

# ENVIRONMENTAL ASSESSMENT

## UPPER AND LOWER LEGION LAKES REPAIRS

### Fort Jackson, South Carolina



**Prepared by USACE Charleston District  
For Fort Jackson  
August 2017**

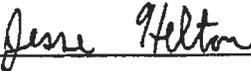
ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

*This page intentionally left blank*

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

**U.S. ARMY CORPS OF ENGINEERS CHARLESTON DISTRICT**

**Prepared by:**

  
\_\_\_\_\_  
Jesse Helton  
Planning and Environmental Branch  
CESAC-PM-PL

30 AUG 2017  
Date

**Reviewed by:**

  
\_\_\_\_\_  
Diane C. Perkins  
Chief, Planning and Environmental Branch  
CESAC-PM-PL

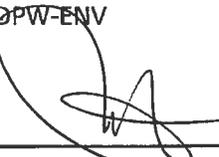
30 Aug 2017  
Date

**Fort Jackson**

**Reviewed by:**

  
\_\_\_\_\_  
Andy Poppen:  
Environmental Division Chief  
DPW-ENV

30 Aug 17  
Date

  
\_\_\_\_\_  
Robert F. Gay  
Attorney-Advisor  
Administrative Law Division  
Office of the Staff Judge Advocate

30 Aug 17  
Date

**Approved by:**

  
\_\_\_\_\_  
STEPHEN F. ELDER  
COL, LG  
Commanding

30 Aug 17  
Date

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

*This page intentionally left blank*

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

## Contents

1.	Introduction and Background .....	9
1.1.	Location.....	9
1.2.	History.....	10
1.2.1.	Upper Legion Lake, and Lower Legion Lake Description .....	10
1.2.2.	Rainfall Event and Lower Legion Dike Breach.....	11
1.3.	Purpose, Need, and Scope of Analysis.....	14
2.	Alternatives and Proposed Action .....	15
2.1.	Alternative 1 - No Action.....	15
2.2.	Alternative 2 – Remove Dam .....	16
2.3.	Alternative 3 – Repair Dam and Dike (Preferred Alternative) .....	17
3.	Affected Environment and Environmental Consequences.....	17
3.1.	Land Use.....	17
3.1.1.	Affected Environment.....	17
3.1.2.	Environmental Consequences.....	18
3.2.	Climate .....	18
3.2.1.	Affected Environment.....	18
3.2.2.	Environmental Consequences.....	18
3.3.	Physiography, Geology, Topography, and Soils .....	19
3.3.1.	Affected Environment.....	19
3.3.2.	Environmental Consequences.....	20
3.4.	Surface Water and Stormwater .....	20
3.4.1.	Affected Environment.....	20
3.4.2.	Environmental Consequences.....	21
3.5.	Ground Water .....	22
3.5.1.	Affected Environment.....	22
3.5.2.	Environmental Consequences.....	22
3.6.	Floodplains and Wetlands.....	22
3.6.1.	Affected Environment.....	22
3.6.2.	Environmental Consequences.....	23
3.7.	Fish and Wildlife.....	24
3.7.1.	Affected Environment.....	24

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

3.7.2.	Environmental Consequences.....	24
3.8.	Vegetation.....	24
3.8.1.	Affected Environment.....	24
3.8.2.	Environmental Consequences.....	25
3.9.	Threatened and Endangered Species .....	25
3.9.1.	Affected Environment.....	25
3.9.2.	Environmental Consequences.....	26
3.10.	Air Quality .....	26
3.10.1.	Affected Environment.....	26
3.10.2.	Environmental Consequences.....	27
3.11.	Noise .....	27
3.11.1.	Affected Environment.....	27
3.11.2.	Environmental Consequences.....	27
3.12.	Cultural Resources .....	28
3.12.1.	Affected Environment.....	28
3.12.2.	Environmental Consequences.....	28
3.13.	Hazardous Materials and Hazardous Waste Management. ....	28
3.13.1.	Affected Environment.....	28
3.13.2.	Environmental Consequences.....	29
3.14.	Environmental Justice and Socioeconomic Condition .....	29
3.14.1.	Affected Environment.....	29
3.14.2.	Environmental Consequences.....	32
3.15.	Aesthetics and Recreation .....	32
3.15.1.	Affected Environment.....	32
3.15.2.	Environmental Consequences.....	32
3.16.	Maintenance .....	33
3.16.1.	Affected Environment.....	33
3.16.2.	Environmental Consequences.....	33
3.17.	Best Management Practices and Mitigation Measures.....	33
4.	Cumulative Impacts .....	34
5.	Public Involvement and Coordination .....	35
6.	Conclusion.....	36

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

7. References ..... 37

**Appendices**

APPENDIX A: Soils

APPENDIX B: Wildcat Creek Watershed

APPENDIX C: Floodplain Data

APPENDIX D: Endangered Species

APPENDIX E: Cumulative Impacts documents

APPENDIX F: Comments Regarding the Draft EA

APPENDIX G: Comments from the Public Meeting

**List of Preparers and Reviewers**

<b>Name</b>	<b>Affiliation</b>	<b>Duty</b>
Jesse Helton	USACE Charleston District	Preparer
Alan Shirey	USACE Charleston District	Preparer
Mark Messersmith	USACE Charleston District	Reviewer
Diane Perkins	USACE Charleston District	Reviewer
Brian Nutter	USACE Charleston District	Reviewer
Jonathan Jellema	USACE Charleston District	Reviewer
Andy Poppen	Fort Jackson	Reviewer
Rikard Stanley	Fort Jackson	Reviewer
Bob Gay	Fort Jackson	Reviewer

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

*This page intentionally left blank*

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

## 1. Introduction and Background

### 1.1. Location

The US Army Training Center and Fort Jackson is centrally located within the State of South Carolina in Richland County (Figure 1.1). The fort includes more than 52,000 acres, with more than 100 ranges and field training sites and 1,160 buildings. Soldiers, civilians, retirees and family members make up the Fort Jackson community. More than 3,500 active duty Soldiers and their 12,000 family members are assigned to the installation and make this area their home.

