra*, *C. tomentosa*, and *C. cordiformis*), American beech (*Fagus grandifolia*), loblolly pine (*Pinus taeda*), Virginia pine (*Pinus virginiana*), sweetgum (*Liquidambar styraciflua*), black cherry (*Prunus serotina*), flowering dogwood (*Cornus florida*), box elder (*Acer negundo*), and eastern red cedar (*Juniperus virginiana*). Invasive plant species include greenbriar (*Smilax spp.*), Chinese privet (*Ligustrum sinense*), Japanese honeysuckle (*Lonicera japonica*), and tall goldenrod (*Solidago altissima*).

Invasive plant species throughout the area include Japanese arrowroot (*Pueraria montana var. lobata*), cogongrass (*Imperata cylindrica*), yellow iris (*Iris pseudacorus*), Japanese honeysuckle (*Lonicera japonica*), star-of-Bethlehem (*Ornithogalum umbellatum*), garlic mustard (*Alliaria petiolata*), and Chinese wisteria (*Wisteria sinensis*). Cobb County currently operates a lawn care maintenance plan through frequent property mowing which prevents the growth of invasive plant species. No formalized invasive species control plans exist within the study area.

2.6.1.1 No Action Alternative

Existing vegetation in the study area would be subject to local municipality land use. Should no development occur vegetation would experience a less than 1% increase of flooding within the 1% ACE storm event, which could have the potential to disrupt the existing balance of the riparian habitat. Increased flooding has been shown to alter plant biomass as a result of a change in soil chemical composition and transportation of seeds throughout the riparian zone (Garssen et. al 2017). Consequently, the potential for an increased transport of invasive plant species throughout the area would exist under the NAA.

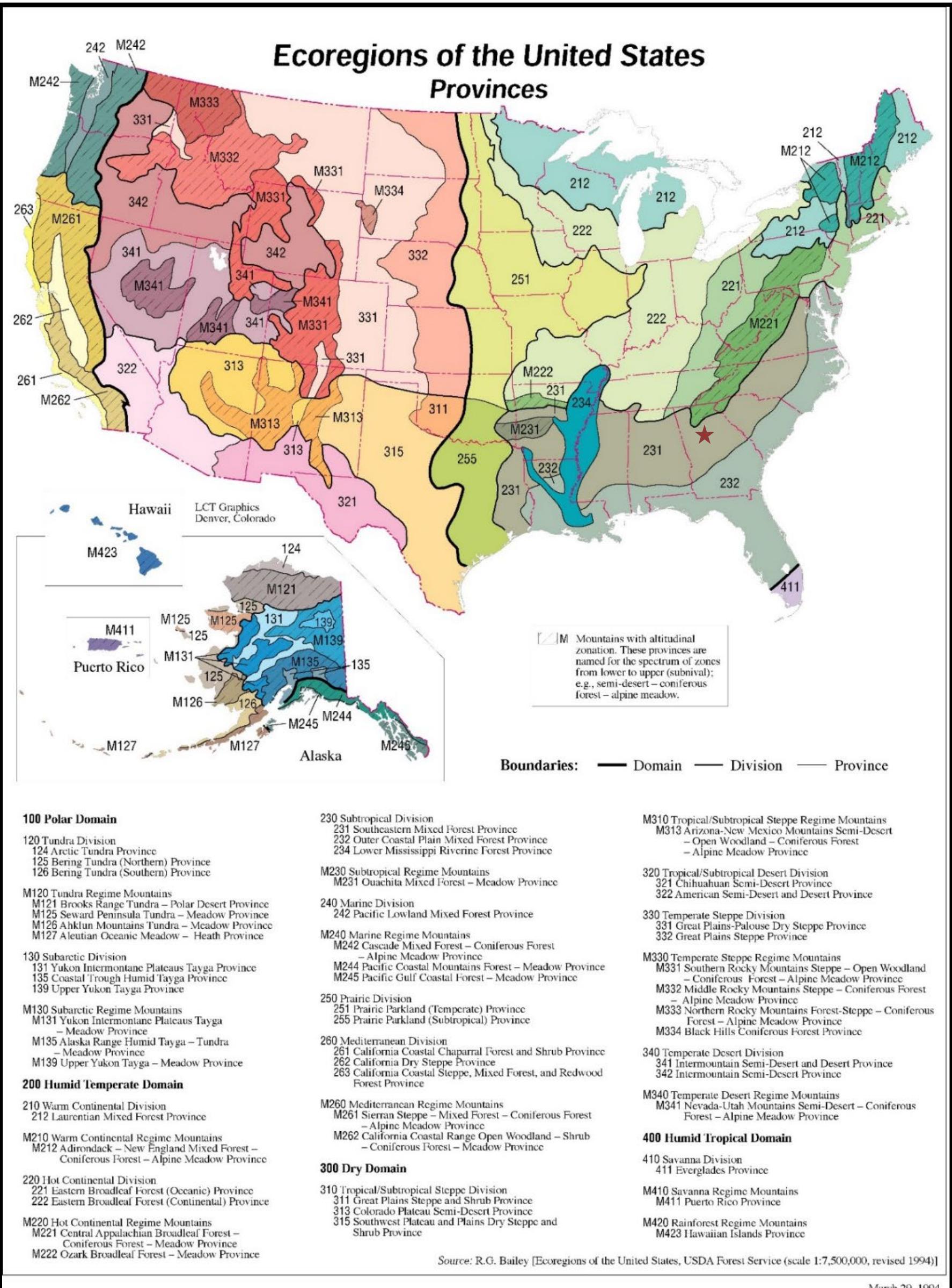


Figure 7: Approximate Location of Sweetwater Creek Watershed within USFS Ecoregions of the U.S.

2.6.2 Fish and Wildlife Resources

Wildlife species vary throughout the Southern Mixed Forest Province. Their presence depends on age and thickness of timber stands, percent of deciduous trees, proximity to clearings, and bottom-land forest types (Bailey 1995). The habitat in the study area is diverse as it passes through undeveloped portions of Cobb, Douglas, and Paulding Counties to sparsely rural residential areas and more developed or urbanized territories. The variety of species found within portions of the study area are dependent on the level of development. More developed areas, such as the City of Austell, contain species that are tolerant of human development activities. Conversely, undeveloped portions of the study area, such as unincorporated Cobb County and the Sweetwater Creek State Park, contain habitat supporting a wider variety of wildlife.

Common species found throughout the study area include white-tailed deer (*Odocoileus virginianus*), eastern wild turkey (*Meleagris gallopavo silvestris*), cottontail rabbit (*Sylvilagus spp.*), raccoon (*Procyon lotor*), nine-banded armadillo (*Dasypus novemcinctus*), bats (*Chiroptera spp.*), opossum (*Didelphis virginiana*), red fox, (*Vulpes vulpes*), fox squirrel (*Sciurus niger*), gray squirrel (*Sciurus carolinensis*), river otter (*Lontra canadensis*), mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), cardinal (*Cardinalidae spp.*), summer tanager (*Piranga rubra*), American crow (*Corvus brachyrhynchos*), mockingbird (*Mimus polyglottos*), starling (*Sturnus vulgaris*), Carolina wren (*Thryothorus ludovicianus*), ruby-throated hummingbird (*Archilochus colubris*), osprey (*Pandion haliaetus*), pine warbler (*Setophaga pinus*), eastern bluebird (*Sialia sialis*), hooded warbler (*Setophaga citrina*), northern bobwhite (*Colinus virginianus*), wood thrush (*Hylocichla mustelina*), eastern towhee (*Pipilo erythrorthalmus*), osprey (*Pandion haliaetus*), tufted titmouse (*Baeolophus bicolor*), cottonmouth moccasin (*Agkistrodon piscivorus*), copperhead (*Agkistrodon contortrix*), rough green snake (*Opheodrys aestivus*), coachwhip (*Masticophis flagellum*), speckled kingsnake (*Lampropeltis getula holbrooki*), eastern fence lizard (*Sceloporus undulatus*), glass lizard (*Ophisaurus spp.*), northern slimy salamander (*Plethodon glutinosus*), and gopher frog (*Rana capito*).

Invasive wildlife species throughout the area include starling (*Sturnus vulgaris*), Africanized honeybee (*Apis mellifera scutellata*), wild boar (*Sus scrofa*), and brown tree snake (*Boiga irregularis*). No formalized invasive species control plans exist within the study area.

2.6.2.1 No Action Alternative

No changes to fish and wildlife resources are anticipated under the NAA conditions.

2.6.3 Waters of the U.S. including Wetlands

Section 404 of the CWA requires that impacts to wetlands should be 1) avoided, 2) minimized, or 3) compensated; in that order of priority. The CWA prohibits the discharge of dredged or fill material into U.S. waters, including wetlands, if any practicable alternative exists. Section 404 of the CWA defines a wetland as meeting all three criteria: soil, vegetation, and hydrology. Wetlands generally include swamps, marshes, bogs, and similar areas.

The U.S. Fish and Wildlife Service (USFWS) adopted the USFS hierarchical description of ecoregions for the contiguous U.S., to regionalize specific inland wetland types based on wetland ecology and likelihood of geological location (Cowardin 1992). The topography of the USEPA defined ‘Piedmont Ecoregion’ and the USFS defined ‘Southern Mixed Forest Province’ allows for the preponderance of streams and wetland development. Streams within these regions are numerous with slower velocity which aids in the creation of marshes and swamps (Bailey 1995).

No extensive surveys have been conducted as part of this FRM study to delineate the locations of jurisdictional wetlands within the boundaries of the study area. A review of the USFWS National Wetland Inventory Wetlands Mapper indicates that the presence of various biological wetlands exist within the study area. Figure 8 shows the potential presence for wetlands within the study area, which generally occurs surrounding the tributaries.

Predominance of the study area by wetland types include freshwater forested and shrub wetland and freshwater emergent wetland along the riparian zones of the tributaries. Forested and shrub wetland is described as woody wetlands such as forested swamps or shrub bogs. Freshwater emergent wetlands include herbaceous marches, fens, swales, or wet meadows.

2.6.3.1 No Action Alternative

The greatest national threat to riparian zone wetlands results from infrastructure development; however, Cobb County’s floodplain management limits the likelihood of development within these areas. As such, potential wetlands throughout the study area would remain functional in the near NAA conditions; however, the study area would experience a less than 1% increase in flooding events over the 1% ACE storm event. Over a long-term period, an increase in flooding frequency could have the potential to alter the three components of wetland habitat: soil, hydrology, and vegetation. As stated in Section 2.6.1 Vegetation, an increase in flooding events has the potential to alter chemical composition of soils. In addition, increased flooding frequency would stress existing wetland habitats by disrupting hydrologic intervals necessary to maintain a functional wetland (Erwin 2008). A change to hydric soils combined with the altered hydrology could alter the stable plant ecology suited to wetland habitats. Therefore, under the long-term NAA conditions a decrease in wetland habitat could occur within the study area.

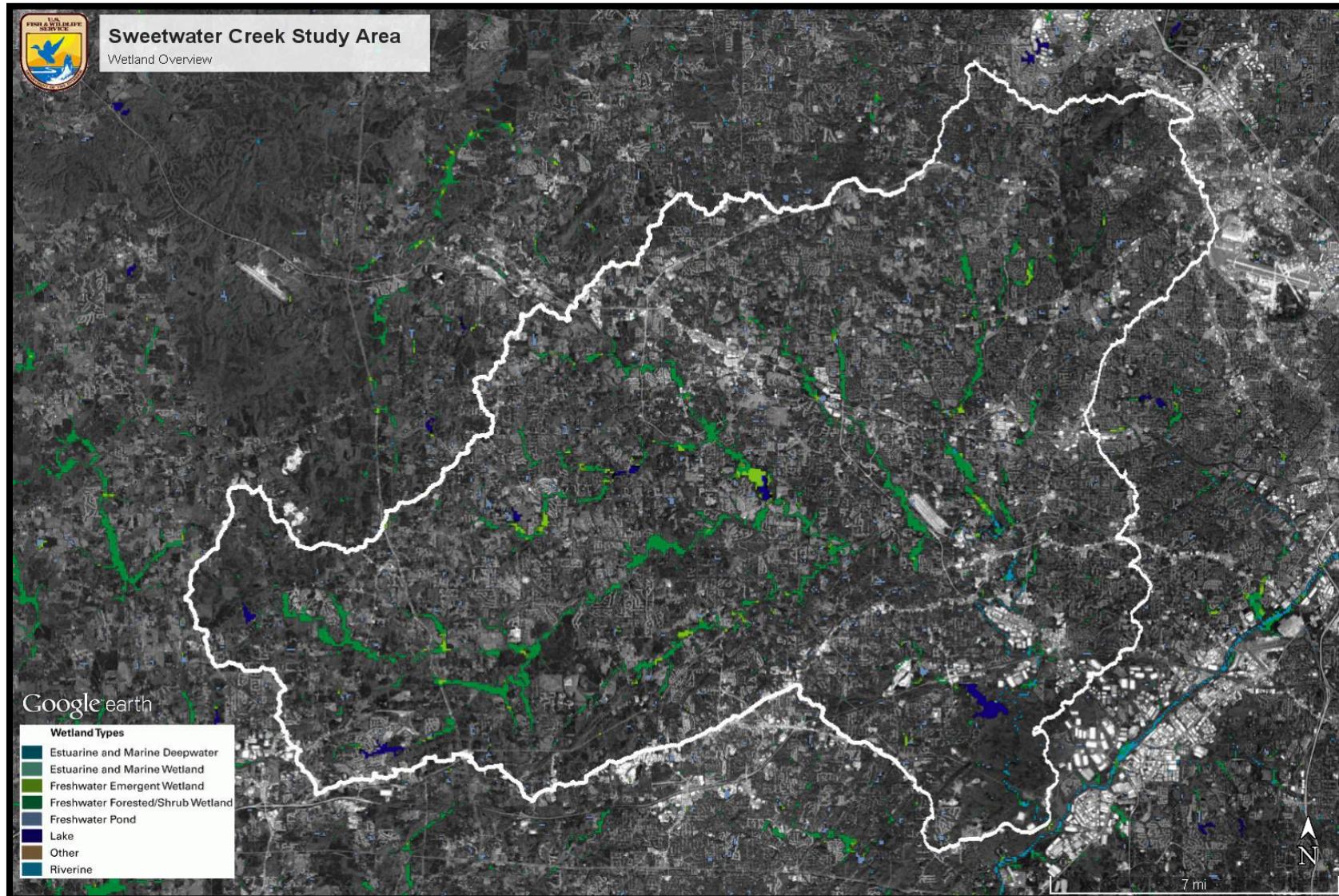


Figure 8: Sweetwater Creek Watershed Wetland Types

2.6.4 Special Status Species

2.6.4.1 Endangered Species Act

The Endangered Species Act (ESA) “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.” (16 United States Code (U.S.C.) § 1531. The ESA makes it illegal to “take” a Federally-listed species, such as threatened and/or endangered species (T&E), without a permit. “Take” is defined by the ESA as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (16 U.S.C. §1532(19)). The USFWS has statutory authority for the assessment of Federally-listed or petitioned species. An endangered species is defined as “any species which is in danger of extinction throughout all or a significant portion of its range or threatened if it is likely to become an endangered species within the foreseeable future.” (16 U.S.C. §1532(6)).

Within Cobb, Paulding and Douglas Counties there are eight Federally-listed threatened and endangered species, three of which have a high likelihood to occur in the study area. The most likely listed species are the Northern Long-eared Bat (*Myotis septentrionalis*) and two plant species, Michaux’s Sumac (*Rhus michauxii*) and Little Amphianthus (*Amphianthus pusillus*). All study efforts assessing FRM will consider the possible presence and protection of these species and their habitat.

A list of Federally-listed species within the study area is included as Table 3.

Additionally, the ESA designates critical habitat believed to be essential for Federally-listed species conservation. No designated critical habitat for these species exists within the study area.

Table 3: Federally Listed Species – Cobb, Douglas, and Paulding Counties*

Common Name	Scientific Name	Status	County		
			Cobb	Paulding	Douglas
Indiana Bat	<i>Myotis sodalis</i>	E			X
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	T	X	X	X
Cherokee Darter	<i>Etheostoma scotti</i>	T	X		X
Etowah Darter	<i>Etheostoma etowahae</i>	E			X
Finelined Pocketbook	<i>Lampsilis altilis</i>	T			X
Little Amphianthus	<i>Amphianthus pusillus</i>	T	X	X	
Michaux’s Sumac	<i>Rhus michauxii</i>	E	X		
White Fringeless Orchid	<i>Platanthera integrilabia</i>	T	X		

Key 1: T=Threatened; E=Endangered; X=listed

*data obtained May 8, 2018

2.6.4.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) states that it is illegal to “take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter” a species identified in 50 C.F.R. 10.13. The USFWS has statutory authority and responsibility for enforcing the MBTA under 16 U.S.C. 703-712. Migratory species protected by the MBTA are internationally protected through conventions between the U.S. and Canada, Mexico, Japan, and Russia. Any species protected through one or more of the four

international conventions is qualified for protection under the MBTA. The final rule for the revised list of migratory birds is included in Appendix E.

Sweetwater Creek River Basin is situated in the Atlantic Flyway Zone. No stopover sites are known to occur within the study area; however, migratory birds, such as the American oystercatcher (*Haematopus palliatus*), black-throated blue warbler (*Setophaga caerulescens*), grouse (*Centrocercus spp*), least tern (*Sternula antillarum*), mottled duck (*Anas fulvigula*), swallow-tailed kite (*Elanoides forficatus*), and the tricolored blackbird (*Agelaius tricolor*), occasionally utilize the study area as a resource.