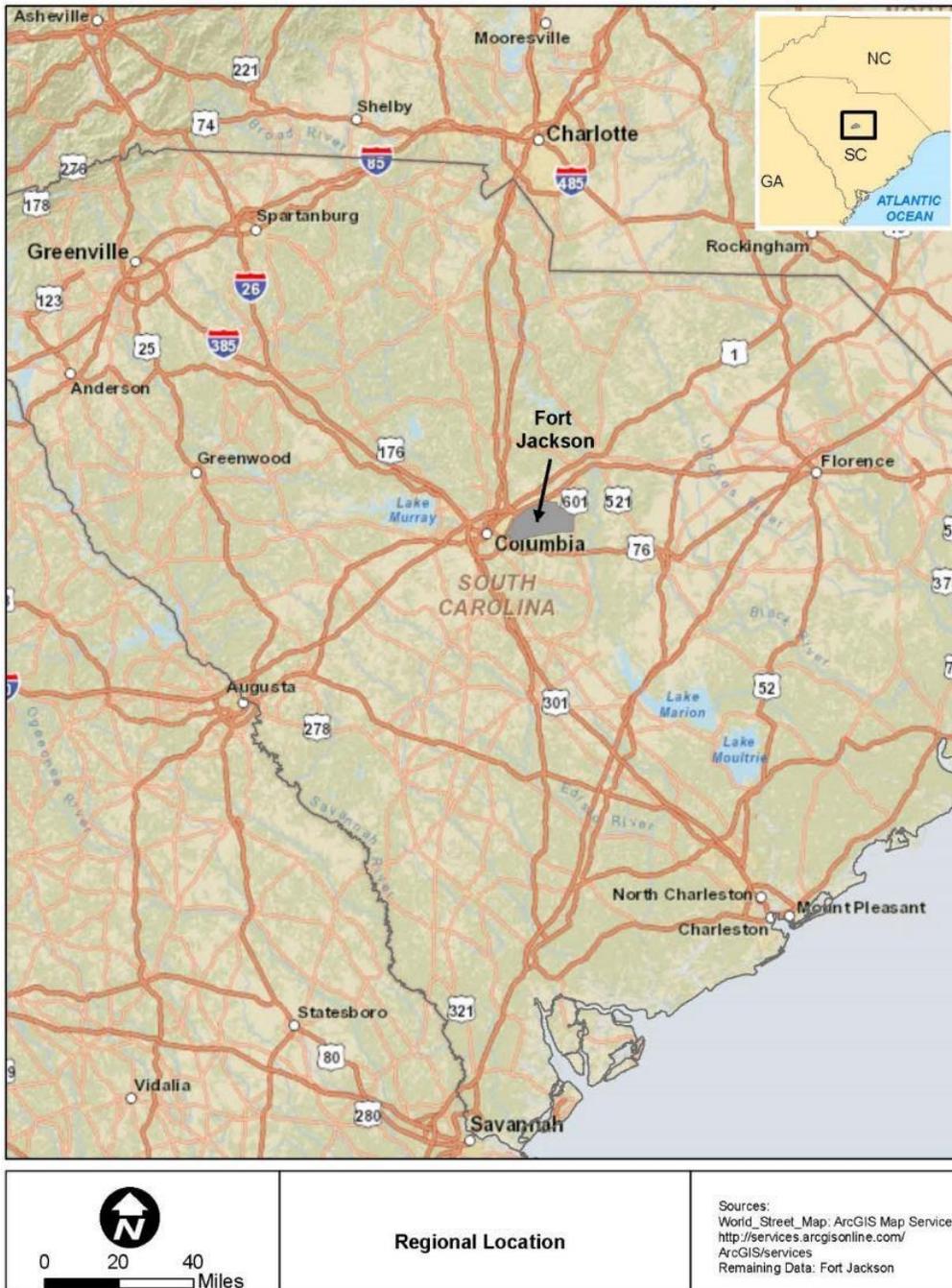
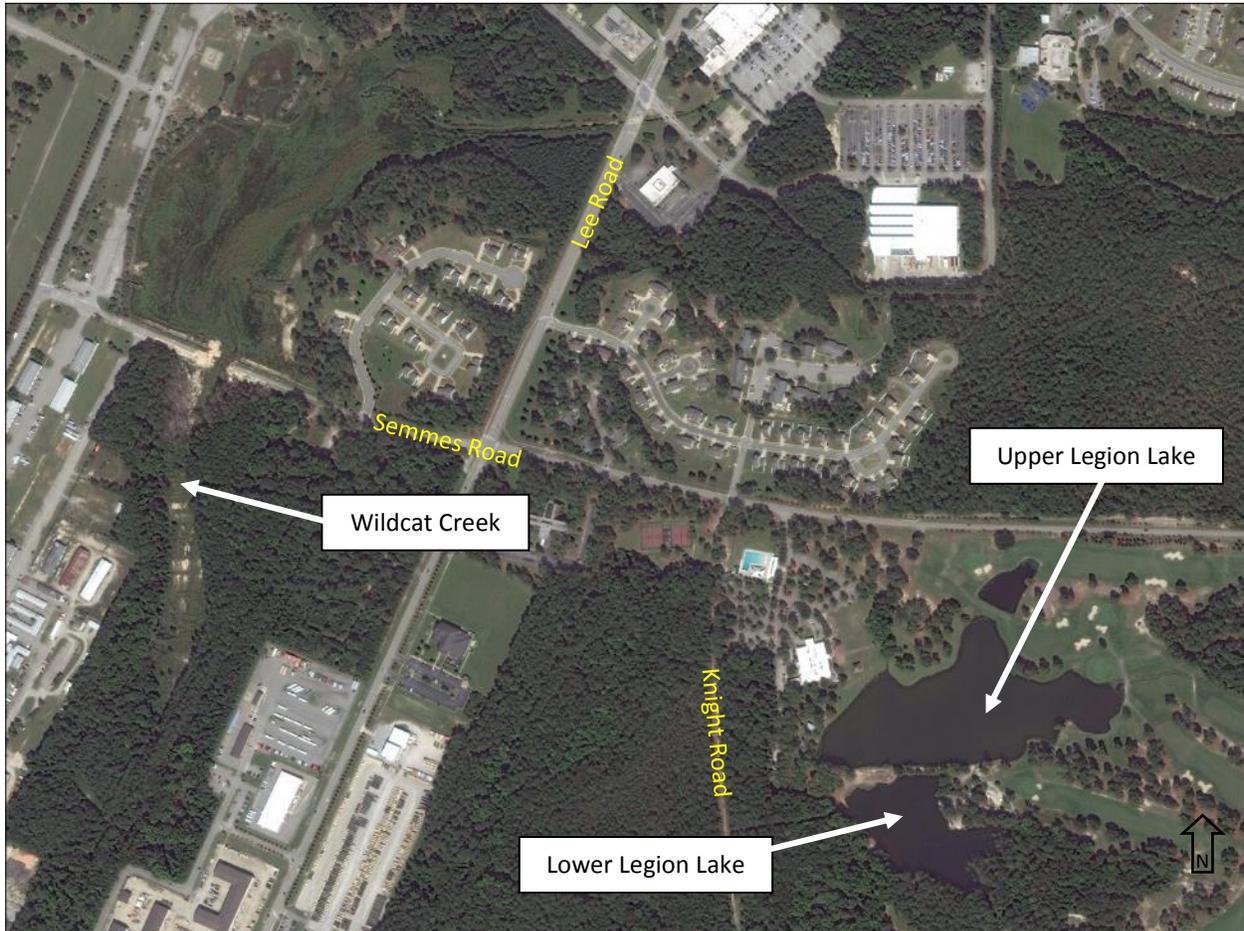