2.6.4.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668-668c, prohibits the “taking” of bald eagles (*Haliaeetus leucocephalus*) or golden eagles (*Aquila chrysaetos*). “Take” is defined by the BGEPA at 16 U.S.C. 668c to include “pursue, shoot, shoot at, poison, wound, kill capture, trap, collect, molest or disturb.” “Disturb” is further defined at 50 C.F.R. 22.3 as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.” The BGEPA extends to activities occurring near nests when eagles are not present.

According to the National Bald Eagle Management Guidelines dated May 2007, included in Appendix E, bald eagles primarily nest near aquatic habitat in mature or dead trees. Man-made structures such as power-poles and communication towers also serve as nesting sites for some bald eagles. Bald eagle nests are distinctly large at four to six feet in diameter and three feet deep weighing more than 1,000 pounds. Nests are generally constructed with large sticks and lined with soft and pliable greenery such as moss, grass, or lichens.

The Georgia Department of Natural Resources (GDNR) inventories and maintains a database of known eagle nests throughout the State of Georgia on an annual or semiannual basis. According to the GDNR, one nest is known to occur within the study area and is located within the Sweetwater Creek State Park in Douglas County; however, no active or inactive eagle nests have been observed within Cobb County, Georgia (GDNR personal communication 2018).

2.6.4.4 No Action Alternative

The USFWS continually assesses Federally-protected species under the ESA and MBTA. The GDNR actively surveys and maintains records of bald eagle activity throughout the state. Species may be listed, down-listed, or de-listed from the T&E species list and/or added or removed from the migratory bird list. Bald eagles have the potential to inhabit more territory throughout the study area in the future. Wildlife habitat under the NAA conditions would remain similar to existing conditions.

2.6.5 Wildlife Corridors

Wildlife corridors act as links between fragmented habitats to provide important routes of migration for a variety of wildlife, including terrestrial and airborne animals. The Sweetwater Creek River Basin is comprised of forested and riparian zones with few isolated habitats. Areas within the more developed portions of the study area show pockets of degraded habitat.

2.6.5.1 No Action Alternative

Wildlife corridors within the study area under the NAA condition would be subject to local municipality land use; however, no changes in corridor connectivity would occur as a result of the land use changes or other consideration in the NAA conditions.

2.7 Cultural Resources

As per the requirements outlined in Section 106 of the NHPA, the lead Federal agency must consider the effects of the proposed action on historic properties. The USACE, Mobile District is also required to assess both direct and indirect effects of the action on historic and cultural resources under NEPA as defined in 40 C.F.R. 1508.8.

In order to take into consideration potential impacts to historic properties (i.e., archaeological sites, buildings, structures, objects, or districts) listed on or eligible for listing on the NRHP Mobile District archaeologists conducted archaeological background research of the study alternatives and Recommended Plan. Background research sources included Georgia's Natural, Archaeological, and Historic Resources GIS (GNAHRGIS) and previous cultural resources reports on file at the USACE, Mobile District office.

2.7.1 Cultural Resource Setting

2.7.1.1 Prehistoric Period

Several archaeological sites and historic properties are present within Cobb, Douglas, and Paulding Counties that are important to local, regional, and national history. There are numerous sites and properties recorded within these three counties including prehistoric and historic archaeological sites. While the prehistoric occupation in Georgia began in the Paleoindian Period, the earliest archaeology sites identified within the Sweetwater Creek Watershed study area date to the Early Archaic Period showing that this area has been occupied since at least 6000 B.C. The majority of prehistoric archaeological sites are identified as lithic scatters and other limited occupation sites, with the exceptions of archaeological site 9PA64, a possible mound and historic burial site, and 9DO66, a multi-component village site. Sweetwater Town (9DO66) is a multi-component village site, with documented occupations in the Early Archaic to Late Woodland Periods. The village was also occupied by the Cherokee during the historic period.

2.7.1.2 Historic Period

The State of Georgia, particularly the area surrounding the City of Atlanta was one of the main stages for some of the most important battles of the Civil War. The Atlanta Campaign is considered a huge turning point in the Civil War. Due to the study area's proximity to known major Civil War sites, the area has great potential for Civil War resources. Of particular interest is the New Manchester Manufacturing Company, a mill located along Sweetwater Creek within the study area. This mill was raided and burned by Union Soldiers during the war in an attempt to hinder the operation of Confederate Soldiers. After its burning the mill was never rebuilt. Currently it stands as a partial five story building with remnants of foundations of over a dozen buildings. It is one of the main attractions of Sweetwater Creek State Park.

2.7.1.3 Historic Structures

In the course of the cultural resources background review, it was found that the State of Georgia and two of the counties within the study area commissioned three separate historic resources surveys including the Georgia Historic Resources Survey commissioned in 1997, the Historic Resource Survey of unincorporated Cobb County commissioned in 2005, and the "FindIT" Paulding County Survey commissioned in 2006. These surveys produced results that showcase the agricultural nature of the study area with the majority of structures consisting of domestic residential structures showing elements of agriculture including but not limited to field systems, livestock, and chicken coops. The style of structures vary from craftsman, to colonial revival, to Victorian. The oldest structure in the study area was constructed in 1834 and the newest structure on this inventory list was constructed in 1959. Paulding County showcases more diversity with a number of business offices, cemeteries, stores, and historic districts. Paulding County also contains a masonic lodge dating back to 1890. Douglas County had the least amount of structures with two structures included in the inventory: a residence built around 1844 and a doctor's office built around 1879. None of these structures are within the buyout parcels.

One of the most predominate existing historic structures in the area is the New Manchester Mill (9DO10) located in Douglas County. The remnants of the 19th century mill can be seen and visited along Sweetwater Creek at the Sweetwater Creek State Park. The mill is significant in showcasing the past industrial complex in the Atlanta area around the 1850s. In addition to 9DO10 multiple 19th to 20th century structures, sites, and farmsteads have been identified within the study area. This includes archaeological site 9PA56, a late 19th to mid-20th century farmstead which has been previously identified as eligible for listing on the NRHP. Being that the study area has rural and undeveloped areas with limited cultural resources survey coverage, there is a high potential for the presence of additional un-recorded archaeological sites.

There are a number of properties listed on the NRHP within Douglas, Cobb, and Paulding Counties (Table 4). These include: the Clarkdale Historic District, the Israel Causey House, Butner-McTyre General Store, and New Manchester Mill (9DO10). The Clarkdale Historic District characterizes the industrial complex that was prevalent in the era in the late 19th and early 20th centuries. The historic district consists of a textile

factory and mill and the associated village that includes residential and community buildings such as a ball field, tennis court, and swimming pool. Another regionally and nationally important structure listed on the NRHP is the Israel Causey House. This structure is one of the few remaining structures of the plain style in Georgia. It was constructed during the Gold Rush and was inhabited by Cobb County's pioneer settlers. The house is surrounded by Sweetwater Town (9DO66) and is associated with Cherokee removal in the 1830s. One other NRHP structure within the study area is the Butner-McTyre General Store. This general store is one of the last standing structures of its type from its time period (late 19th century) in the State of Georgia.

Table 4: NRHP listed properties within the study area

Resource Name/Site Trinomial	County	NRHP Status	Type of Site
Israel Causey House	Cobb	Listed	Dwelling
Butner-McTyre General Store	Cobb	Listed	Store
Clarkdale Historic District	Cobb	Listed	Historic District
Sweetwater Manufacturing Company/9DO10	Douglas	Listed	Mill

2.7.1.4 Results of Background Research

The primary source for background research conducted for this project was GNAHRGIS as well as cultural resources assessment reports on file at the USACE, Mobile District office. During the background research the Mobile District archaeologists documented numerous previously identified resources within a mile radius of all proposed work areas within the project alternatives. These previously recorded archaeological sites are summarized in Table 5. While several of these archeological sites are located within the work areas associated with the alternatives examined in the study, none are located within the Recommended Plan. A total of seven previously recorded archaeological sites are located within a mile of the parcels included in the Recommended Plan. These archaeological sites are summarized in Table 6.

Table 5: Previously Recorded Archaeological Sites within a mile radius of all Alternatives

Site Number	Component(s)	Eligibility
9DO66	Mid archaic, early woodland, protohistoric multicomponent village	Eligible
9PA56	Late 19th to mid-20th century rural farmstead	Eligible
9CO132	Late archaic lithic scatter	Ineligible
9CO141	Archaic lithic scatter	Ineligible
9CO740	Prehistoric lithic scatter	Ineligible
9CO503	Undetermined prehistoric	Ineligible
9DO175	Undetermined prehistoric lithic scatter, 19th-20th century	Ineligible
9DO176	Middle archaic lithic scatter	Ineligible
9PA128	Prehistoric lithic scatter	Ineligible
9PA129	Mid-20th century	Ineligible
9PA130	Prehistoric lithic scatter	Ineligible

Site Number	Component(s)	Eligibility
9PA136	Prehistoric lithic and historic artifact scatter	Ineligible
9PA137	Undetermined prehistoric lithic scatter late- 19th early 20th century artifact scatter	Ineligible
9PA292	Woodland lithic scatter	Ineligible
9PA293	Undetermined prehistoric lithic scatter	Ineligible
9PA506	Lithic scatter/pottery scatter	Ineligible
9PA506	Prehistoric lithic scatter	Ineligible
9PA507	Lithic scatter, isolated historic artifact	Ineligible
9PA53	Prehistoric lithic scatter	Ineligible
9PA57	Undetermined prehistoric	Ineligible
9PA61	Early to mid-20th century wood frame house	Ineligible
9PA62	Early to mid-20th century brick house	Ineligible
9CO716	Middle archaic lithic scatter	Ineligible
9CO295	Prehistoric lithic scatter	Undetermined
9CO304	Undisclosed resource	Undetermined
9CO305	Lithic scatter	Undetermined
9CO409	Campsite, early archaic, late archaic and woodland	Undetermined
9CO410	Dump, 19th and 20th century	Undetermined
9CO423	Early archaic and 20th century lithic scatter	Undetermined
9CO430	Archaic lithic scatter	Undetermined
9CO449	Late archaic lithic scatter	Undetermined
9CO451	Archaic-woodland campsite	Undetermined
9CO474	Archaic Mississippian lithic scatter	Undetermined
9CO480	Archaic lithic scatter	Undetermined
9CO526	Archaic lithic scatter	Undetermined
9DO69	Lithic and ceramic scatter, late woodland/Mississippian	Undetermined
9PA28	Prehistoric lithic scatter	Undetermined
9PA29	Prehistoric lithic scatter	Undetermined
9PA30	Prehistoric lithic scatter	Undetermined
9PA51	Prehistoric upland with lithic and ceramics	Undetermined
9PA54	Abandoned historic cemetery	Undetermined
9PA55	Farmstead	Undetermined
9PA58	Limited occupation site, woodland/Mississippian	Undetermined
9PA59	Undetermined prehistoric	Undetermined
9PA63	Early 20th century steel bridge	Undetermined
9PA64	Possible mound with potential graves	Undetermined

Table 6: Previously Recorded Archaeological Sites within a mile radius of the proposed parcel locations for the Recommended Plan

Site Number	Component(s)	NRHP Eligibility
9DO66	Possible village and mound site	Eligible
9CO740	Prehistoric lithic scatter	Ineligible
9CO295	Prehistoric lithic scatter	Undetermined
9CO409	Campsite, early archaic, late archaic and woodland	Undetermined
9CO410	Historic dump, 19th and 20th century	Undetermined
9CO449	Late archaic lithic scatter	Undetermined
9CO451	Archaic-woodland campsite	Undetermined

2.7.2 No Action Alternative

Previously unidentified cultural resources within the study area under the NAA condition would be subject to continued flooding, which has the potential to impact the NRHP eligibility of resources.

2.8 Flooding and Floodplain Management

Updated floodplains delineations, to include the floods of late 2009 to present, are part of the existing and NAA condition. Conditions in relation to flood risks are anticipated to slightly deteriorate with less than a 1% increase in peak runoff. Sedimentation from the 2009 flood reduced the channel capacity of Sweetwater Creek and future sediment accretion is possible from another large storm. There are 2,230 structures inside the 0.2% ACE floodplain; most are residential structures and only 271 are nonresidential.

Cobb County's 2012 development standards regulate the development in the floodplain. The standards require that development within or contiguous to the 1% ACE floodplain must be constructed so that the lowest point, including basement, crawl space and foundation wall, is located a minimum of three feet about the base flood elevation.

2.8.1 No Action Alternative

Development in the area with land use changes will continue, affecting the movement of sediment into and down the stream in some cases. However, significant deposition of sediment in the channel is tied to extreme events in excess of 1% ACE such as the storm of September 2009. As such, continually increasing sedimentation is not considered over the next 50 years. Local stormwater management regulations will prevent the quantity of overland flow from changing. However, hydrologic timing resulting from the local runoff of developed sites may result in higher peak flow elevations, increasing the height and extent of the floodplain. Currently the Cobb County development standards are under revision, but there is no proposed change to the sections concerning development in or contiguous to the 1% ACE floodplain, so it is not anticipated to change within the next 50 years. The future 2% ACE floodplain is shown in Figure 9.



Figure 9: 2% Annual Chance of Exceedance Floodplain Extents

2.9 Social and Economic Resources

2.9.1 Flood Damages

The existing structure inventory within the floodplain contains 2,230 structures on 1,902 parcels. Residential structures account for 1,959 of structures, with the remaining 271 being nonresidential. Sixty-two (62) structures are located within the Buttermilk reach; 69 structures within the Mill Creek reach; 632 structures within the Noses Creek reach; 133 structures within the Olley Creek reach; 220 structures within the Powder Springs Creek reach; and 1,114 structures within the Sweetwater Creek reaches.

Table 7 and Table 8 summarize the number of structures in each reach along with their depreciated replacement cost and vehicle depreciated replacement cost in Fiscal Year (FY) 2018 dollars. For more detail on how this was developed see Appendix A. For the economic analysis the study reaches were subdivided into economic reaches. The relation between those reaches is shown in the economic tables.

**Table 7: Total Depreciated Replacement Value of Study Area
 (x \$1,000, 2018 Prices)**

Study Reach	Economic Reach	Structures			Total Structure Value	Total Content Value	Total Vehicle Value	Total Value
		Residential	Non-Residential	Total				
Buttermilk Creek	Buttermilk Creek	46	16	62	\$9,010	\$5,588	\$475	\$15,073
Mill Creek	Mill Creek	62	7	69	\$6,242	\$6,030	\$641	\$12,913
Noses Creek	Mud Creek	38	5	43	\$5,827	\$5,601	\$393	\$11,821
	Noses Creek 1	36	0	36	\$11,917	\$11,917	\$372	\$24,206
	Noses Creek 2	515	38	553	\$49,427	\$46,575	\$5,312	\$101,314
Oolley Creek	Olley Creek	116	17	133	\$35,570	\$15,798	\$1,199	\$52,567
Powder Springs Creek	Powder Springs Creek	189	31	220	\$50,829	\$32,430	\$1,912	\$85,171
Upper Sweetwater Creek	Sweetwater Creek 1	63	2	65	\$6,493	\$6,439	\$651	\$13,583
Middle Sweetwater Creek	Sweetwater Creek 2	274	26	300	\$30,331	\$29,247	\$2,822	\$62,400
Lower Sweetwater Creek	Sweetwater Creek 3	64	21	85	\$27,441	\$12,179	\$661	\$40,281
	Sweetwater Creek 4	13	0	13	\$1,342	\$1,342	\$134	\$2,818
	Sweetwater Creek 5	374	39	413	\$19,989	\$16,079	\$1,437	\$37,505
	Sweetwater Creek 6	169	69	238	\$181,229	\$79,509	\$1,220	\$261,958
	Total	1,959	271	2,230	\$435,647	\$268,734	\$17,229	\$721,610

**Table 8: Existing Condition Mean Expected Annual Damages
 (x 1,000, 2018 Prices)**

Study Reach	Economic Reach	Category	Existing Condition Damages
Buttermilk Creek	Buttermilk Creek	Residential	\$5
		Nonresidential	\$1
		Total	\$6
Mill Creek	Mill Creek	Residential	\$69
		Nonresidential	\$0
		Total	\$69
Noses Creek	Mud Creek	Residential	\$0
		Nonresidential	\$0
		Total	\$0
	Noses Creek 1	Residential	\$19
		Nonresidential	\$0
		Total	\$19
	Noses Creek 2	Residential	\$466
		Nonresidential	\$0
		Total	\$466
Olley Creek	Olley Creek	Residential	\$37
		Nonresidential	\$11
		Total	\$48
Powder Springs Creek	Powder Springs Creek	Residential	\$13
		Nonresidential	\$1
		Total	\$15
Upper Sweetwater Creek	Sweetwater Creek 1	Residential	\$23
		Nonresidential	\$6
		Total	\$29
Middle Sweetwater Creek	Sweetwater Creek 2	Residential	\$296
		Nonresidential	\$25
		Total	\$321
Lower Sweetwater Creek	Sweetwater Creek 3	Residential	\$7
		Nonresidential	\$53
		Total	\$60
	Sweetwater Creek 4	Residential	\$3
		Nonresidential	\$0
		Total	\$3
	Sweetwater Creek 5	Residential	\$21
		Nonresidential	\$18
		Total	\$39
	Sweetwater Creek 6	Residential	\$141
		Nonresidential	\$96
		Total	\$237
	Total	Residential	\$1,100
		Nonresidential	\$212
		Total	\$1,312

2.9.1.1 No Action Alternative

Changes in the structure inventory as stated in Section 2.4.1 contribute to increased flood damages. Table 9 shows how the average annual damages change between the existing and NAA.