Figure 1.1 - Fort Jackson Regional Location

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

Upper and Lower Legion Lakes are all located off Semmes Road. The Lakes are located completely within the boundaries of Fort Jackson's Military Reservation, and as such, are owned by the Federal Government. Figure 1.2 shows the locations of Upper and Lower Legion Lakes.



**Figure 1.2 - Upper and Lower Legion Lakes Location Map.**

## 1.2. History

### 1.2.1. Upper Legion Lake, and Lower Legion Lake Description

Both Upper and Lower Legion Lakes are located on a tributary of Wildcat Creek. Upper Legion Dam separates Upper Legion Lake from Lower Legion Lake.

#### *Upper Legion Dike Pre-October 2015 and current Condition*

Upper Legion Dam is an earthen dam with a structural height of approximately 15 feet, a hydraulic height of approximately 12 feet, a crest length of approximately 730 feet, and a crest width of approximately 10 feet. The upstream slopes are approximately 1 vertical on 2 horizontal (1V:2H), and the downstream slopes are approximately 1V:1.5H. There are three outlet works penetrations through the embankment and an approximately 12-foot-wide spillway near the eastern end of the dam. The normal reservoir capacity, at elevation 222 feet NAVD88, is approximately 45 acre-feet (maximum capacity, at elevation 225 feet NAVD88, of approximately 85 acre-feet). The normal surface area was approximately 12.24 acres.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

*Lower Legion Dike Pre-October 2015 Condition*

Lower Legion Dike is an earthen dike with a structural height of approximately 13 feet, a crest length of approximately 500 feet, and a crest width of approximately 17 feet. The upstream slopes were approximately 1V:1.75H. The downstream slopes were approximately 1V:1.2H. There was one outlet works penetration through the embankment and an approximately 12-foot-wide spillway near the eastern end of the dam. The normal reservoir capacity, at pool elevation 215 feet NAVD88, was approximately 21 acre-feet (maximum capacity, at elevation 218 feet NAVD88, of approximately 39 acre-feet). The normal surface area was approximately 5.4 acres.