**Table 9: Existing vs. Future Mean Expected Annual Damages
 (x 1,000, 2018 Prices)**

Study Reach	Economic Reach	Structure Type	Existing Damages	NAA Damages	Change in Damages
Buttermilk Creek	Buttermilk Creek	Residential	\$5	\$6	-\$1
		Nonresidential	\$1	\$1	\$0
		Total	\$6	\$7	-\$1
Mill Creek	Mill Creek	Residential	\$69	\$79	-\$10
		Nonresidential	\$0	\$0	\$0
		Total	\$69	\$79	-\$10
Noses Creek	Mud Creek	Residential	\$0	\$2	-\$2
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$2	-\$2
	Noses Creek 1	Residential	\$19	\$40	-\$21
		Nonresidential	\$0	\$0	\$0
		Total	\$19	\$40	-\$21
	Noses Creek 2	Residential	\$466	\$480	-\$14
		Nonresidential	\$0	\$0	\$0
		Total	\$466	\$480	-\$14
Olley Creek	Olley Creek	Residential	\$37	\$42	-\$5
		Nonresidential	\$11	\$11	\$0
		Total	\$48	\$53	-\$5
Powder Springs Creek	Powder Springs Creek	Residential	\$13	\$23	-\$10
		Nonresidential	\$1	\$1	\$0
		Total	\$15	\$24	-\$9
Upper Sweetwater Creek	Sweetwater Creek 1	Residential	\$23	\$25	-\$2
		Nonresidential	\$6	\$7	-\$1
		Total	\$29	\$32	-\$3
Middle Sweetwater Creek	Sweetwater Creek 2	Residential	\$296	\$309	-\$13
		Nonresidential	\$25	\$26	-\$1
		Total	\$321	\$336	-\$15
Lower Sweetwater Creek	Sweetwater Creek 3	Residential	\$7	\$7	\$0
		Nonresidential	\$53	\$55	-\$2
		Total	\$60	\$62	-\$2
	Sweetwater Creek 4	Residential	\$3	\$3	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$3	\$3	\$0
	Sweetwater Creek 5	Residential	\$21	\$21	\$0
		Nonresidential	\$18	\$19	-\$1
		Total	\$39	\$40	-\$1
	Sweetwater Creek 6	Residential	\$141	\$171	-\$30
		Nonresidential	\$96	\$99	-\$3
		Total	\$237	\$270	-\$33
	Total	Residential	\$1,100	\$1,208	-\$108
		Nonresidential	\$212	\$220	-\$8
		Total	\$1,312	\$1,428	-\$116

2.9.2 Hazardous, Toxic, and Radioactive Waste

An Environmental Site Assessment (EnSA) was conducted for the Sweetwater Creek FRM Feasibility Study for the presence of Hazardous, Toxic, and Radioactive Waste (HTRW) sites within the study area. The intent of the EnSA was to evaluate areas for the presence of environmental contamination as described in *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*.

Available environmental records and databases were reviewed to identify known areas of hazardous material/waste storage or disposal within the entire watershed area. An environmental database search identified 177 properties, with complete address information, within 1000 feet of the stream centerlines for each area. Sites with incomplete addresses, coordinates or other database information were not plotted. A site inspection was completed to visually inspect each of the alternative plan areas for evidence of recognized environmental conditions (RECs). Properties were photographed to document conditions at the time of the inspection and interviews were completed to document conditions in the area known by local residents, officials, and workers.

Observations of RECs are available in the USACE “Phase I EnSA for Sweetwater Creek Feasibility Study, Douglas, Paulding, and Cobb Counties, Georgia” report. An abbreviated version of this report can be found in Appendix E. The full version will be made available upon request.

2.9.2.1 No Action Alternative

No additional HTRW sites are anticipated to be introduced as a result of continued localized flooding.

2.9.3 Noise

Ambient noise in the study area is consistent with rural and suburban zones. The study area is located 12 miles west of the City of Atlanta where heavy traffic, construction, and community events contribute to higher levels of steady noise. Increased noise levels occur within the more developed portions of the study area, i.e. near the City of Austell.

2.9.3.1 No Action Alternative

As local populations increase, noise levels would increase incrementally. Rural sections within the study area would not experience the level of ambient noise that the more urbanized portions of the study area undergo.

2.9.4 Aesthetic

Aesthetics is an approach to assign appreciation of natural environments, surrounding infrastructure, and scenic landscapes. The general aesthetics of the study area are comprised of intermittent forested and riparian habitat interspersed with residential, commercial, and communal structures.

2.9.4.1 No Action Alternative

Local aesthetics of the study area for the NAA conditions would remain the same.

2.9.5 Navigation

There is no commercial navigation within the study area. The nearest navigable waterway is considered the Chattahoochee River below Walter F. George Lock and Dam. The USACE does not maintain a navigation channel in the Chattahoochee River below Lake Sidney Lanier.

2.9.5.1 No Action Alternative

The NAA conditions would resemble existing conditions. No dredging activities within the Chattahoochee River would occur in the near future.

2.9.6 Socioeconomics

Based on the 2016 American Survey by the U.S. Census, a breakdown of the socioeconomics within the study area is included in Table 10 through Table 14.

Table 10: Study Area Demographics

Subject	Cobb County	Douglas County	Paulding County	Georgia	United States
Total population	748,150	142,224	155,825	10,310,371	323,127,515
Male	48.30%	48.40%	48.60%	48.70%	49.20%
Female	51.70%	51.60%	51.40%	51.30%	50.80%
Median age (years)	36.5	36	36.4	36.5	37.90
White	58.70%	47.30%	74.30%	58.70%	72.60%
Black or African American	27.00%	47.40%	22.10%	31.60%	12.70%
American Indian and Alaska Native	0.40%	N	N	0.40%	0.80%
Asian	5.30%	1.60%	N	3.90%	5.40%
Native Hawaiian and Other Pacific Islander	N	N	N	0.10%	0.20%
Hispanic or Latino (of any race)	12.90%	9.40%	6.10%	9.30%	17.80%
Some other race	4.90%	N	N	2.90%	5.10%
Two or more races	3.50%	1.70%	N	2.50%	3.20%

Table 11: Study Area Housing

Subject	Cobb County	Douglas County	Paulding County	Georgia	United States
Total housing units	297,399	52,194	54,840	4,219,103	135,702,775
Total households	277,949	48,901	53,249	3,686,135	118,860,065
Average household size	2.66	2.88	2.91	2.73	2.65

Table 12: Study Area Income

Subject	Cobb County	Douglas County	Paulding County	Georgia	United States
Median household income (dollars)	70,947	62,445	60,856	53,559	\$57,617
Median family income (dollars)	87,542	75,046	68,825	65,018	\$71,062
Per capita income (dollars)	35,722	28,004	25,730	28,183	\$31,128
Population below the poverty line	9.60%	12.50%	8.70%	16.00%	14.00%

Table 13: Study Area Occupation

Subject	Cobb County	Douglas County	Paulding County	Georgia	United States
Civilian employed population 16 years and over	392,106	70,398	74,892	8,085,411	152,571,041
Management, business, science, and arts occupations	45.00%	35.40%	33.10%	36.40%	37.60%
Sales and office occupations	23.90%	24.40%	26.70%	24.10%	23.30%
Service occupations	15.90%	16.10%	18.20%	16.70%	18.10%
Production, transportation, and material moving occupations	8.20%	14.80%	11.30%	13.30%	12.20%
Natural resources, construction, and maintenance occupations	7.10%	9.30%	10.70%	9.40%	8.80%
Unemployment Rate	4.50%	7.50%	3.00%	6.00%	5.80%

Table 14: Study Area Industry

Subject	Cobb County	Douglas County	Paulding County	Georgia	United States
Educational services, and health care and social assistance	17.60%	19.00%	17.10%	20.20%	23.00%
Retail trade	11.60%	12.10%	13.90%	11.90%	11.50%
Professional, scientific, and management, and administrative and waste management services	16.70%	9.60%	11.40%	12.10%	11.40%
Manufacturing	6.80%	8.50%	9.40%	10.60%	10.10%
Arts, entertainment, and recreation, and accommodation and food services	10.60%	9.80%	8.50%	9.80%	9.80%
Finance and insurance, and real estate and rental and leasing	9.40%	5.50%	8.00%	6.20%	6.60%
Construction	6.80%	8.00%	11.40%	6.70%	6.40%
Transportation and warehousing, and utilities	5.40%	9.90%	6.20%	6.20%	5.20%
Other services, except public administration	5.30%	5.70%	5.80%	4.90%	4.90%
Public administration	3.20%	5.20%	4.70%	5.00%	4.60%
Wholesale trade	3.30%	4.10%	2.30%	3.00%	2.70%
Information	3.10%	2.60%	1.20%	2.30%	2.10%
Agriculture, forestry, fishing and hunting, and mining	0.20%	0.00%	0.10%	1.10%	1.70%

2.9.6.1 No Action Alternative

There was no anticipated change to the socioeconomics between the existing and NAA condition.

2.9.7 Public Safety

There is an increased risk to public safety within the study area during localized flooding events. Emergency vehicles can expect delays reaching 30 minutes due to the need to avoid impacted roads during flooding events.

2.9.7.1 No Action Alternative

Public safety with regards to flood risk under the NAA conditions would continue to decline as the frequency of localized flooding increases.

2.9.8 Recreation

Local recreational parks throughout the study area include sports fields and municipal playgrounds. At the southern end of the study area lies Sweetwater Creek State Park which encompasses 2,549 acres of land and 215 acres of the George Sparks Reservoir lake surface. According to the GDNR State Parks and Historic Sites, Sweetwater Creek State Park is the most visited recreational park in the State of Georgia and received approximately 770,000 visitors in 2017 (personal communication, February 2, 2018). Sweetwater Creek State Park is open yearlong and accommodations within the park

include yurts, tent campsites, picnic shelters, playgrounds, fishing docks, boat ramp, a seasonal bait shop, an event room and visitor center. A sample of outdoor activities includes birding, fishing, hiking, picnicking, geocaching, family reunions, kayaking, canoeing, paddle-boarding, and weddings. Even with the available recreation, according to the data available in the Georgia State Comprehensive Outdoor Recreation Plan (SCORP), there is still unmet demand for recreation.

Through the passage of the Georgia House Resolution 281 on March 9, 2017, the State of Georgia encourages the use of rivers and streams as “water trails” for economic, recreation, and environmental benefits. Neither Sweetwater Creek nor its tributaries have been designated as a water trail; however, the river mile at which the study area deposits into the Chattahoochee River is being considered for inclusion into the Georgia Water Trails Network as the Middle Chattahoochee River Water Trail. This segment would also include Sweetwater Creek State Park and possibly additional sites.

2.9.8.1 No Action Alternative

The NAA conditions would result in more frequent flooding. Flooding events would result in temporary closures of affected areas which in turn would result in lost revenue.

3.0 Plan Formulation

The National or Federal objective of water and related land resources planning is to contribute to NED consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders (EO), and other Federal planning requirements. Plan formulation is a process to develop water and related land resources plans to alleviate problems and take advantage of opportunities in ways that contribute to study planning objectives and, consequently, to the Federal objective. Flood risk management projects typically contribute to NED through the reduction of anticipated flood damages. A repeatable planning process as outlined in the Planning Guidance Notebook (Engineer Regulation (ER) 1105-2-100) is followed in order to achieve this objective. This process includes six steps which are:

1. Identify problems and opportunities (Section 3.1)
2. Inventory and forecast conditions (Section 2.0)
3. Formulate alternative plans (Section 3.3 to 3.5)
4. Evaluate alternative plans (Section 3.6)
5. Compare alternative plans (Section 3.6)
6. Select recommended plan (Section 3.7)

3.1 Problems, Opportunities, Objectives, and Constraints

Problems, opportunities, and constraints were identified based on the existing conditions and the NAA. Objectives were developed from the identified problems and opportunities in the study area. Problems and opportunities that are not also objectives would only be addressed as part of a flood risk management solution and would not increase the cost.

3.1.1 Problems

The existing problems in the study area include:

- Routine rainfall events cause flooding along Sweetwater Creek increasing flood risk and damaging residential and commercial structures throughout Cobb County
 - The Cities of Austell, Powder Springs, and the surrounding areas experience the most extensive and frequent flooding in the study area
- Emergency services disrupted during routine flood events
- Reduced channel conveyance from sedimentation caused by erosion and run-off during the 2009 flood event, which increases the likelihood of flooding during a rainfall event

3.1.2 Opportunities

The existing opportunities in the study area include:

- Reduce flood damages along Sweetwater Creek and its tributaries within Cobb County
- Reduce impacts to emergency services during flood events
- Provide additional recreation
- Reduce stream bank erosion
- Improve flood risk communication among stakeholders
- Address environmental degradation of the channel and its habitat for the creatures therein

3.2 Study Goal, Objectives, and Constraints

The goal of this study is to determine the feasibility of providing flood risk management in Cobb County, Georgia, to reduce the flood risk associated with frequent flood events in the vicinity of Sweetwater Creek.

3.2.1 Objectives

Objectives are what the alternative plans should achieve in order to address problems and the Federal objective. The planning objectives for the 50-year period of analysis from 2023 to 2073, within the Sweetwater Creek Watershed inside Cobb County are:

1. Reduce average annual flood damages
2. Increase safety and community resiliency
3. Reduce response times for emergency services during flood events

4. Increase access to emergency services during flood events
5. Provide recreation ancillary to flood risk management solution

3.2.2 Constraints

Impacts to the below study specific planning constraints should be avoided when able, minimized where possible, and mitigated if there are any resulting impacts. Study specific constraints include:

1. Significant induced flooding in developed areas
2. Impacts to cultural resources
3. HTRW site
4. Impacts to T&E species

3.3 Management Measures

Management measures are features or actions that can be done in the study area that address the planning objectives and make up the components of alternative plans. The measures include structural and non-structural features. The measures considered were based on local input, local conditions, and professional judgment. The measures considered for Sweetwater Creek are shown in Table 15.

Table 15: Measures Considered

	Measure	Various Methods to Develop Measure
Non-Structural Measures	Structure Relocation/Evacuation (Buyouts)	
	Elevating Structures	
	Flood Proofing Structures	
	Flood Warning System	
	Flood Plain Regulation	
Structural Measures	Modifying Channel Capacity	Clearing and snagging, Channel deepening and/or widening, Modifying bridge crossings and culverts
	Retention/Attenuation	In-channel/Off-channel, Rehabilitation/Modification of existing dams
	Levees/Floodwalls	
	Diversion	High flow, Full flow, Channelized tunnel

3.3.1 Screening of General Measures

The criteria for screening the initial measures by using professional judgment included whether the measures were: 1) implementable, 2) not likely to induce significant flooding, 3) part of a solution that consistently meets the project objectives, and 4) effective relative to other measures.

Many measures were eliminated because they were not able to be implemented. Elevating structures was removed because the type of construction (i.e. slab on grade foundations) in the flood prone areas does not allow for elevating the structures. Flood proofing does not increase safety or community resiliency, and it is not easily implemented in residential structures. The suburban setting for the study area is mostly residential neighborhoods; therefore, it was removed. Floodplain regulation, or regulating the development in floodplains, and a flood warning system have already been implemented by the NFS and so was not carried forward.

Other measures would not meet the project objectives so they were not carried forward. Clearing and snagging would require 10 or more miles on five different streams to be snagged after each flood event. Without that constant clearing this would only help meet project objectives for a single event so it was eliminated since it would not achieve the project objectives. Modifying bridges and culverts would not meet project objectives since the ponding that occurs on the upstream side of the structures does not appear to be causing damages to adjacent property owners. Therefore, these options were eliminated because they did not consistently meet the project objectives.

Full flow diversion was eliminated since it could negatively affect T&E species potentially occurring within the area, while a high flow diversion could achieve the same benefits without the T&E species risk. The basin before Powder Springs Creek joins Sweetwater Creek has high hydrologic and hydraulic connectivity making diversions impacts on the floodplain negligible in this portion of the basin. Finally levees and floodwalls were not considered effective when compared to other alternatives. Floodwalls and levees alignments would only be able to reduce the flood risk for one to three structures from a single floodwall or levee.

3.4 Initial Alternatives Array

From the screened management measures, the PDT developed multiple alternative plans, either from a single measure or multiple measures combined. The initial alternatives were developed by comparing the alternatives against the study objectives and constraints. Alternatives could be combined based on their capability not only to address objectives and avoid constraints, but also for technical feasibility, environmental acceptability, and being economically justified, as well as for the level of flood risk reduction that could be realized after construction. This initial array of plans included: channel modifications, diversions, single site retention areas, relocation/evacuation (buyout), and possible combinations of retention.

For this study the PDT developed an array of initial alternatives and screened them to identify a focused array of alternatives. These were screened until an NED Plan was identified and became the Recommended Plan. More detail on the initial array of alternatives is in Appendix B.

3.4.1 Structure Relocation/Evacuation (buyout)

Relocation/Evacuation is purchasing residential and commercial structures with first floor elevations below an ACE's water surface elevation (WSE). After the structures are purchased they would be demolished and the site would be left undeveloped. Owners

who are affected by the buyouts would be offered relocation benefits as part of this measure. Alternatives 1 through 1.3 consist of purchasing structures with first floor elevations lower than the floodplains for the 10, 4, 2, or 1% ACE storms. Table 16 shows the number of structures that would be purchased as part of each alternative based on the ACE floodplain buyout.

Table 16: Structures for Purchase by Annual Chance of Exceedance

Alternative	Percent ACE	Number of Structures
1	10	20
1.1	4	26
1.2	2	66
1.3	1	117

3.4.2 Retention Areas

No off-line retention sites were identified that would provide a measurable hydrologic or hydraulic change in the flood effected areas. In-line retention sites of various sizes and locations on Sweetwater Creek and its tributaries were identified. The locations of the retention measures are shown in Figure 10.