**1.2.2. Rainfall Event and Lower Legion Dike Breach**

During a four day period from October 2-5, 2015 a stalled mid-latitude weather system directed a stream of deep tropical moisture across South Carolina resulting in record-breaking rainfall totals across the state (Figure 1.3). The 4-day rainfall totals in the Columbia area exceeded the 1,000-year recurrence intervals as referenced to the point precipitation frequency estimates in NOAA Atlas 14 (CISA, 2015). Total rainfall exceeded 20 inches across much of eastern South Carolina (Figure 1.4). Upper Legion Dam overtopped, suffered damage, but did not breach during the October 2015 storm event. Emergency/temporary repairs made included, plugging 2 of the 3 spillways with concrete, and buttressing the downstream slope of the dam. Lower Legion Dike overtopped and breached. A breach 50 feet wide and over 12 feet in height was created draining Lower Legion Lake. A temporary repair (the spillway was replaced and the embankment in the breach area was repaired) was made to the Lower Legion Dike so that water could be provided to the Fort Jackson Golf course pump station, which is located on the lake. Figure 1.5 shows a comparison of Upper and Lower Legion Lakes prior the flood and after the breach of Lower Legion Lake. Figure 1.6 shows Upper and Lower Legion Lakes after the temporary emergency repairs were made.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina



Figure 1.3 – October 3-4 2015 Confluence of Weather Systems Impaction North and South Carolina (source, AccuWeather.com 2015)

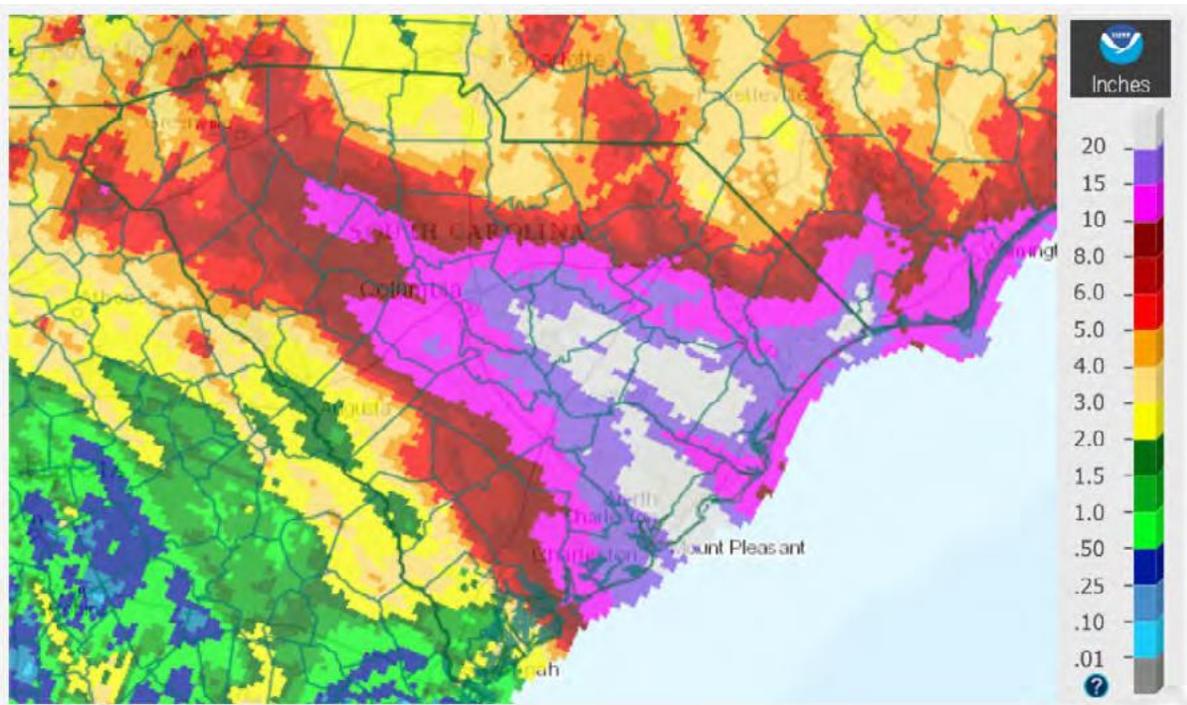


Figure 1.4 - National Weather Service Rainfall Totals for October 1-5, 2015 (source, NWS 2015)

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina



Figure 1.5 - Upper and Lower Legion Lakes before October 2015 flood (Left) and Post October 2015 Flood (right).

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina



**Figure 1.6 – Upper and Lower Legion Lakes Post Emergency Repair.**

### 1.3. Purpose, Need, and Scope of Analysis

The National Environmental Policy Act of 1969 (NEPA), which is implemented by 32 Code of Federal Regulations (CFR) Part 651: Environmental Analysis of Army Actions requires federal facilities to evaluate the environmental impacts of a proposed action and any associated alternative actions prior to implementation of the action.

The Environmental Assessment (EA) considers the direct, indirect, and cumulative effects of the Proposed Action, the No Action Alternative, and other alternatives over the reasonably foreseeable future. It was prepared in accordance with the NEPA of 1969 [42 United States Code (USC) 4321 *et seq.*], Council on Environmental Quality (CEQ) Regulations CFR Parts 1500-1508, and 32 CFR Part 651 (Environmental Analysis of Army Actions). This EA is an appraisal of impacts of the proposed project, including a determination of a Finding of No Significant Impact (FNSI) or a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS).