The facilities will reduce the peak downstream discharges by temporarily detaining floodwaters. The outlet works of the structures would consist of a multi-stage concrete slot with vertical side walls discharging into a stilling basin downstream of the structure. The sites listed in Figure 10 that are not listed in Table 17 were, based on professional judgment, too small or not close enough to flood damages to affect any measurable change even when combined with other measures and retention sites. The MC5 retention sites, when the retention structure was made large enough to affect a change, could not be tied into high ground and was removed from further consideration. Table 17 shows a detailed description of the retention sites that were considered either as individual alternatives or in combination with other retention sites. Any difference in how a retention structure is designed not shown in the other columns is written in the notes column.

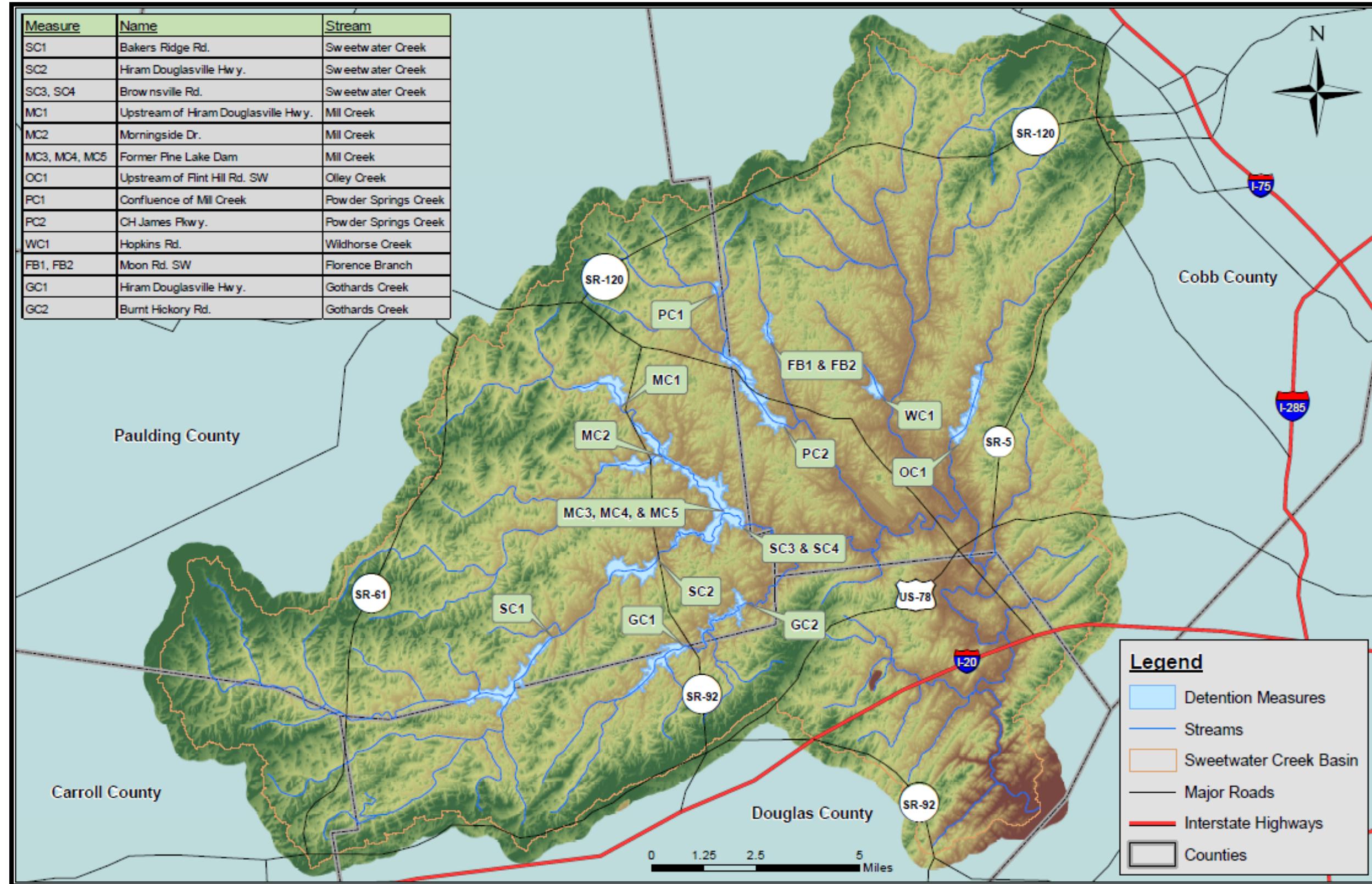


Figure 10: Possible Retention Sites

Table 17: Retention Site Descriptions

Measure			Description			Notes
	Height (feet)	Approximate Size (acres)	Location			
SC1	24	400	upstream of Bakers Bridge Road in Paulding County near the Douglas and Paulding County line			
SC1s	19	400	upstream of Bakers Bridge Road in Paulding County near the Douglas and Paulding County line			
SC2	15	250	upstream of Highway 92 in Paulding County			
SC6	33	900	upstream of Highway 92 upstream of Brown Road in Cobb County			
SC6LF	33	900	upstream of Highway 92 upstream of Brown Road in Cobb County			with a smaller outfall structure than SC6
MC2	20	300	upstream of Morningside Drive in Paulding County			
MC5	25		at the current site of Pine Valley Lake near the Mill Creek Sweetwater Creek confluence			
PC2	25	400	upstream of C.H. James Parkway in Cobb County near the Cobb and Paulding County line			
OC2	29	250	upstream of Flint Hill Rd Southwest in Cobb County			

3.4.2.1 Retention Site Alternatives

Retention sites could be considered individually or in combination with other retention sites. When multiple retention sites were part of an alternative, sites were developed with modified designs in order to capture additional benefits. One retention alternative combined all the sites to determine a relative maximum effect from retention. Table 18 shows all the retention alternatives including single measure retention alternatives.

Table 18: Retention Alternatives

Alternative	SC1s	SC1	SC2	SC6	SC6LF	MC2	MC5	PC2	OC1
2				✓					
5a						✓		✓	✓
5b						✓	✓	✓	✓
5c				✓		✓	✓	✓	✓
5d		✓	✓		✓	✓	✓	✓	✓
5e		✓	✓		✓			✓	✓
5f		✓	✓		✓				
5g		✓	✓		✓	✓			
5h		✓			✓				
5i	✓								
5j	✓								

3.4.3 Diversion

Diversion channel alternatives were investigated. Alignments included connecting tributaries, such as Noses and Olley Creeks, as well as an alignment that would require a tunnel under the City of Austell that would be 3 12x12-foot culverts in order to pass sufficient flow. The diversion alignments are shown in Figure 11.

Alternative 3 is the most viable alignment, which bypasses developed areas on Sweetwater Creek itself and is SC5 in Figure 11. After further investigation into the topography and geotechnical data, diversions were fully eliminated because it would require pumps or extensive excavation in order to develop the needed grade for water to flow from upstream to downstream.

3.4.4 Channel Modification

The channelization of Sweetwater Creek would begin upstream of the City of Austell, and in order not to induce flooding would need to extend downstream to the rapids in Sweetwater Creek State Park. The objective of the measure is to increase channel conveyance through the creation of a more optimal channel design that will reduce flood elevations and concurrently provide a more stable channel.

Sweetwater Creek has a small elevation change from the Cobb/Paulding County line to Sweetwater Creek State Park. In the 44,000 feet of creek the elevation drops by only 20 feet. Because of the small elevation change, the channel deepening and/or widening would need to extend to the rapids and falls in Sweetwater Creek State Park in order not to induce flooding. The location of the channel modification is shown in Figure 11, and is Alternative 4.

The Alternative 4 channel modification would stretch from the C.H. James Parkway to the rapids in Sweetwater Creek State Park near the historic mill site (14.2 miles). The channel would be widened to 80 feet and would have 2V:1H side slopes. The length of the channel modification is approximately 74,000 linear feet and would remove approximately three million cy of material from the channel. The objective of Alternative 4 is to increase channel conveyance through the creation of a more optimal channel design that will reduce flood elevations and concurrently provide a more stable channel. Dredged material would be placed at city approved disposal areas within four miles of the project.

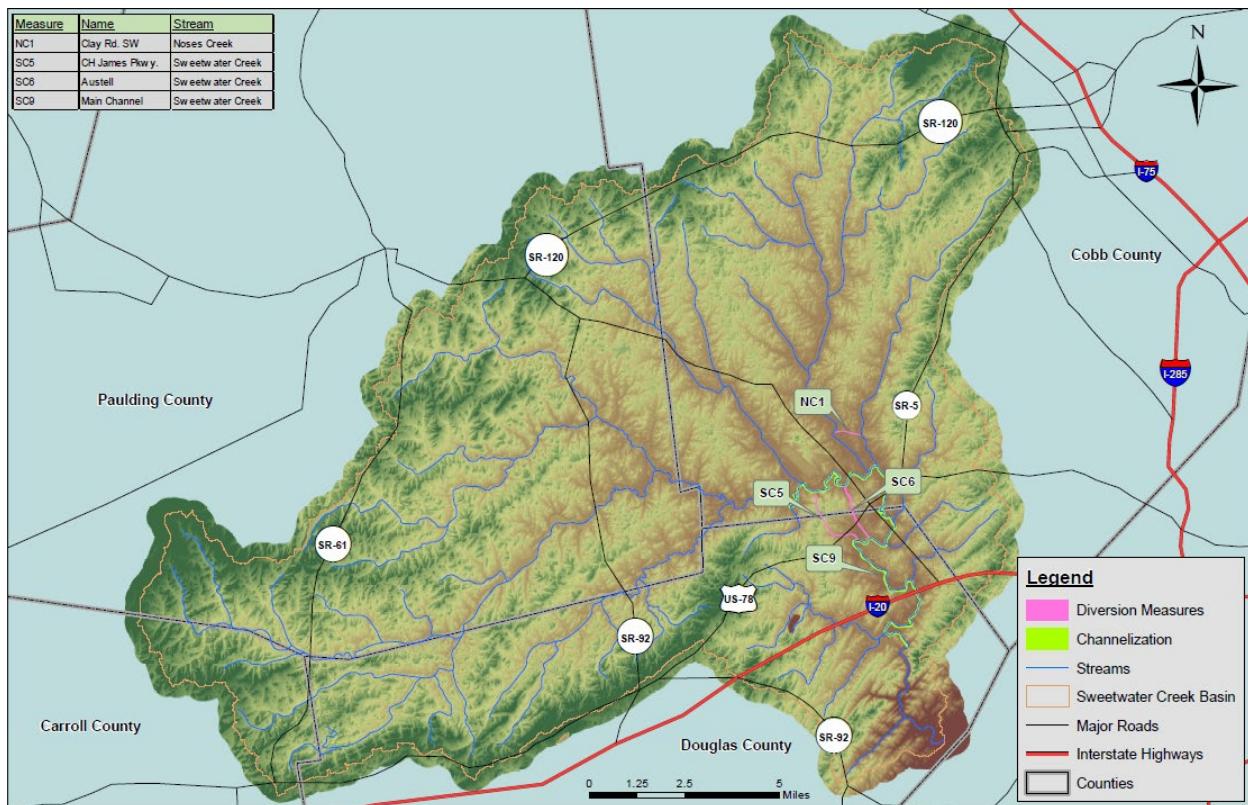


Figure 11: Channel Modification and Diversion Measures

3.4.5 Comparison of the Initial Alternative Array

The evaluation and comparison of the initial alternative array were based on engineering analysis. The results were taken from the hydrologic and hydraulic model in approximate 1% ACE WSE. When comparing the retention sites, those that achieve more WSE change with the least sites were carried forward.

Table 19: Initial Alternative Array Evaluation and Comparison

Alt #		Meets Project Objectives	Avoids Constraints	Approximate 1% ACE Water Surface Elevation Change at Austell	Retention Sites Required	Note
1	Relocation	✓	✓	Not Evaluated	0	Carried forward as 4 levels of buyouts
2	SC6	✓	✓	1.2	1	
3	Diversion	✓		Not Evaluated	0	Induces Flooding in Developed Areas
4	Channel Modification	✓	✓	Not Evaluated	0	
5a	MC2, PC2, OC1	✓	✓	0.5	3	Can achieve greater reduction with equal sites
5b	MC2, MC5, PC2, OC1	✓	✓	0.5	4	Can achieve greater reduction with fewer sites
5c	SC6, MC2, MC5, PC2, OC1	✓	✓	1.5	5	Can achieve greater reduction with fewer sites
5d	SC1, SC2 SC6LF, MC2, MC5, PC2, OC1	✓	✓	2.9	7	Anticipated high cost but carried forward as relative maximum comparison
5e	SC1, SC2 SC6LF, PC2, OC1	✓	✓	2.5	5	Can achieve greater reduction with fewer sites
5f	SC1, SC2 SC6LF	✓	✓	2.7	3	Can achieve greater reduction with equal sites
5g	SC1, SC2 SC6LF, MC2	✓	✓	2.7	4	Can achieve greater reduction with fewer sites
5h	SC1, SC6LF	✓	✓	2.8	3	
5i	SC1	✓	✓	1.0	1	Can achieve greater reduction with equal sites
5j	SC1s	✓	✓	1.2	1	

It was found that MC5 was unable to be built, since there was no high ground to tie into. Therefore, it was not carried into the final array of alternatives.

3.5 Final Array of Alternatives

The alternatives carried forward for the final array are summarized below. The location of the components are shown in Figure 12.



Figure 12: Components in Final Array

3.5.1 Alternatives 1 through 1.3: Relocation/Evacuation of Structures (Buyouts)

The evaluation of Alternative 1 through 1.3 included the four levels of relocation/buyouts based on the annual percent chance of exceedance floodplain in order to identify the most justifiable level of buyouts.

3.5.2 Alternative 2: Brown Road Detention Alternative

Alternative 2 consists of SC6. This structure would provide up to 9,000 acre-feet of flood storage in the basin.

3.5.3 Alternative 4: Austell Channel Modification

Alternative 4 consists of the 14.2 mile channel modification from the C.H. James Parkway to the rapids in Sweetwater Creek State Park near the historic mill site.

3.5.4 Alternative 5H: Multiple Detention Structures on Sweetwater Creek

Alternative 5H consists of SC1 and SC6LF. These structures would provide a combined 18,900 acre-feet of flood storage in the basin.

3.5.5 Alternative 5D: Multi-Subbasin Detention

Alternative 5D consists of SC1, SC2, SC6LF, MC2, PC2, and OC1. These structures would provide a combined 25,040 acre-feet of flood storage in the basin.

3.5.6 Alternative 5J: South Paulding High Detention Short

This alternative consists of SC1. This structure would provide up to 7,660 acre-feet of flood storage in the basin.

3.6 Evaluation and Comparison of Final Alternatives

The PDT then compared the alternatives to the decision criteria. Criteria used to evaluate the remaining alternatives include a comparison to see if objectives have been met, improvements to flood risk, environmental impacts, and evaluation of costs and benefits of the proposed alternatives. At each stage of the process the PDT looked at the measures, initial alternatives, and focused alternatives and cross checked them to ensure we were meeting the intent of each objective which also address the study problems; and to determine what the environmental impacts would be. Alternatives were screened and compared based on how well an alternative plan 1) accounts for all the required work in order to ensure project objectives (Completeness); 2) achieves the planning objectives (Effectiveness); 3) complies with laws, regulation, and public policy (Acceptability); and 4) achieves the planning objectives in relation to costs (Efficiency).

3.6.1 Completeness

All alternatives included the required work needed to ensure that the project objectives were achieved. This includes assessing if any additional structures should be bought out if all avenues of egress were cut off by the flood event water surface level used for an alternative. For all alternatives, this included determining likelihood of cultural and natural resources that would need to be protected as part of a project's implementation.

3.6.2 Effectiveness

3.6.2.1 Increase Safety and Community Resiliency

This objective was assessed through a qualitative analysis of whether a plan is likely to reduce the structures impacted by flooding. Structures impacted are both those that receive flood damages as well as those that are surrounded by flood waters and are not damaged. Due to uncertainty in the analysis of structures impacted, especially with the structural alternatives, this objective was evaluated based on a qualitative assessment of whether an alternative was likely to remove structures from the 1% ACE flood event. The results of that qualitative analysis are shown in Table 20.

Table 20: Reduce Number of Structures Impacted

Alternative	Reduce the Structures Impacted
No Action Alternative	No
1	Yes
1.1	Yes
1.2	Yes
1.3	Yes
2	Yes
4	Yes
5H	Yes
5D	Yes
5J	Yes

3.6.2.2 Reduce Response Times for Emergency Services during Flood Events

During flood events, the time for emergency vehicles response increases due to road closures as well as the increase in the requests for emergency services. The evaluation of this objective took into account whether the number of requests would decrease as well as whether the number of roads available to provide transit to and from areas would be decreased. The qualitative assessment of whether an alternative would reduce response time was used to assess this objective. For the buyout alternative, it was determined that having less people working and living in floodplains would reduce the calls for emergency services in hard to reach places and thus reduce the response times for the study area as a whole. Structural alternatives were assessed like the buyout alternatives, but also were evaluated to determine whether the avenues of egress to an area increased. A summary of these results is found in Table 21.

Table 21: Reduced Response Times Qualitative Summary

Alternative	Would the Change Reduce Response Times
No Action Alternative	No
1	Yes
1.1	Yes
1.2	Yes
1.3	Yes
2	Yes
4	Yes
5H	Yes
5D	Yes
5J	Yes

3.6.2.3 Increase Access to Emergency Services during Flood Events

During flood events, some areas of the study area become surrounded with flood waters, reducing access to emergency services. The qualitative assessment of whether an alternative would increase access to emergency services was used to assess this objective. For the buyout alternative, it was determined that having less people working and living in floodplains would increase access since they would relocate to areas that do not experience as frequent of flooding. Structural alternatives were assessed like the buyout alternatives, but also were evaluated to determine whether the avenues of egress to an area increased. A summary of these results is found in Table 22.

Table 22: Increased Access Qualitative Summary

Alternative	Would the Change Increase Emergency Services Access
No Action Alternative	No
1	Yes
1.1	Yes
1.2	Yes
1.3	Yes
2	Yes
4	Yes
5H	Yes
5D	Yes
5J	Yes

3.6.2.4 Reduce Average Annual Flood Damages

Average Annual Benefits were used to determine how well an alternative met the objective of reducing flood damages. The benefits were developed using the USACE certified Hydrologic Engineering Center (HEC) River Analysis System (HEC-RAS) and HEC-Flood Damage Reduction Analysis (FDA) models, for hydraulics and economics respectively. The results of the evaluation are shown in Table 23.

Table 23: Alternatives Equivalent Annual Damages Reduced(x1000, 2018 Prices)

Study Reach	Econ Reach	Damage Category	NAA	Alt 1	Alt 1.1	Alt 1.2	Alt. 1.3	Alt 2	Alt 4	Alt 5D	Alt 5H	Alt 5J
Buttermilk Creek	Buttermilk Creek	Residential	\$0	\$0	\$3	\$3	\$3	\$1	\$3	\$1	\$2	\$1
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$0	\$3	\$3	\$3	\$1	\$3	\$1	\$2	\$1
Mill Creek	Mill Creek	Residential	\$0	\$0	\$0	\$0	\$0	-\$3	\$0	-\$4	\$0	-\$4
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$0	\$0	\$0	\$0	-\$3	\$0	-\$4	\$0	-\$4
Noses Creek	Mud Creek	Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	Noses Creek 1	Residential	\$0	\$9	\$9	\$13	\$14	\$0	\$0	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$9	\$9	\$13	\$14	\$0	\$0	\$0	\$0	\$0
	Noses Creek 2	Residential	\$0	\$190	\$194	\$213	\$229	\$4	\$34	\$15	\$12	\$8
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$190	\$194	\$213	\$229	\$4	\$34	\$15	\$12	\$8
Olley Creek	Olley Creek	Residential	\$0	\$7	\$11	\$23	\$29	\$1	\$1	\$1	\$2	\$1
		Nonresidential	\$0	\$4	\$4	\$4	\$4	\$0	-\$2	\$0	\$0	\$0
		Total	\$0	\$12	\$15	\$28	\$33	\$1	-\$1	\$1	\$2	\$1
Powder Springs Creek	Powder Springs Creek	Residential	\$0	\$0	\$0	\$2	\$7	\$1	\$2	\$3	\$3	\$2
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$0	\$0	\$2	\$7	\$1	\$2	\$3	\$3	\$2
Upper Sweetwater Creek	Sweetwater Creek 1	Residential	\$0	\$0	\$0	\$0	\$0	-\$2	\$0	\$8	\$8	\$3
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3	\$3	\$2
		Total	\$0	\$0	\$0	\$0	\$0	-\$2	\$0	\$11	\$11	\$5
Middle Sweetwater Creek	Sweetwater Creek 2	Residential	\$0	\$264	\$269	\$271	\$273	\$3	\$19	\$44	\$34	\$18
		Nonresidential	\$0	\$0	\$11	\$11	\$11	-\$1	\$1	\$6	\$4	\$2
		Total	\$0	\$264	\$280	\$282	\$284	\$3	\$20	\$50	\$38	\$20
Lower Sweetwater Creek	Sweetwater Creek 3	Residential	\$0	\$0	\$0	\$2	\$3	\$1	\$2	\$2	\$2	\$1
		Nonresidential	\$0	\$46	\$46	\$52	\$53	\$1	\$10	\$6	\$5	\$3
		Total	\$0	\$46	\$46	\$54	\$56	\$2	\$12	\$8	\$7	\$4
	Sweetwater Creek 4	Residential	\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$1	\$1	\$1
		Nonresidential	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
		Total	\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$1	\$1	\$1
	Sweetwater Creek 5	Residential	\$0	\$3	\$3	\$5	\$7	\$2	\$7	\$6	\$5	\$3
		Nonresidential	\$0	\$8	\$8	\$11	\$14	\$1	\$5	\$5	\$4	\$3
		Total	\$0	\$11	\$11	\$16	\$21	\$3	\$12	\$11	\$9	\$6
	Sweetwater Creek 6	Residential	\$0	\$0	\$0	\$2	\$2	\$7	\$34	\$36	\$29	\$29
		Nonresidential	\$0	\$0	\$0	\$3	\$6	\$7	\$25	\$27	\$23	\$22
		Total	\$0	\$0	\$0	\$5	\$7	\$14	\$59	\$63	\$52	\$51
	Total	Residential	\$0	\$473	\$489	\$532	\$567	\$15	\$103	\$114	\$97	\$63
		Nonresidential	\$0	\$58	\$69	\$82	\$88	\$8	\$39	\$46	\$39	\$31
		Total	\$0	\$531	\$558	\$615	\$655	\$23	\$142	\$161	\$136	\$95

All levels of buyouts produced more flood damage reduction benefits than the structural alternatives. Channel modification produced the largest benefits from a structural solution. For more information on the benefits and how they were calculated see Appendix A.

3.6.3 Acceptability

All of the alternatives in the final array complied with laws, regulations, and public policy. This effort includes, as required by regulation, a qualitative assessment of climate change for the area, as well as a qualitative assessment on how climate change will affect the resiliency of the recommended action. The qualitative climate change analysis shows no impact on the evaluated alternatives nor a change in resiliency from one alternative to the other. Further, as shown in Section 6.0, the Recommended Plan is in compliance with environmental laws and public policy.

3.6.4 Efficiency

Average Annual Net Benefits, which is the average annual benefits minus the average annual costs, were used to determine the efficiency of the alternatives. The annual Operations and Maintenance (O&M) costs are included in this analysis.

Table 24: Alternative Project Costs

Alternative	Project First Cost	Const. Period (Months)	Interest During Const.	Total Cost	Average Annual Cost	Annual O&M Cost
1	\$4,669,100	24	\$123,567	\$4,792,667	\$177,526	\$0
1.1	\$5,674,100	48	\$312,534	\$5,986,634	\$221,751	\$0
1.2	\$15,708,300	60	\$1,096,202	\$16,804,502	\$622,455	\$0
1.3	\$23,028,400	72	\$1,951,896	\$24,980,296	\$925,294	\$0
2	\$22,748,000	12	\$285,767	\$23,069,767	\$854,525	\$20,000
4	\$134,178,600	30	\$4,497,869	\$138,676,469	\$5,156,704	\$0
5h	\$33,342,000	17	\$610,584	\$33,952,584	\$1,257,635	\$26,000
5d	\$152,668,600	29	\$4,937,447	\$157,606,047	\$5,837,873	\$36,000
5j	\$8,685,700	9	\$79,049	\$8,764,749	\$324,654	\$18,000

Table 25: Cost and Benefit Comparison

Alternative	Description	Average Annualized Benefits	Total Average Annualized Costs	First Cost	Net Benefits
1	10% ACE Buyouts (20 Structures)	\$531,210	\$177,526	\$4,669,100	\$353,684
1.1	4% ACE Buyouts (26 Structures)	\$558,210	\$221,751	\$5,674,100	\$336,459
1.2	2% ACE Buyouts (66 Structures)	\$614,680	\$622,455	\$15,708,300	-\$7,775
1.3	1% ACE Buyouts (117 Structures)	\$654,780	\$925,294	\$23,028,400	-\$270,514
2	SC6	\$22,660	\$874,525	\$22,748,000	-\$851,865
4	Channelization	\$142,090	\$5,156,704	\$134,178,600	-\$5,014,614
5H	SC1, SC6LF	\$135,750	\$1,283,635	\$33,342,000	-\$1,147,885
5D	All Detention	\$160,540	\$5,873,873	\$152,668,600	-\$5,713,333
5J	SC1S	\$95,210	\$342,654	\$8,685,700	-\$247,444

Alternative 1 reasonably maximizes net benefits and is therefore the NED Plan.

3.6.4.1 Benefit Uncertainty Analysis

There is uncertainty in the benefits calculated to identify the NED Plan. The uncertainty is shown in Table 26 and also in Figure 13.

Table 26: Benefit Uncertainty Analysis

		Probability Net Benefits Exceeds Indicated Values (2018 price levels \$1000) given the Annual Cost						
Alternative		Equivalent Annual Damages Reduced (2018 prices \$1000)	0.75	0.50	0.25	Annual Costs (2018 price levels \$1000)	Mean Net Benefits (2018 price levels \$1,000)	
1		531	306	348	387	178	354	
1.1		558	277	330	382	222	336	
1.2		615	-101	-24	63	622	-8	
1.3		655	-390	-298	-182	925	-271	
2		23	-866	-854	-831	875	-852	
4		142	-5,033	-5,015	-4,970	5,157	-5,015	
5H		136	-1,186	-1,156	-1,095	1,284	-1,148	
5D		161	-5,764	-5,730	-5,655	5,874	-5,713	
5J		95	-279	-257	-218	344	-247	

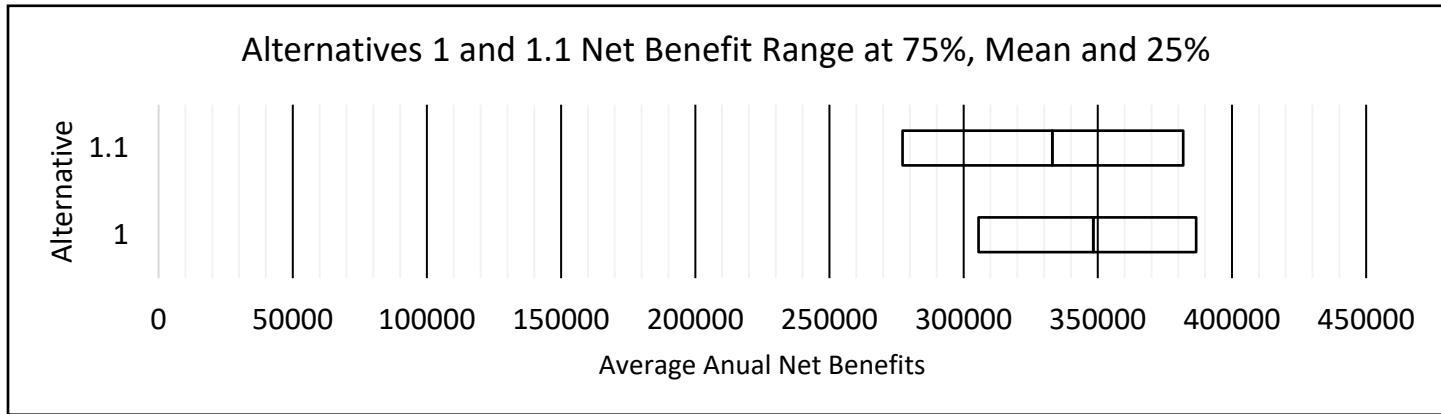


Figure 13: 1st and 3rd Quartile Uncertainty for Economically Justified Alternatives

The alternative with the lowest uncertainty is the 10% ACE buyouts and is an economically justified alternative. It also, has the highest possible net benefits at the 75%, 50%, and 25% likelihood of exceedance scenarios. This further supports the identification of Alternative 1.0 as the NED.

3.7 Initial Plan Selection

Alternative 1.0 is the NED Plan that reasonably maximizes net benefits. Further, of the two justified alternatives, Alternative 1.0 has the least uncertainty in benefits with the highest possible net benefits of all the plans. There is no critical infrastructure or life safety concerns addressed by Alternative 1.1 that is not also addressed by Alternative 1.0. Therefore Alternative 1.0, the buyout of structures with a lower first floor elevation than the 10% ACE event, is selected as the Initial Recommended Plan.

Cobb County, the NFS, supports Alternative 1.0 as the Initial Recommended Plan to address the flood risk problems in the area. The Cities of Powder Springs and Austell also support the Initial Recommended Plan implementation of the portions of the project that are inside their jurisdiction. No state or Federal agency has objected to the proposed plan, and the results of official coordination can be found in Section 6.1.

3.8 Four Accounts

According to the 1983 Principles and Guidelines the water resource development projects will display the effects of a plan in four areas or accounts. The accounts are the NED, Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE).

3.8.1 NED

As shown above in Section 3.6.4 the Initial Recommended Plan maximizes the NED. The Initial Recommended Plan has \$353,000 more average annual benefits than the NAA Plan.

Table 27: Recommended Plan benefits compared to NAA

Alternative	Description	Average Annualized Benefits	Total Average Annualized Costs	First Cost	Net Benefits
1	10% ACE Buyouts (20 Structures)	\$531,210	\$177,526	\$4,669,100	\$353,684
NAA	No Action	\$0	\$0	\$0	0\$

3.8.2 RED

The RED benefits are how the regional economy is affected by the implementation of the project. Changes to government spending drive the input-output model to project new levels of sales (output), value added measured in gross regional product (GRP), employment, and income for each industry. The specific input-output model used in this analysis is RECONS (Regional Economic System). The results of the RED analysis are shown in Table 28. For more detail on how the RED benefits were developed, see Appendix A.

Table 28: Overall Summary Economic Impacts for Alternative 1.0

Impact Areas		Regional	State	National
Impacts				
Total Spending		\$4,669,100	\$4,669,100	\$4,669,100
Direct Impact	Output	\$4,101,700	\$4,402,353	\$4,657,616
	Jobs	44.94	47.29	48.39
	Labor Income	\$2,579,389	\$2,820,892	\$2,905,916
	GRP	\$2,883,290	\$3,154,812	\$3,290,058
Total Impact	Output	\$8,251,357	\$8,948,577	\$12,667,531
	Jobs	78.39	84.46	103.5
	Labor Income	\$4,145,732	\$4,508,277	\$5,550,660
	GRP	\$5,539,748	\$6,029,838	\$7,856,420

3.8.3 EQ

More detail on environmental effects are in Section 5.0. A brief summary of the effects to EQ are contained in this section.

Threatened and endangered species are not anticipated to be adversely affected by the Initial Recommended Plan and there are no significant impacts to fish and wildlife resources. The Initial Recommended Plan will not impact Cultural Resources. A cultural resource survey will be performed during the Planning, Engineering, and Design (PED) phase. All listed HTRW were avoided; any potential sites will receive Phase II

analysis and, if needed, remediation before construction. Water quality certification and stream buffer variance will be acquired during PED. It is possible that the 10% ACE floodplain could be returned to a more natural state in the future.

3.8.4 OSE

The OSE for the area is that social vulnerability decreased and the community resiliency increased through less frequent structural flooding. Further, the plan does not cause disproportionate negative impacts to minority or low income populations.

3.9 Additional Analysis of the Initial Recommended Plan

The Initial Recommended Plan was further refined and developed to reduce uncertainty. The additional refinement would affect all relocation plans equally so it would not change the selection of the Recommended Plan or NED Plan. The first effort concentrated on confirming the structures that would be relocated. This analysis showed that of the 20 structures that comprised the Initial Recommended Plan, eight were physically located outside of the 1% ACE floodplain, in spite of having lower first floor elevations than the 10% ACE WSE. During that analysis the USACE found two structures that cannot accrue benefits according to Section 308 of the Water Resources Development Act (WRDA) 1990 (Public Law (PL) 101-640), as amended by Section 219 of WRDA 1999, and were removed because they were constructed or received a major renovation after July 1991. One structure was designed to be flooded, receiving no flood damages, and was removed. This left a total of nine structures in the refined plan, which included seven residential and two commercial structures on a total of 12.06 acres.

While confirming the relocations the USACE noted that the location of three of the relocations on Hopkins Road were adjacent to each other and provided enough space for a small municipal park. Further, another municipal park could be located on Clay Road at Olley Creek, upstream of Olley Creek's confluence with Sweetwater Creek where a relocation of two adjacent parcels occurs. The type of recreation provided would include hiking, walking, picnicking, canoeing, and kayaking. According to the data available in the Georgia SCORP, the recreation that could be provided still has unmet demand. A rough concept of each municipal park is shown in Figure 14 and Figure 15.

3.9.1 Refined Benefits

The refinement of the structures in the plan reduced the total benefits provided by the flood risk management portion of the project for all relocation alternatives equally as these structures were part of the other relocation plans. The recreation provided would also be similar for all the relocation alternatives so the benefits would be equally affected.

3.9.1.1 Flood Damages Reduced

Table 29 shows the reduction in annual flood damages resulting from refinements to the relocation list.