The purpose of this EA is to analyze and evaluate the environmental impacts of alternatives and to analyze and evaluate the environmental impacts of alternatives to update Upper Legion Dam and Lower Legion Dike to current dam safety standards.

This EA provides a discussion of the affected environment and the potential impacts to the physical, natural, and socioeconomic resources from the alternative actions for revitalization Upper Legion Lake,

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

Lower Legion Lake, and infrastructure associated with these areas. These Lakes and the surrounding area were damaged due to the October 2015 flood event discussed in Section 1.2 of this document. This EA will help inform Army decision makers and the public of the environmental consequences from the alternatives for revitalization of Upper Legion Lake, Lower Legion Lake, and infrastructure associated with these areas. Impacts are evaluated on both a direct and indirect basis and on a short-term, long-term, and cumulative basis. Specifically, the topics that are covered in this EA include:

- Land Use
- Climate
- Physiography, Geology, Topography, and Soils
- Surface Water and Stormwater
- Ground Water
- Floodplains and Wetlands
- Fish and Wildlife
- Vegetation
- Threatened and Endangered Species
- Air Quality
- Noise
- Cultural Resources
- Hazardous Materials & Hazardous Waste Management
- Environmental Justice and Socioeconomic Conditions
- Aesthetics and Recreation
- Cumulative Impacts

## 2. Alternatives and Proposed Action

### 2.1. Alternative 1 - No Action

A basic alternative to any proposed action is the "No Action" alternative (Figure 2.1). The No Action Alternative would leave Upper and Lower Legion Lakes in their current conditions. Upper Legion Lake does not meet current dam safety standards, mostly because of tree growth on the downstream face of the dam and the fact that it was constructed with what would now be deemed inadequate spillway capacity. The post-October 2015 repairs to Lower Legion Lake were temporary and do not enable the structure to meet current safety standards.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina



Figure 2.1 - Alternative 1 No Action Alternative

2.2. Alternative 2 – Remove Dam

Alternative 2 consists of the total removal of the dams on Upper Legion Lake and the dike on Lower Legion Lake (Figure 2.2). In order to maintain the stormwater detention function that the Legion Lake complex provided prior to October 2015, stormwater detention ponds would be constructed. The stormwater detention ponds would be placed throughout the green area shown in Figure 2.2. The detention ponds would be of adequate size and number to maintain the existing storm water detention function of Upper and Lower Legion Lakes. Construction of the detention ponds would require construction of several berms to impound the stormwater.

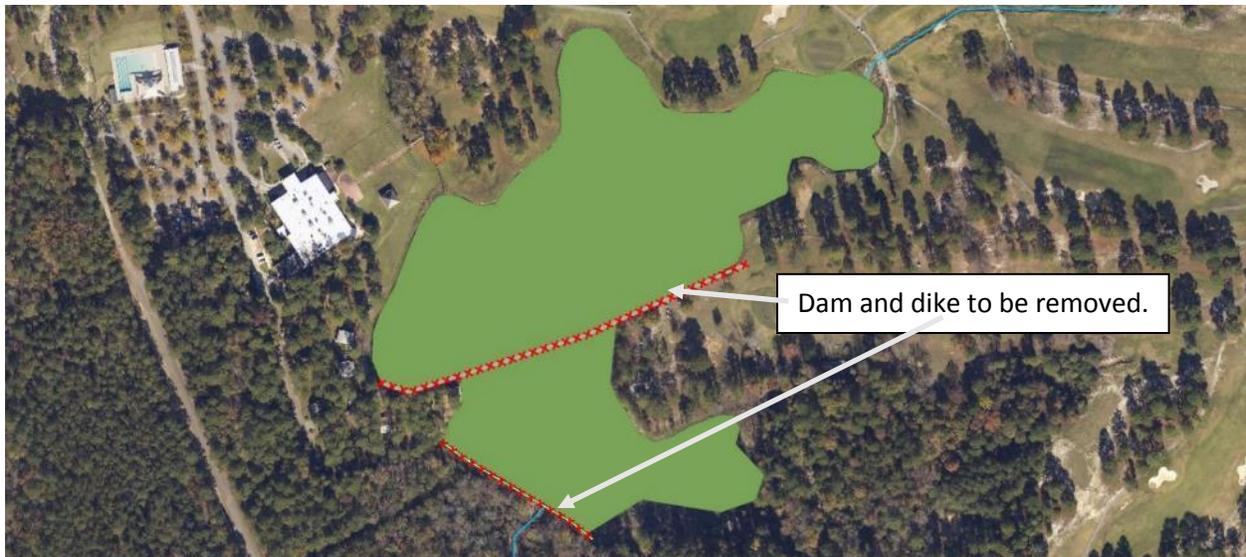


Figure 2.2 - Alternative 2 Remove Dam/Dike

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

### 2.3. Alternative 3 – Repair Dam and Dike (Preferred Alternative)

Alternative 3 (preferred alternative) consists of making repairs to Upper Legion Lake dam and permanent repairs to replace the temporary emergency repairs (discussed in section 1.2.2 of this document), to the Lower Legion Lake dike (Figure 2.3). This alternative would maintain the stormwater detention capacity that existed prior to October 2015. The repairs would upgrade the Upper Legion Lake dam to current dam safety standards by removing the trees on the downstream face of the dam and replacing the spillway. Upper Legion Lake would be listed on the National Inventory of Dams and would undergo periodic inspections and maintenance as required by dam safety standards. The repairs to the Lower Legion Lake dike would replace the temporary outlet structure and would improve the stability of the dike. Because of its size and limited depth, Lower Legion Lake is not required to be listed on the National Inventory of Dams.