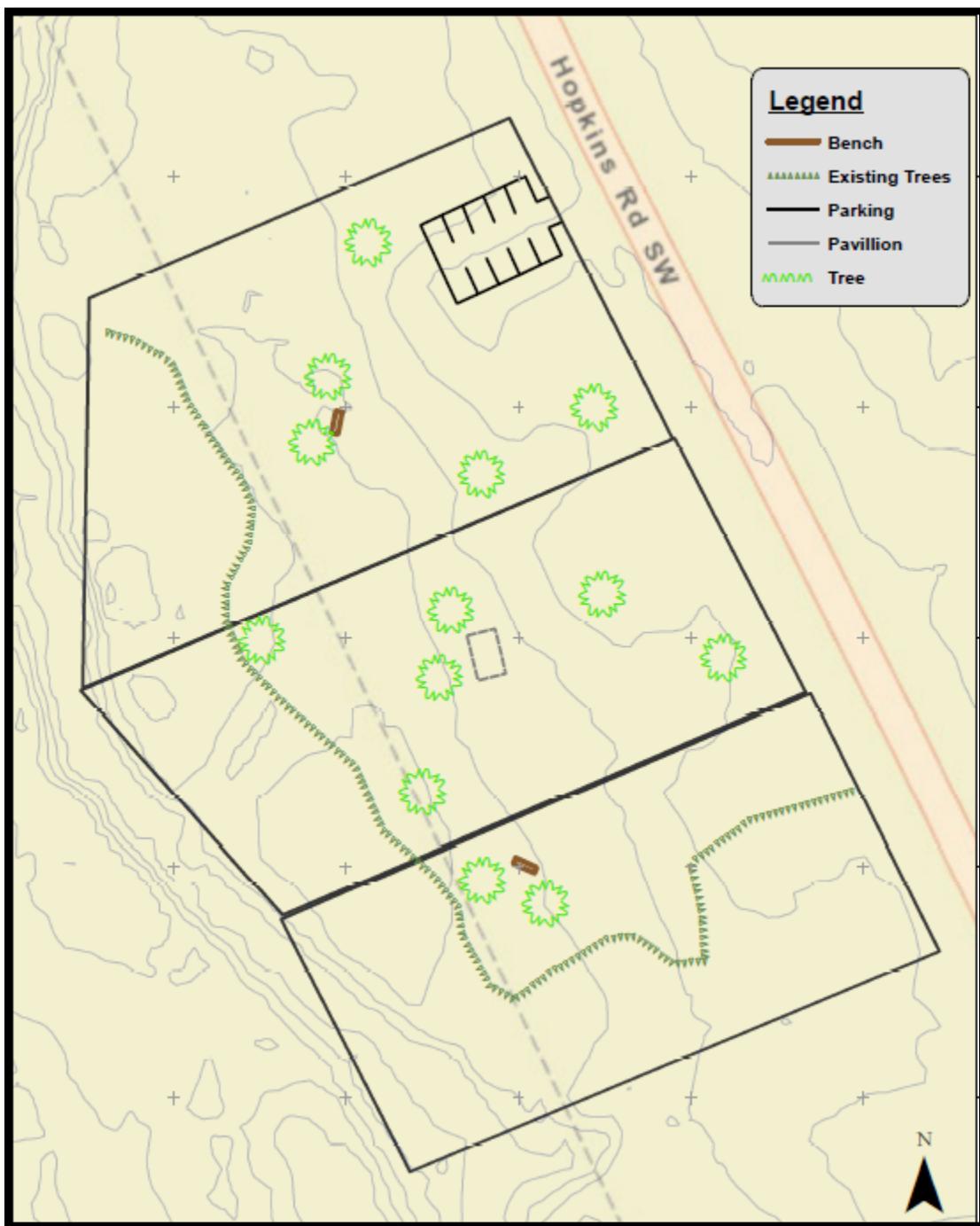


Figure 14: Recreational Concept Drawing for Park on Hopkins Road

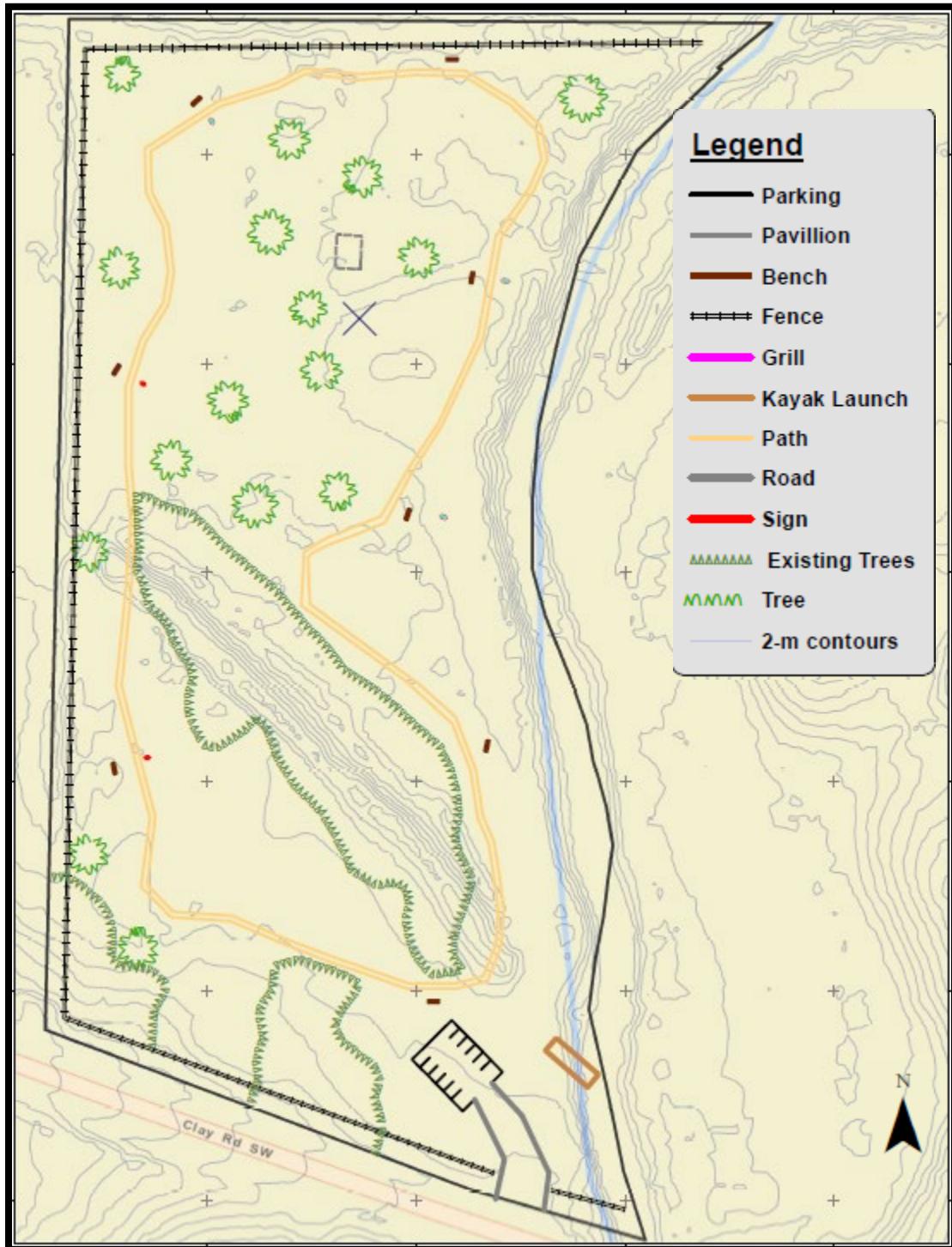


Figure 15: Recreational Concept Drawing for Park on Clay Road

Table 29: Revised Alternative Equivalent Annual Damages Reduced (x1000, FY18 Prices)

Study Reach	Econ Reach	Damage Category	NAA	Original Alt 1	Refined Alt. 1
Buttermilk Creek	Buttermilk Creek	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
Mill Creek	Mill Creek	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
Noses Creek	Mud Creek	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
	Noses Creek 1	Residential	\$0	\$9	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$9	\$0
	Noses Creek 2	Residential	\$0	\$190	\$31
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$190	\$31
Olley Creek	Olley Creek	Residential	\$0	\$7	\$8
		Nonresidential	\$0	\$4	\$4
		Total	\$0	\$12	\$12
Powder Springs Creek	Powder Springs Creek	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
Upper Sweetwater Creek	Sweetwater Creek 1	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
Middle Sweetwater Creek	Sweetwater Creek 2	Residential	\$0	\$264	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$264	\$0
Lower Sweetwater Creek	Sweetwater Creek 3	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$46	\$46
		Total	\$0	\$46	\$46
	Sweetwater Creek 4	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
	Sweetwater Creek 5	Residential	\$0	\$3	\$0
		Nonresidential	\$0	\$8	\$0
		Total	\$0	\$11	\$0
	Sweetwater Creek 6	Residential	\$0	\$0	\$0
		Nonresidential	\$0	\$0	\$0
		Total	\$0	\$0	\$0
	Total	Residential	\$0	\$473	\$39
		Nonresidential	\$0	\$58	\$50
		Total	\$0	\$531	\$89

3.9.1.2 Recreation Benefits

Recreation value is estimated in a manner consistent with ER 1105-2-100, Appendix E, Section VII, and Economic Guidance Memorandum # 18-03. Five basic steps are used to estimate recreation benefits: 1) estimate market size, 2) estimate market demand, 3) estimate unit day value, 4) estimate seasonal influence on demand, and 5) calculate annual demand based on expected seasonal use and demand satisfied by a new recreational facility. Table 30 shows the average annual visitation and benefits that the recreational features would be provide. For more details on how benefits were determined, see Appendix A.

Table 30: Visits and Recreation Benefits Summary

	Foot Travel (90%)	Picnic (78%)	Paddling (33%)	Total
Number of Visits (Annually)	5,812	5,037	2,131	12,981
Number of Visits (Average Daily)	16	14	6	36
Expected UDV of a Visit	\$5.40	\$5.40	\$7.17	
Expected Annual Willingness to pay (FY18 Prices)	\$31,364	\$27,182	\$15,272	\$73,818

3.9.2 Refined Costs

The reduction in structures in the relocation list caused the total cost of relocation and demolition to drop, while the recreation increases implementation and maintenance costs. The results of the gross appraisals discussed below would affect all alternatives proportionally.

3.9.2.1 Recreation Costs

The costs for recreation include the construction and maintenance of parking lots, walking trails, benches, grills, a kayak launch, and picnic pavilions. The total construction cost for recreation is approximately \$485,000 with an average annual maintenance cost of \$3,900.

3.9.2.2 Gross Appraisals and Relocation Costs

The gross appraisal of the nine structures in the Recommended Plan was higher than the tax data that was used as part of the previous iteration. That increased the costs of the relocation portion of the plan to approximately \$3,000,000, including real estate acquisition and legal, relocation, and demolition costs. More detail on the real estate acquisition and legal costs as well as relocation costs are found in Appendix D. More detail on the demolition costs are found in Appendix C.

3.9.3 Cost and Benefit Analysis

The cost and benefit analysis of the revisions to the Initial Recommended Plan are shown in Table 31.

Table 31: Revised Cost and Benefit Comparison

Alternative	Description	Average Annualized Benefits	Discount Rate	Average Annualized Costs	First Cost	Net Benefits
1	10 Year Buyouts (9 Structures)	\$89,390	2.75%	\$121,022	\$3,183,000	-\$31,632
Alt 1 @ FY2019 DR		\$89,350	2.875%	\$124,132	\$3,183,000	-\$34,782
1 (with Rec)	Buyouts with Recreation	\$163,208	2.75%	\$150,044	\$3,835,000	\$13,164
1 (with Rec) @ FY 2019 DR		\$163,168	2.875%	\$153,815	\$3,835,000	\$9,353

4.0 Final Recommended Plan

Alternative 1.0 with recreation is the NED Plan and the Recommended Plan. The feature consists of buying out structures whose first floor elevations are lower than the anticipated WSE of the 10% ACE floodplain. This totals nine structures throughout Cobb County, the City of Austell, and the City of Powder Springs.

The recreation portion of the plan includes a municipal park on Hopkins Road and a municipal park on Clay road (Figure 16). Construction of these municipal parks would include sodding, planting trees, using already disturbed footprints for proposed structures, building walking trails, and placing bat houses. There would be approximately 0.33 miles of walking trail at the Clay Road Park. Construction of the kayak launch would use approximately 10 cy of gravel to support a 12-foot wide concrete slab that extends into Olley Creek to a typical water depth of 2 feet.

4.1 Sites Required and Area of Effect

The nine structures in the 10% ACE buyout plan are on nine different parcels, and the two municipal parks will be constructed on five of the parcels. The parcels are found throughout the Sweetwater Creek Basin. A breakdown of the number of structures to be purchased as part of the relocation/evacuation of the 10% ACE floodplain are shown in Table 32. Of the structures identified in Table 32, a list of all parcels selected for relocation/evacuation in the study area and the associated naming convention, or Parcel ID, is included in Table 33 and detailed in Appendix D.



Figure 16: Conceptual Park Layouts for Recommended Plan

Table 32: Number of Structure in Recommended Plan by Reach

Reach	Number of Structures
Buttermilk Creek	0
Mill Creek	0
Noses Creek	0
Olley Creek	2
Powder Springs Creek	6
Upper Sweetwater Creek	0
Middle Sweetwater Creek	1
Lower Sweetwater Creek	0

Table 33: Recommended Plan Parcel IDs

Reach	Parcel ID	Structure Type
Sweetwater Creek	PID_SCa	Service Station
Powder Springs Creek	PID_PCa	Residence
	PID_PCb	Residence
	PID_PCc	Residence
	PID_PCd	Residence
	PID_PCe	Residence
	PID_P Cf	Residence
Olley Creek	PID_OCa	Residence
	PID_OCb	Auto Repair

4.2 Cost

The costs developed for the Recommended Plan included the cost to acquire all the structures and their parcels, relocation expenses for the residence or business proprietor, demolition costs for each of the structures, and construction of the two parks. The first costs for implementation of the Recommended Plan are \$3,835,000. For more detail on how costs were developed, see Appendix C.

4.3 Risk and Uncertainty

There is no risk of the Recommended Plan failing because the bought out structures will no longer be within any floodplain. There is residual flood risk in the study area that will not be reduced, which is represented by the expected average annual damages for the study area. Those damages are \$1,075,000 of the approximately \$1,165,000 of damages in the NAA, or a residual risk of 92% of the damages.

4.3.1 Real Estate

Quantifying Real Estate planning risks is inherently challenging by virtue of the degree of variability associated with land acquisitions, unknown potential for landowner opposition, fluctuations in Fair Market Value for the cost of acquiring real estate,

negotiation breakdowns, and other unforeseen issues which may develop in the course of relocating families and businesses. Risk analysis has been incorporated throughout the study by virtue of due consideration and incorporation of the requirements of PL 91-646, 49 C.F.R. Part 24, and ER 405-1-12 in addition to public outreach commensurate with current stage of the study, and research as to the availability of replacement dwellings. The gross appraisal report is designed to refine real estate values to a level of certainty sufficient for the purpose of facilitating the decision-making process for USACE feasibility studies. A moderate level of contingency has been incorporated into the cost analysis to capture those elements of risk which are not easily quantifiable.

After some coordination with the local public and the owners of the properties, it has been concluded that the property owners would be willing to sell their parcels and structures when implementation begins. The NFS will be responsible for undertaking any investigations to identify the existence and extent of any hazardous substances.

4.3.2 Hydrology and Hydraulics

The physical factors that contribute to uncertainty in the parameterization of the hydrologic (HEC-HMS) and hydraulic (HEC-RAS) models are outlined in this section. The characteristics of the stream bed and banks can determine the likelihood that a chosen roughness coefficient will be representative for the duration of the analyses period and can suggest the probable stability of the stream bed during major flood events. Likewise, seasonal changes in the character of vegetation, and the presence of debris at bridges, for example, can have an impact on selection of a Mannings n-value for both the stream and overbanks. Tall grasses may present high roughness initially in a mid-summer flood, but may be laid down due to the stress of a long-lasting event. On the other hand, dense trees and shrubs are likely to maintain a constant roughness function. This uncertainty in the Mannings n-value can affect the timing and the peak stage of the floodwave throughout the model.

Another factor that may affect the accuracy of computed water surface profiles is the source of data that describes bridge and channel characteristics. Field surveys of channel cross-sections are more likely to provide more reliable flow lines than those that may be generated from 2-foot contours on a large-scale map or cross sections collected from older FEMA flood models. In many cases an error in top of bank elevation of ± 2 feet can produce like errors in the water surface calculations at any particular location in small streams, particularly where there is a small difference in elevation between the 5-year and 500-year floods. Adequate description of bridge features can have a major impact on the successful modeling of bridge losses and supercritical flow as well.

When stage-discharge observations are available, the duration of observations and the relative stability of the channel slope and bed can influence the confidence applied to a HEC-HMS or HEC-RAS model of the watershed. The occurrence of multiple gaging sites in a study area can increase the comfort level of the modeler, particularly if the data is corroborative of several major events. However, there is still significant uncertainty in the long-term future stability of the stage-discharge relationship. Factors that may reduce the level of confidence are evidence of looping in the stage-discharge data or scour and erosion in the channel reach under study.

Land use is also a major uncertainty when addressing future conditions. There is a number of data sources projecting land use on national down to local scales. However, there is still a large amount of uncertainty in practically forecasting land use in 30 to 50 years. This could have a substantial effect on the rainfall-runoff relationship used to develop frequency flows in a HEC-HMS model.

5.0 Environmental Consequences

The direct and indirect impacts to resources listed below were evaluated for those alternatives that can be implemented under current USACE policies and regulations; therefore, this section will evaluate impacts as they relate to the Recommended Plan.

As shown in Figure 17 the buyout of structures within the 10% ACE floodplain comprises a small portion of the entire study area. As such, the potential for adverse environmental impacts are minimal. Table 34 lists the effects of the Recommended Plan on all environmental resources evaluated within Section 2.0. For details on the no action alternative see Section 2.0 of this document.

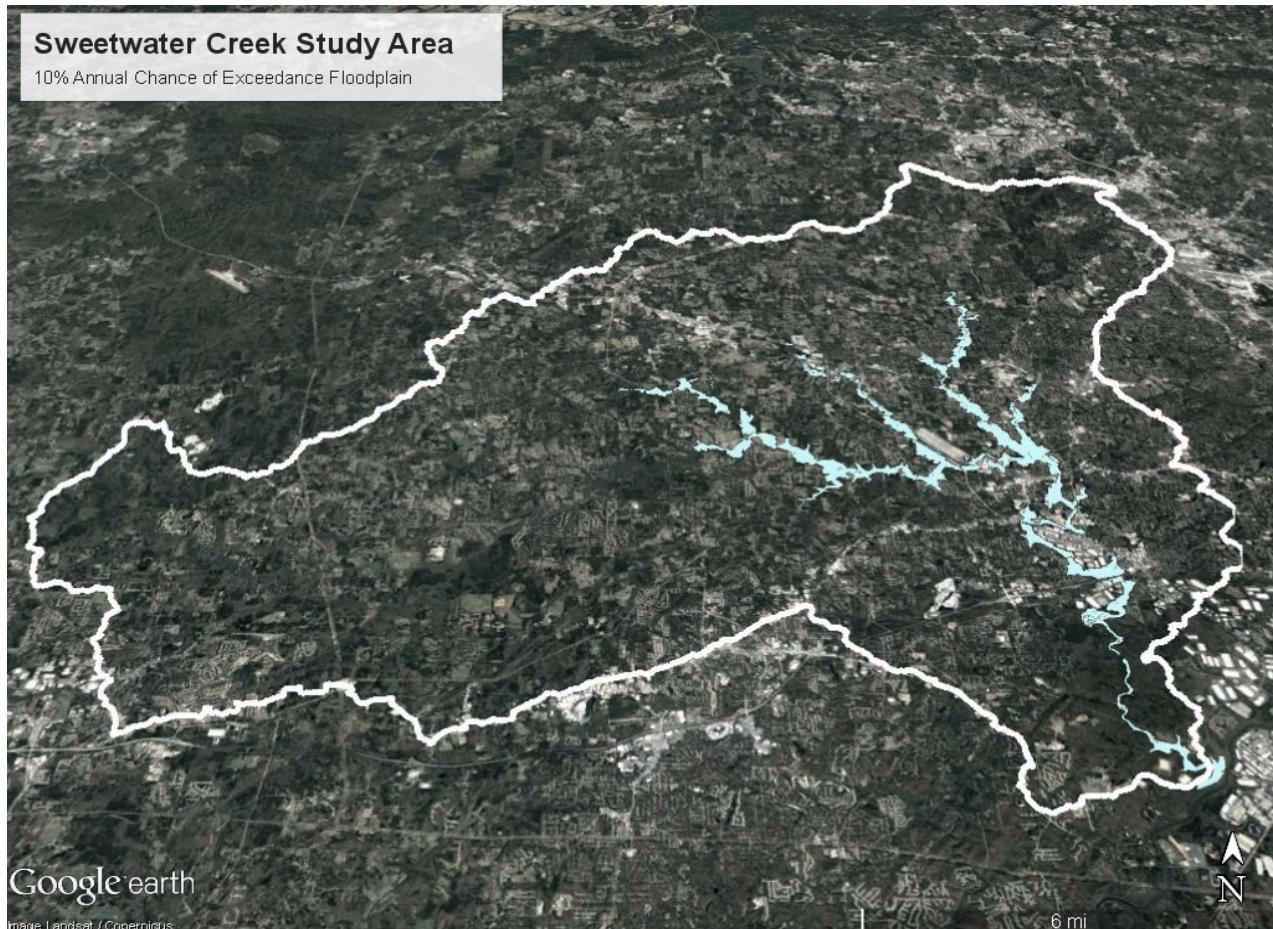


Figure 17: Recommended Plan Floodplain Extent in Sweetwater Creek Basin

Table 34: Environmental Impacts Summary

Resource		Impact	
Section	Sub-section	No Action	Recommended Action
Topography, Geology and Soils		NE	NE
Air Quality		NE	NE
Land Use		NE	NE
Water Resources		-	-
	<i>Sweetwater Creek and Tributaries</i>	NE	NE
	<i>Surface Water Quality</i>	NE	NE
	<i>Groundwater</i>	NE	NE
Biological Resources		-	-
	<i>Vegetation</i>	NE	PB
	<i>Fish and Wildlife</i>	NE	PB
	<i>Wetlands</i>	NE	NE
	<i>Special Species</i>	NE	NE
	<i>Wildlife Corridors</i>	NE	PB
Cultural Resources		NE	NE
Sociological Resources		-	-
	<i>Flooding and Flood Damages</i>	NE	PB
	<i>HTRW</i>	NE	NE
	<i>Noise</i>	NE	NE
	<i>Aesthetic</i>	NE	PB
	<i>Navigation</i>	NE	NE
	<i>Socioeconomics</i>	AE	PB
	<i>Public Safety</i>	AE	PB
	<i>Recreation</i>	AE	PB

Key 1: NE = No Effect; AE = Adverse Effect; PB = Positive Benefit

5.1 General Environmental Setting

5.1.1 Topography, Geology, and Soils

Of the entire study area, only nine parcels would experience surface disturbance. Common construction practices for structural buildings involve the use of red clay to set structural foundations. Because the Recommended Plan involves the demolition of existing structures, it is assumed that no unique topography, geology, or soils exist within the footprint of each location. Each structure would be demolished and the footprint of each site would be re-graded to match surrounding terrain.

As part of the Recommended Plan, two separate municipal recreation parks would be constructed following removal of the existing structures spanning a total of five parcels. In total, approximately 22,227 square feet (sq ft) of disturbed area and 855 cy of disturbed volume would occur during the construction of the parks including disturbances within the stream buffer zone as detailed further in Section 5.1.4.2 Surface Water Quality. See Table 35 for the specific locations where construction would occur.

Table 35: Parcels Comprising Recreation Locations

Reach	Parcel ID	Structure Type
Powder Springs Creek	PID_PCa	Residence
	PID_PCb	Residence
	PID_PCc	Residence
Olley Creek	PID_OCa	Residence
	PID_OCb	Auto Repair

Construction of the parks would involve minor grading for parking lots, trail paths, and amenities. Best Management Practices (BMPs) would minimize soil runoff. These direct and indirect impacts to the immediate surrounding would be minor. Because the identified recreation parcels occupy a small percentage of the entire study area and the parcels previously were developed, no significant adverse impacts to the topography, geology, or soils are anticipated as a result of the Recommended Plan.

5.1.2 Air Quality and Greenhouse Gases

The potential for existing structures to contain hazardous materials is moderate. The oldest of the nine structures in the Recommended Plan dates to 1942. All existing structures would be inspected for the presence of asbestos, toxic mold, and other environmental hazards that could impact air quality as a result of demolition. Should any existing structures contain toxic materials, licensed contractors from the State of Georgia would remove the materials consistent with USEPA and Occupational Safety and Health Administration (OSHA) guidelines.

Demolition and construction activities would contribute to a localized temporary increase in dust particles within the immediate vicinity of the parcels. All demolition and construction activities would be in accordance with BMPs to minimize and contain small particles. Equipment used for demolition and construction would be in accordance with state standards. Equipment emissions during implementation would be minor and localized.

Upon completion of all activities, any localized minor increases in dust or emissions would revert to pre-demolition levels. Therefore, the Recommended Plan would have no significant direct or indirect effects on air quality within the immediate or surrounding environment.

5.1.3 Land Use

The Recommended Plan would result in the conversion of four parcels located within the 10% ACE floodplain in Cobb County, Georgia, shown in Figure 17, from residential use to vacant use, and five parcels from residential to recreational use. As shown in Figure 5, the locations of these structures lie within low to medium intensity developed areas. Of the entire study area, the parcels identified in the Recommended Plan occupy a small percentage of land. Therefore, the conversion of each parcel would not

significantly impact immediate or surrounding land use of the study area through direct or indirect impacts.

5.1.4 Water Resources

5.1.4.1 Sweetwater Creek and Tributaries

An increase in impervious surface and developed land has the ability to modify stream flow which results in increased peak flows and stream flashiness. The Recommended Plan would not increase the amount of impervious surface within the watershed. BMPs would be used to minimize and contain runoff resulting from demolition and construction activities at all parcels. Therefore, direct and indirect impacts to the immediate water resources are anticipated to be minor and temporary.

5.1.4.2 Surface Water Quality

Table 36 lists parcels adjacent to the USEPA 303(d) listed streams identified in Section 2.5.2 Surface Water Quality. Prior to demolition a National Pollutant Discharge Elimination System (NPDES) stormwater permit would be obtained. All demolition and construction activities would incorporate BMPs to minimize and contain runoff. Construction of the kayak launch would not contribute to the existing causes for impairment of the 303(d) listed stream.

Both the GEPD 25-foot stream buffer zone and the Cobb County 100-foot buffer zone are applicable and would require separate stream buffer variance requests. Aerial examination of all parcels show existing structure locations well beyond the maximum GEPD stream buffer zone; therefore, no demolition would occur within the GEPD 25-foot stream buffer zone. Demolition at parcels PID_PCa, PID_PCb, and PID_PCc would occur within the Cobb County 100-foot buffer zone as each of the structures are partially located inside the buffer zone. Of the five recreation parcels PID_PCa, PID_PCb, PID_PCc, PID_OC a, and PID_OCb, construction within the GEPD 25-foot stream buffer zone would occur at parcel PID_OCb for activities related to the kayak launch and road access totaling approximately 5,502 sq ft of disturbed area.

Construction within the Cobb County 100-foot buffer zone would occur at all five recreation parcels and would total approximately 21,934 sq ft of disturbed area at the small municipal park on Hopkins Road and 66,495 sq ft of disturbed area at the large municipal park on Clay Road. A Draft 404(b)(1) evaluation has been prepared and is included in Appendix F.

The appropriate stream buffer variances and water quality certification would be obtained prior to implementation (Appendix F). Therefore, direct and indirect impacts to surface-water quality within the immediate and general surroundings are anticipated to be minor and temporary.

**Table 36: Recommended Plan Identified Properties
and nearby USEPA 303(d) Listed Waterbodies**

Reach	Parcel ID	Structure Type	Nearby 303(d) Reach ID
Olley Creek	PID_OC _a	Residence	R031300020204
	PID_OC _b	Auto Repair	R031300020204

5.1.4.3 Groundwater

No seepage would occur as a result of the Recommended Plan; therefore, no effects to groundwater would occur either directly or indirectly.

5.1.5 Biological Resources

5.1.5.1 Vegetation

Demolition of existing structures within the four non-recreation parcels would not result in vegetation removal; however, construction activities within the five recreation parcels would involve approximately 22,277 sq ft of ground disturbance, including the removal of vegetation. Following demolition and construction, locally sourced native seed would be used to prevent further runoff. Native tree species would be planted within the five recreation parcels for environmental and aesthetic purposes. In accordance with *Executive Order (EO) 13112 Safeguarding the Nation from the Impacts of Invasive Species* the areas selected for evacuation/relocation incentives will reseed each site with native species. The further prevention of invasive species growth will be realized through the existing Cobb County property maintenance program once the project is turned over to the NFS.

Therefore, direct adverse impacts would occur as a result of ground disturbance for parking lots, trails, and amenities at the five recreation parcels; however, those impacts would be mitigated through the sodding of native grasses and planting of native tree plantings as well. Indirect long-term benefits may occur as a result of the Recommended Plan through establishment of a more natural floodplain within the four non-recreation parcels. Each location may experience the regrowth of forested habitat after years of vacancy. Therefore, the Recommended Plan may result in direct and indirect beneficial impacts to vegetation within the nine parcels as well as in the adjacent area.

5.1.5.2 Fish and Wildlife Resources

Each existing structure identified for demolition currently is inhabited. It is assumed that each structure is devoid of wildlife infestation, such as bats or rodents. Prior to demolition, each structure would be inspected. Should inspection show signs of wildlife infestation, measures will be taken to safely remove the creatures.

The Recommended Plan would result in the conversion of residential structures to four vacant lots and two recreational parks which may benefit local wildlife species in the long-term. Years of vacancy at the four non-recreation parcels may result in a reestablishment of forested habitat suitable for native species within the area. Inclusion of native tree plantings and bat houses would provide additional resources to the

surrounding wildlife. Therefore, the Recommended Plan may result in indirect beneficial impacts to fish and wildlife resources within the immediate vicinity of the parcels and the general surrounding of the study area.

5.1.5.3 Waters of the U.S. Including Wetlands

Prior to demolition each parcel identified for buyout will be surveyed by a qualified wetland biologist to delineate any jurisdictional wetlands that may exist within the demolition and construction radius. Demolition and construction crews would be instructed to avoid staging or access activities within delineated wetland areas. Additionally, BMPs would be used to minimize and contain runoff from entering any potential nearby wetland. Therefore, the Recommended Plan would not result in direct or indirect negative impacts to waters of the U.S., including wetlands within either immediate or general surroundings.

5.1.5.4 Special Status Species

5.1.5.4.1 *Endangered Species Act*

No direct or indirect impacts to Federally-protected species would result from the Recommended Plan. No designated critical habitat for Federally-listed threatened or endangered species exists within the identified parcels for buyout. Each structure would be inspected for the presence of any wildlife, including Federally-listed bats, prior to demolition; however, none of the structures are uninhabited and, therefore, listed species are not expected to be present within the parcels for the Recommended Plan. No indirect disturbances through a temporary increase in noise levels as a result of demolition activities are anticipated to affect any Federally-protected threatened or endangered species that might be present within each parcel.

5.1.5.4.2 *Migratory Bird Treaty Act*

The nine parcels are situated in moderately developed portions of the study area. Any migratory birds present within the nine parcels would most likely occupy areas of least disturbance. No direct impacts to migratory bird suitable habitat would occur as a result of the Recommended Plan. Demolition and construction may result in localized and temporary noise level increases; however, these increases would be minor and would revert to pre-demolition levels upon completion. Therefore, the Recommended Plan would have no significant impact on any migratory bird within the study area.

5.1.5.4.3 *Bald and Golden Eagle Protection Act*

Only one Bald Eagle nest is located within the study area and it is within the Sweetwater Creek State Park; therefore, no parcels are located within the buffer zones of active or inactive eagle nests. No impacts would occur as a result of noise interference. Therefore, the Recommended Plan would have no direct or indirect effects on bald or golden eagles within the study area.

5.1.5.5 Wildlife Corridors

The identified parcels currently exhibit habitat fragmentation through the yard maintenance practices of the homeowners. Conversion of the structures to vacant lots and recreation parks may benefit wildlife corridors by allowing the regeneration of vegetation throughout each area. Tree regrowth would connect fragmented habitats between the parcels and surrounding habitats. Therefore, the Recommended Plan would have no significant direct adverse impacts on wildlife corridors, but may indirectly benefit wildlife corridors within the immediate and general surrounding area.

5.1.6 Cultural Resources

5.1.6.1 Cultural Resource Identification

Mobile District conducted a thorough search of the existing records for prehistoric and historic use of the area of potential effect (APE), which is a fully developed residential and business area with listings on the National Register of Historic Places (NRHP), including historic properties listed on or eligible for the NRHP, Georgia's Natural, Archaeological, and Historic Resources GIS, and previous project and cultural resources on file at the Mobile District Office. Additional investigation included visual inspections of locations, photographs of locations, familiarity with the residences and businesses in southern Cobb County, public meetings, and coordination with the SHPO. Based on these investigations, there is only one structure older than fifty years that will be affected by the Recommended Plan, and it has undergone modern renovations and is currently occupied as a residence. No other structures were constructed before 1972. There are previously recorded archaeological sites within a mile of each plan alternative and within a mile of each of the parcel locations identified in the Recommended Plan, but none are located on the parcels affected by the Recommended Plan. Consequently, the USACE concludes there will be no adverse effects to cultural resources.

The USACE informed the SHPO that it will conduct further work (that is, a historic resources survey of the one property that is over fifty years old and any additional structures coordinated with the SHPO) and an archaeological survey of the demolition area. Any additional information that is obtained will be coordinated with the Georgia SHPO and any interested Federally Recognized Indian Tribes. If any cultural resources eligible for listing on the NRHP are identified as a result of the further surveys and in consultation with the SHPO and Tribes, a Memorandum of Agreement (MOA) will be developed to mitigate adverse effects on historic properties.

5.1.7 Social and Economic Resources

5.1.7.1 Flooding and Flood Damages

The Recommended Plan would result in the removal of structures affected by flooding within Cobb County, which reduces the quantity of structures experiencing flood damages. Therefore, the Recommended Plan would reduce flood damages within the study area.

5.1.7.2 Hazardous, Toxic, and Radioactive Waste

The Recommended Plan would not result in the introduction or spread of HTRW related contaminants within the study area. Table 37 lists the properties with identified RECs and shows the age of each structure.

Table 37: Recommended Plan Identified Properties and Age of Structures

Reach	Parcel ID	Structure Type	Year Built*
Sweetwater Creek	PID_SCa	Service Station	1945
Powder Springs Creek	PID_PCa	Residence	1973
	PID_PCb	Residence	1973
	PID_PCc	Residence	1973
	PID_PCd	Residence	1973
	PID_PCe	Residence	1973
	PID_P Cf	Residence	1984
Olley Creek	PID_OCa	Residence	1971
	PID_OCb	Auto Repair	1971

*based on tax data

Of the nine properties, two properties with RECs were identified in the initial review. The property within PID_SCa appears to be an abandoned service station which is adjacent to a former auto salvage business. The concern for such a property would primarily be improperly abandoned underground fuel storage tanks or improperly disposed of waste oil products, which could lead to soil and/or groundwater contamination.

The property within PID_OCb is within the Olley Creek reach and appears to house a home auto repair/salvage business on the back/northern portion of the property. This property was not identified by the environmental database search, but was identified during the inspection of potential buyout properties. The concern for this property would primarily be improper disposal of waste oil products.

Each site was further inspected for the presence of HTRW substances during a Supplemental Phase I Environmental Site Assessment (Appendix E). The resulting inspections showed that a Phase II HTRW assessment is necessary. Should Phase II reveal contamination, Cobb County would remediate any harmful substances. USACE would reimburse Cobb County, the Federal portion of project costs, solely for property purchase once an inspection following remediation procedures shows no contamination.

The remaining seven residential structures would be inspected prior to demolition for signs of lead-based paint, asbestos, toxic mold, or other harmful substances.

Structures built prior to 1978 have a higher likelihood of containing lead-based paint, asbestos, toxic mold, or other harmful substances. Furthermore, houses built between 1930 and 1950 may have asbestos as insulation; its use was banned in 1977. The removal of harmful substances would be accomplished through state licensed contractors and would abide by USEPA and OSHA requirements.