**Figure 2.3 - Alternative 3 – Repair Dam and Dike**

## 3. Affected Environment and Environmental Consequences

The focus of this EA is Upper and Lower Legion Lakes and the immediate vicinity. For additional information about environmental conditions at Fort Jackson please see part 1 and 2 of the Programmatic Environmental Assessment Real Property Master Plan Fort Jackson, South Carolina <http://jackson.armylive.dodlive.mil/files/2014/05/Fort-Jackson-Real-Property-Master-Plan-PEA-Pt-1.pdf> and <http://jackson.armylive.dodlive.mil/files/2014/05/Fort-Jackson-Real-Property-Master-Plan-PEA-Pt-2.pdf>

### 3.1. Land Use

#### 3.1.1. Affected Environment

This section describes the existing land use of the area surrounding Upper and Lower Legion Lakes taking into consideration both natural or human modified activities. Natural land use classifications include wildlife areas, forests, and other open or undeveloped areas. Human-modified land use classifications include residential, community, commercial, industrial, utilities, agricultural, recreational, and other developed uses. Land use is regulated by management plans, policies, and regulations

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

determining the type and extent of land use allowable in specific areas and protection specially designated for environmentally sensitive areas. Both Upper and Lower Legion Lakes are encompassed by lands designated for community uses.

### 3.1.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would not result in any immediate significant or negative impacts to land use; however, since the dike, as currently designed and constructed, is a temporary emergency measure, it may be more susceptible to long term erosion and failure if left in place long term. If the Lake were lost, the golf course would lose its irrigation source. Without an irrigation source, either a new water source or a change in land use (abandon the golf course) would be required.

#### LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 would not result in any significant or negative impacts to land use. Though this alternative would result in the loss of Upper and Lower Legion Lakes, it would not have a significant impact on land use in the area. However, if the Lake were removed, the golf course would lose its main irrigation source. Without an irrigation source, either a new water source or a change in land use (abandon the golf course) would be required.

#### LL Alternative 3 (Preferred Alternative)

LL Alternative 3 would not result in any significant or negative impacts to land use. Construction of this alternative would generally return the area to its pre-flood condition. As such, no changes from historic (pre-flood) land uses in the area would occur with construction of this alternative.

## 3.2. Climate

### 3.2.1. Affected Environment

According to the Köppen climate classification, South Carolina is classified as a humid subtropical climate. The predominant climatic factors are the Installation's location in the lower latitudes and its proximity to the Appalachian Mountains to the west, which block the approach of unseasonable cold weather in the winter. Columbia, located in central South Carolina, typically experiences its coldest month in January with an average high of 55 °F and warmest month in July with an average high of 92 °F. The average annual temperature is approximately 75 °F while on average receiving 48 inches of precipitation per year, mostly during June, July, and August. During these months, the city of Columbia receives between five and five and one half inches of rain per month. In general, the state of South Carolina has warmed by one-half to one degree (F) over the last century; however, this increase is less than that of most of the nation (USEPA 2016). It is expected that in the coming decades changing climate in South Carolina will lead to an increase in the number of unpleasantly hot days, an increase in heat related illness, an increase in inland flooding, a decrease in crop yields, and harm to livestock (USEPA 2016).

### 3.2.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would not result in any significant environmental impacts on climate because the greenhouse gas emission would not change significantly, over time, from the current condition.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 would not result in any significant or negative environmental impacts on climate. LL Alternative 2 would not cause changes to the area's climate. Minimal amounts of greenhouse gases would be created during construction of this alternative. Best management practices (discussed in the air quality section) would be followed to reduce greenhouse gas emissions.

LL Alternative 3 (Preferred Alternative)

Construction of LL Alternative 3 (Preferred Alternative) would not result in any significant or negative environmental impacts on climate. Minimal amounts of greenhouse gases would be created during construction of the Preferred Alternative. Best management practices (discussed in the air quality section) would be followed to reduce greenhouse gas emissions.

### 3.3. Physiography, Geology, Topography, and Soils

#### 3.3.1. Affected Environment

Fort Jackson contains two physiographic provinces: the Piedmont Plateau and the Atlantic Coastal Plain. Fort Jackson is located in the northwestern portion of the Atlantic Coastal Plain, referred to as the "Sand Hills", which joins with the Piedmont Province running north and west. The Sand Hills are a region of low to moderate relief and gently rolling plains with numerous streams and springs that are fed by groundwater. Local relief in the high plains of the reservation is largely between 165 and 250 feet. Slopes are predominately between three and eight percent at Fort Jackson. In the areas along narrow stream valleys, slopes commonly exceed 15 percent. The highest elevation on the Installation is 540 feet above sea level in the west-central portion of Fort Jackson; the lowest point is less than 160 feet above sea level occurring in the floodplain of Colonels Creek in the southeastern portion of Fort Jackson. The second physiographic province, known as the Piedmont Plateau also contains numerous streams and water bodies. Ridge tops are broad sloping gentle to moderate toward the streams. The stream floodplains are often narrow. The Fall Line, a zone which marks the boundary between the younger, softer sediments of the Coastal Plain Province and the ancient, crystalline rocks of the Piedmont Province, lies approximately four miles west of the cantonment area.

Rocks in the Piedmont Plateau are shale and schist, rather than true slate. The principal rock type is argillite and fine-grained rock with a high content of silica and alumina. The principal geologic formation in the Sand Hills is the Tuscaloosa, which consists of unconsolidated marine deposits of light-colored sands and kaolin clays. Most of the soils at Fort Jackson are formed from sediment of the Tuscaloosa. A layer of Quaternary sand terrace overlies the Tuscaloosa formation, which lies upon a complex of old metamorphic and igneous rock. The Tuscaloosa complex generally consists of clay strata overlying unconsolidated sands. Near the northern boundary of the installation, the older crystalline rocks of the Carolina Slate Group outcrop at the surface. In the northwestern portions of Fort Jackson, Pleistocene sands and gravel are present at the ground surface.

Soils serve a critical role in the natural and human environment, affecting vegetation and habitat, water and air quality, and the success of the construction and stability of roads, buildings, and shallow excavations. A soil survey conducted by the United States Department of Agriculture (USDA) concluded that soils in the Fort Jackson coastal plain are predominantly well drained on the higher plains and side slopes and somewhat poorly drained in the valleys. These soils have a sandy surface layer and a predominantly loamy sub-soil.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

### **Legion Lakes Soils**

The soils surrounding Upper and Lower Legion Lakes are classified as Pelion-Johnston-Vaucluse soils. The soils along the tail waters of Upper and Lower Legion Lakes are classified as Johnston loam. A Soil map and descriptions of Soil Classifications found adjacent Upper and Lower Legion Lakes are included in Appendix A.

#### 3.3.2. Environmental Consequences

##### *LL Alternative 1 - No Action*

The No-Action Alternative would not result in any significant or negative environmental impacts on physiography, topography, geology, or soils. Selection of this alternative would provide a minor long term positive impact by allowing sediments to settle in the lake, thereby reducing sedimentation downstream of the dam. However, since the dike, as currently designed and constructed, is a temporary emergency measure it may be more susceptible to long term erosion and failure if left in place long term. If the lake were lost, it could lead to erosion and increase transport of sediments downstream as the water retention structure and lake bed were eroded away.

##### *LL Alternative 2 - Remove Dam and Dike and LL Alternative 3 (Preferred Alternative)*

Construction of either LL Alternative 2 or 3 would not result in any significant or negative environmental impacts on physiography, topography, geology, or soils. Construction of either of the action alternatives would provide a long term positive environmental impact by allowing sediments from runoff to settle out of suspension during high flow events, thereby reducing sedimentation downstream of the dam. During construction of any action alternative best management practices would be followed to reduce temporary negative impacts from erosion and runoff due to construction activities.

### 3.4. Surface Water and Stormwater

#### 3.4.1. Affected Environment

Fort Jackson lies within the boundaries of the Congaree River and the Wateree River basins in the City of Columbia. Streams at Fort Jackson are typical of those found in the Coastal Plain Province. The surface pattern is linear branching and streams occupy relatively broad valleys with gentle regional gradients to the south and southeast. Eventually, all streams leaving Fort Jackson flow into either the Wateree River or the Congaree River. The confluence of these rivers forms the Santee River. The Santee River continues in a southeasterly direction, eventually emptying into the Atlantic Ocean south of Georgetown, South Carolina.

There are four surface water drainage systems on the installation. All of the streams that are present on the eastern half of the reservation flow into Colonels Creek, a major tributary of the Wateree River, which flows southeastward across the installation. The other major surface water drainage system, Gills Creek, flows slightly southwesterly across the northwestern quarter of the installation. After leaving the installation, Gills Creek flows south through a series of lakes and is joined by Wildcat Creek prior to reaching the Congaree River. Wildcat Creek drains the major portion of the cantonment area. Upper and Lower Legions Lake are located on a tributary of Wildcat Creek (Appendix B). The southern part of the installation is drained by the upper reaches of Cedar Creek and Mill Creek.

Upper Legion Lake and Lower Legion Lake are located on a tributary of Wildcat Creek. Upper Legion has a watershed of 0.38 square miles, while Lower Legion has a small unregulated drainage area of 0.067 square miles. The drainage areas above the dams consist mostly of wooded areas and the open golf

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

course. From Lower Legion Dike the tributary of Wildcat Creek flows south under Knight, Washington, Lee and Ewell Roads. The 4,400 feet reach between Lower Legion Dike and Ewell Roads consist mostly of wooded low-lying floodplain that has little development except in the vicinity of Washington and Lee Rd where there are several buildings. The tailwaters of Lower Legion Lake join Wildcat Creek near Ewell road. Below Ewell Road, Wildcat Creek flows west to Fort Jackson Blvd. This 3,000 feet reach of Wildcat Creek roughly defines the boundary line of Fort Jackson. The Kings Grant residential sub division is located south of Wildcat Creek along this boundary. About 650 feet upstream of Fort Jackson Blvd is an abandoned railroad embankment with a single 10 feet by 10 feet box culvert. This embankment is over 40 feet high and was noted as a potential restriction to flow. From Fort Jackson Blvd, Wildcat Creek continues west under Interstate I-77 and Shady Lane to join with Gills Creek below Lake Katherine. Gills Creek continues to flow south to join the Congaree River and then the Santee River. Gills Creek has a watershed area of 74.5 square miles at its confluence with the Congaree River.