Considering the above mitigation measures, the Recommended Plan is likely to have no direct or indirect adverse effects on the immediate and general surrounding as a result of HTRW.

5.1.7.3 Noise

The nine parcels identified for buyouts within the 10% ACE floodplain identified in Figure 17 are located in low to moderate intensity developed portions of the study area as shown in Figure 5. These areas experience relatively low to moderate ambient noise levels compared to heavily urbanized cities. Localized and temporary increases in noise levels would occur as a direct result of demolition and construction equipment and activities. These increases would be minor and would revert to pre-demolition/construction levels upon completion.

The addition of two municipal parks would provide increased pedestrian and vehicle traffic for the five recreation parcels. The increased noise is anticipated to be minor as the design of the parks would meet the needs for leisurely outdoor enjoyment. The anticipated impacts would be a minor increase from the existing noise traffic experienced on a regular basis within the parcels. Therefore, the Recommended Plan would not significantly affect ambient noise levels.

5.1.7.4 Aesthetic

Following removal of structures at the four non-recreation parcels, immediate direct effects of the Recommended Plan would result in vacant and barren appearances at each site. Aesthetics would improve upon the establishment of the seeded areas. Long-term indirect benefits may occur as the establishment of vegetation changes to a more natural floodplain. The remaining five recreation parcels would be converted into municipal parks and would be designed for community connectivity and cohesion. Therefore, the Recommended Plan would result in beneficial improvements.

5.1.7.5 Navigation

No activities would occur within or near commercial navigable waterways as a result of the Recommended Plan. Therefore, no effects to commercial navigation would occur either directly or indirectly.

5.1.7.6 Socioeconomics

Socioeconomics of the study area would experience an increased benefit as a result of the Recommended Plan. Homeowners experiencing frequent flooding would directly benefit from relocation incentives which would provide homeowners with the opportunity to move to less flood prone areas. The addition of two municipal parks within the study area would benefit the local surrounding area of the affected parcels by providing increased recreational benefits. Indirectly, the entire study area would benefit from local economic stimulus as a result of increased job opportunities for local contractors and businesses as evidenced by the RED model in Appendix A. Therefore, there would be an increased benefit as a result of the Recommended Plan.

5.1.7.7 Public Safety

Increased public safety would occur through the buyout of each parcel. Local emergency operatives would indirectly benefit by the removed hazardous threat of accessing those parcels during frequent flooding events. Relocated homeowners and families would directly benefit physically and emotionally by moving to less flood prone areas. Therefore, the Recommended Plan would result in an increased benefit to the study area.

5.1.7.8 Recreation

The Recommended Plan would involve the addition of two municipal park within the study area which is consistent with Georgia's SCORP for years 2017 through 2021. Though the study area is not located within the Georgia Water Trails Network, the addition of a kayak launch within PID_OCb in the Olley Creek reach would provide increased access to the preliminary Middle Chattahoochee River Water Trail of the Georgia River Network. It would also allow for an easy expansion of the water trail network in the future. Therefore, the Recommended Plan would have minor increased benefits to the immediate and surrounding study area.

5.2 Cumulative Impacts

Cumulative impacts analysis considers the potential environmental consequences resulting from "the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 C.F.R. 1508.7). USACE guidance in considering cumulative impacts affirms this requirement, stating that the first steps in assessing cumulative impacts involve defining the scope of the other actions and their interrelationship with a proposed action. The scope must consider other projects that coincide with the location and timetable of a proposed action and other actions. Cumulative impacts analyses must also evaluate the nature of interactions among these actions.

The scope of the cumulative impacts analysis involves both timeframe and geographic extent in which impacts could be expected to occur and a description of what resources could be cumulatively affected. For the purposes of this analysis, the geographic area for consideration of cumulative impacts is the Sweetwater Creek Watershed.

Cobb County has conducted buyouts of residences and commercial buildings for several years. Numerous structures were removed from the 10% ACE, otherwise known as the 10-year floodplain. The majority of the previous buyouts were with FEMA assistance. As a result of the Cobb County implemented buyout plan, the Sweetwater Creek FRM study has only identified nine structures for buyouts at the 10% ACE. With the inclusion of the Recommended Plan and the continued floodplain management by Cobb County, the resulting cumulative impacts would support a long-term restoration of the 10% ACE floodplain hydrology, thus proving beneficial to the surrounding environment.

5.3 Environmental Justice (Executive Order 12898)

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* dated February 11, 1994 directs all Federal agencies to determine whether a proposed action would have a disproportionately high and adverse impact on minority and/or low-income populations.

The Recommended Plan would not cause any disproportionately high and adverse impacts on minority or low-income populations associated with the proposed action.

5.4 Protection of Children (Executive Order 13045)

Executive Order 13045, The Protection of Children from Environmental Health Risks and Safety Risks, was issued April 23, 1997. Executive Order 13045 applies to significant regulatory actions that concern an environmental health or safety risk that could disproportionately adversely affect children. Environmental health risks or safety risks refer to risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest.

The proposed action will not adversely impact the health and safety of children, and, instead, will provide a positive benefit to children. Barriers, site workman and other measures would be implemented during demolition and construction to ensure protection to non-project workers, including children.

5.5 17 Points of Environmental Quality

As required by NEPA, environmental quality categories of impacts were reviewed and considered in arriving at the final determination. As laid out in Table 15, the following categories were considered: noise, displacement of people, aesthetic values, community cohesion, desirable community growth, tax revenues, property values, public facilities, public services, desirable regional growth, employment, business and industrial activity, displacement of farms, man-made resources, natural resources, air and water. Long-term significant adverse impacts from the Recommended Plan to these identified points are not expected. Temporary minor, adverse impacts from constructions activities would occur on some categories (Table 38).

Table 38: 17 Points of Environmental Quality Effects Considered

Points of Environmental Quality	Recommended Plan Effects
Noise	minor, temporary negative
Displacement of people	Minor negative
Aesthetic values	Potential benefit
Community cohesion	no effect
Desirable community growth	no effect
Tax revenues	no effect
Property values	no effect
Public facilities	Potential benefit
Public services	benefit

Desirable regional growth	potential benefit
Employment	no effect
Business and industrial activity	beneficial effect
Displacement of farms	no effect
Man-made resources	no effect
Natural resources	potential benefit*
Air	minor, temporary negative
Water	no effect

*prevention of invasive species growth through planting and maintenance of native species

6.0 Environmental Compliance

Federal laws and EO's applicable to the USACE Recommended Plan, their applicability to the proposed project, and, if applicable, their status is presented in Table 39 below.

The Recommended Plan is in compliance with NEPA.

Table 39: Public Law Environmental Compliance Status

STATUS	PUBLIC LAW (US CODE)/EXECUTIVE ORDER
C	Archeological and Historic Preservation Act of 1974, as amended (54 U.S.C. 312)
C	Bald and Golden Eagle Protection Act (16 U.S.C. § 668 et seq)
C	Clean Air Act of 1972, as amended (42 U.S.C. 7401 et seq)
C	Clean Water Act of 1972, As Amended (33 U.S.C. 1251 et seq)
P	Federal Water Pollution Control Act of 1972, as amended (33 U.S.C. 1251 et seq)
N/A	Comprehensive Environmental Response, Compensation & Liability Act of 1980 (42 U.S.C. 9601)
C	Endangered Species Act of 1972 (16 U.S.C. 1531)
C	EO 11988, Floodplain Management
C	EO 12898, Environmental Justice
C	EO 13045, Protection of Children
C	Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661)
N/A	Flood Control Act of 1944, as amended, Section 4 (16 U.S.C. 460b)
N/A	Historic and Archeological Data Preservation (16 U.S.C. 469)
C	Historic Sites Act of 1935 (16 U.S.C. 461) Note: Superseded by NHPA, Section 106
N/A	Migratory Bird Conservation Act of 1928, as amended (16 U.S.C. 715)
C	Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703)
P	NEPA of 1969, as amended (42 U.S.C. 4321 et seq)
P	National Historic Preservation Act Amendments of 1980 (16 U.S.C. 469a)
N/A	Native American Religious Freedom Act of 1978 (42 U.S.C. 1996)
N/A	Native American Graves Protection and Repatriation Act (25 U.S.C. 3001)
N/A	National Trails System Act (16 U.S.C. 1241)
N/A	Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq)
N/A	Rehabilitation Act of 1973 (29 U.S.C. 794)
N/A	Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901-6987)

N/A	River and Harbor Act of 1888, Section 11 (33 U.S.C. 608)
N/A	River and Harbor Act of 1899, Sections 9, 10, 13 (33 U.S.C. 401-413)
N/A	River and Harbor and Flood Control Act of 1962, Section 207 (16 U.S.C. 460)
C	River and Harbor and Flood Control Act of 1970, Sects 122, 209 and 216 (33 U.S.C. 426 et seq)
N/A	Submerged Lands Act of 1953 (43 U.S.C. 1301 et seq)
N/A	Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601)
N/A	Toxic Substances Control Act of 1976 (15 U.S.C. 2601)
N/A	Wild and Scenic River Act of 1968 (16 U.S.C. 1271 et seq)

Key: N/A = Non-applicable; C = In compliance; P = Compliance pending

6.1 Coordination

This feasibility study was coordinated with the public, USFWS Athens Field Office, Georgia SHPO, and Federally Recognized Tribes. Cooperating agency letters dated December 20, 2017 were mailed to affected state and Federal agencies and are included in Appendix F. Electronic correspondence for participation of the USACE Recommended Plan Milestone Meeting was submitted to each agency identified in Table 40.

Table 40: Coordination

Federal	State
Department of Interior	Georgia Department of Natural Resources
Department of Interior Atlanta Region	Georgia Department of Natural Resources Environmental Protection Division
Environmental Protection Agency Region 4	Georgia Department of Natural Resources Wildlife Resources Division
Federal Emergency Management Agency Region 4	Georgia Department of Public Safety
U.S. Fish and Wildlife Service Athens Field Office	Georgia Department of Transportation
U.S. Fish and Wildlife Service Southeast Region	Georgia Emergency Management Agency
U.S. Geological Survey Southeast Region	Georgia Secretary of State
	Georgia Soil and Water Conservation Commission

6.1.1 Fish and Wildlife Coordination Act

According to the *Water Resources Development Under the Fish and Wildlife Coordination Act* (FWCA) report dated November 2004, “The FWCA provides a basic procedural framework for the orderly consideration of fish and wildlife conservation and enhancement measures in Federally constructed, permitted, or licensed water development projects. The FWCA provides that, whenever any water body is proposed to be controlled or modified “for any purpose whatever” by a Federal agency or by any “public or private agency” under a Federal permit or license, the action agency is required first to consult with the wildlife agencies, “with a view to the conservation of fish and wildlife resources in connection with that project.”

The Sweetwater Creek FRM Feasibility Study is considered a Federal project for the purpose of evaluating the manipulation of a body of water. USACE coordinated closely with the USFWS Athens Field Office regarding the study and subsequent development of the Fish and Wildlife Coordination Act Report (FWCAR), Appendix F.

FWCAR Recommendation:

"The anticipated cost of the proposed buyout/demolition of 20 structures in the Sweetwater Creek basin's floodplain is \$4,858,864, a large portion of which will be Federal share cost. The Corps' March 2018 Sweetwater Creek Flood Risk Management Study Integrated Feasibility Report and Environmental Assessment estimates that another 213 residential structures will be constructed in the Sweetwater Creek basin's floodplain by 2050, an almost 13% increase over the number of structures currently in the floodplain. We strongly recommend that, contingent on receiving providing this large sum of Federal money, Cobb County, at a minimum, require future development in the floodplain, including structures and utilities, be elevated to 1 foot above the 500-year flood level."

FWCAR Summary and Service Position:

"With implementation of the conservation measures above, the project is not likely to adversely affect fish and wildlife resources and may provide limited benefit to downstream aquatic resources."

6.1.1.1 USACE Position

While the recommendation of limiting future development to at least 1-foot above the 500-year flood event is a good floodplain management practice, the USACE does not have authority to require or enforce such a regulation. The recommendation has been shared with Cobb County for its consideration and any decision regarding rules that limit future development in the floodplain.

6.1.2 Public Involvement

A charette was held on June 13, 2016 in Marietta, Cobb County, Georgia to gain information about the problems and opportunities within the study area. Two additional public meetings were held on April 9th and 10th of 2018 within Powder Springs, Georgia and near the City of Austell, Cobb County, Georgia where the PDT updated attendees on the study progress. For each public meeting, attendance reached approximately 30-45 various members of the public, Federal, and state agencies. At the public meeting held in early April the public was asked to provide any address that they knew had flooded in recent years. All addresses provided were outside the 10% ACE floodplain, which is the Recommended Plan.

6.2 Plan Implementation

6.2.1 Cobb County Responsibilities

Cobb County, prior to any demolition, shall complete Phase II HTRW surveys and any required remediation on the Clay Road site and Austell Powder Springs Road site. Once the project is constructed, the O&M will be performed by Cobb County. The O&M includes vegetation management, including invasive species management, of the

vacant parcels as well as facility management of the parcels developed into parks. Cobb County will take the lead on outreach and purchase of the properties in the Recommended Plan. Cobb County is responsible for providing all lands, easements, rights-of-way, relocations, and disposal areas (LERRDs). This estimated cost is \$2,940,000. After reimbursement from the Federal Government following the purchase of the lands, Cobb County's portion of the cost share of the project is anticipated to be approximately \$1,439,000. A detailed cost breakdown is described in Section 6.2.3.

6.2.2 USACE Responsibilities

The USACE will be responsible for demolition of the structures after Cobb County acquires the properties. For parcels that will involve construction of recreation features, all required permits will be completed by the USACE. The Federal portion of the cost share of the project, including that provided through the USACE, is anticipated to be approximately \$2,394,000. A detailed cost breakdown is described in Section 6.2.3.

6.2.3 Cost Share Breakdown

The cost shares for the relocations and the recreation portion of the project are different. A detailed cost share breakdown and description is described in this section.

6.2.3.1 Non-Structural Relocation Cost Share

For a non-structural portion of a project, the NFS costs are limited to 35% of the total cost of the non-structural costs. The NFS is responsible for all LERRDs costs of a project, meaning their initial cost is greater than the 35% maximum. The Federal Government reimburses the NFS for the Federal share of the costs incurred upon completion of the non-structural portion of the project. Table 41 shows the detailed non-structural cost share for the Recommended Plan.

Table 41: Non-structural Relocation Cost Share Breakdown

Item	Non-Federal Cost	Federal Cost	Total Cost
Design & Implementation	\$17,150	\$31,850	\$49,000
Construction Management	\$14,350	\$26,650	\$41,000
Lands and Damages	\$2,810,000	\$0	\$2,810,000
Construction Features	\$99,400	\$184,600	\$284,000
Total Without Reimbursement	\$2,940,900	\$243,100	\$3,184,000
(Percent of Costs)	92%	8%	
35% Maximum NFS Contribution	\$1,114,400		
Federal Reimbursement		\$1,826,500	
Total	\$1,114,400	\$2,069,600	\$3,184,000
(Percent of Costs)	35%	65%	

6.2.3.2 Recreation Cost Share

The cost share for recreational portions of a FRM project are 50% Federal and 50% non-Federal. Also, recreational components may only be constructed on lands that

were acquired for the FRM project. Table 42 shows the detailed recreation cost share for the Recommended Plan.

Table 42: Recreation Cost Share Breakdown

Item	Non-Federal Cost	Federal Cost	Total Cost
Design & Implementation	\$121,000	\$121,000	\$242,000
Construction Management	\$25,000	\$25,000	\$50,000
Lands and Damages	\$0	\$0	\$0
Construction Features	\$180,000	\$180,000	\$360,000
Total	\$326,000	\$326,000	\$652,000
(Percent of Costs)	50%	50%	

6.2.3.3 Total Cost Share Breakdown

Table 43 shows the summarized cost breakdown after reimbursement for the Recommended Plan.

Table 43: Recommended Plan Cost Share Summary

Combined Costs	Non-Federal Cost	Federal Cost	Total Cost
Relocations	\$1,114,400	\$2,069,600	\$3,184,000
Recreation	\$326,000	\$326,000	\$652,000
Total	\$1,440,400	\$2,395,600	\$3,836,000
Percentage	38%	62%	

7.0 Public and Agency Comments

The report underwent a public, state, and Federal agencies comment period from early April to early March 2018, with public meetings on April 9-10, 2018. No state agencies or Federal agencies commented on the project. The public provided no comments on this project.

8.0 Recommendation

Consideration has been given to all significant aspects of the public interest. The aspects considered include environmental, social, and economic effects; engineering feasibility; and any other elements bearing on the decision. There has been no controversy concerning this study or the proposed project and the NFS and local stakeholders are in support of the proposed action. The Recommended Plan complies with all seven of the USACE Environmental Operating Principles.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation

funding. However, prior to transmittal to the Congress, the NFS, the states, interested Federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

Based on the analysis the buyout of structures with a first floor elevation lower than the 10% ACE WSE is the NED Plan and is the Recommended Plan. The plan includes the purchase of nine parcels and demolition of the structures contained on each site. It further provides relocation benefits for the residences and proprietors of the homes and businesses. Archaeological and architectural surveys will be completed by USACE before the demolition of the structures and construction of the municipal parks. The Recommended Plan also includes the development of two municipal parks located in the upper and middle portions of the basin.

The first project costs are \$3,835,000 and estimated O&M costs are \$3,900 per year to maintain the municipal parks. Operating and maintaining the project requires seasonal mowing of the evacuated parcels, invasive species maintenance, and the maintenance of the kayak launch, trails, and picnic pavilions at the municipal parks. Since the Recommended Plan meets the Continuing Authorities Program – Section 205 requirements, it is recommended that it be designed and implemented under that authority.

DATE: _____

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