Fort Jackson does not lie within an area controlled under a Coastal Zone Management Program (CZMP). Therefore, Fort Jackson's on-Post operations and activities are not managed or controlled by the CZMP.

### 3.4.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would cause no changes from the current conditions of the stormwater and surface water at Upper and Lower Legion Lakes. However, the dam of Upper and the dike of Lower Legion Lakes were not constructed to current dam safety standards when they were built years ago. Additionally, the dike and outlet works of Lower Legion Lake were repaired after the October 2015 storm as a temporary emergency measure.

#### LL Alternative 2 - Remove Dam/Dike

Construction of Alternative 2 would cause temporary changes to stormwater and surface water during construction. These impacts would consist of a short term increase in turbidity and increased downstream sedimentation during construction that would subside shortly after construction activities cease. After construction, Alternative 2 would have a long term positive impact to surface water by allowing sediments to settle out of runoff and have no impact to storm water. Stormwater detention would match that of Upper and Lower Legion Lakes prior to the October 2015 breach. Lower Legion Lake is the irrigation source for the Fort Jackson golf course. Removal of the lakes would require another irrigation source (either wells tapping into the aquifer or using water from the municipal water system). If the municipal water system was used to irrigate the golf course, it would create additional demand on the municipal water supply of the area, some of which comes from other water bodies in the area. Best management practices such as silt fencing, mulching, temporary seeding and other erosion control practices would be implemented during construction to reduce impacts to water quality.

#### LL Alternative 3 (Preferred Alternative)

Construction of Alternative 3 would cause temporary changes to stormwater and surface water flow during construction. These impacts would consist of a short term increase in turbidity and increased downstream sedimentation during construction that would subside shortly after construction activities cease. Alternative 3 would have a long term positive impact to surface water by allowing sediments to settle out of runoff and no impact to storm water. Once construction was completed the stormwater and surface water at Upper and Lower Legion Lakes would be the same as the existing condition. Best management practices such as silt fencing, mulching, temporary seeding and other erosion control practices would be implemented during construction to reduce impacts to water quality.

### 3.5. Ground Water

#### 3.5.1. Affected Environment

Fresh groundwater is generally plentiful at Fort Jackson. The Tuscaloosa Formation, of the Upper Cretaceous age, underlies all of Fort Jackson and is the primary source of groundwater in the area. The formation consists of inter bedded, generally unconsolidated, fine to coarse sand and clay, causing groundwater to occur under both unconfined and confined (i.e., artesian) conditions. Groundwater occurs under water table conditions in the upper part of the zone of saturation. At a depth ranging from 100 to 250 feet, the permeable sand zones are frequently overlain by less permeable clay zones, and the groundwater exists under artesian conditions. Small quantities of groundwater may be available in the alluvial deposits along major streams. Fort Jackson has two water wells in the Semmes Lake and Legion Lakes watershed. Those wells serve as an occasional source of water to irrigate the golf course and are not used for drinking water. Fort Jackson is not located within a recharge area for a sole-source aquifer.

#### 3.5.2. Environmental Consequences

##### LL Alternative 1 - No Action

The No Action Alternative would not result in any significant or negative environmental impacts on ground water; however, since the dike as currently designed and constructed is a temporary emergency measure it may be more susceptible to long term erosion and failure if left in place long term. If the Lake were lost, it would lead to the loss of the irrigation source for the golf course. Without an irrigation source, either a new water source or an increase in ground water withdraws from existing nearby wells would be required to maintain the golf course. If ground water was used as the sole source of water for irrigation of the golf course it would negatively impact ground water by increasing demand on the aquifer of the area.

##### LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 could result in long term negative environmental impacts on ground water. Lower Legion Lake is the irrigation source for the Fort Jackson golf course. Removal of the lakes would require another irrigation source (either wells tapping into the aquifer or using water from the municipal water system). If ground water is used for irrigation of the golf course, it would create additional demand on the aquifer in the area.

##### LL Alternative 3 (Preferred Alternative)

Construction of LL Alternative 3 (Preferred Alternative) would not result in any significant or negative environmental impacts on ground water.

### 3.6. Floodplains and Wetlands

#### 3.6.1. Affected Environment

One hundred-year floodplains have been designated along all of the major waterways on Fort Jackson. These include lands along Gills Creek, Mill Creek, Cedar Creek, Wildcat Creek and Colonels Creeks. Sections of developed areas, downstream of Fort Jackson, with in the Wildcat Creek floodplain are shown on excerpts from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Richland County (FEMA, 2017) (Appendix C).

Development activities in regulatory floodplain and wetland areas are limited in accordance with Executive Orders (EO) 11988 and 11990, respectively. An analysis of the preferred alternative for Upper

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

and Lower Legion Lakes' compliance with EO 11988 is included in Appendix C. This EA is also accompanied by a Finding of No Practicable Alternative (FNPA) in compliance with EO 11988.

Wetlands are defined by the Environmental Protection Agency (EPA) as areas where water covers the soil or is either at or near the surface of the soil all year long or for varying periods during the year (USEPA, 2012c). These areas are known to support both aquatic and terrestrial species. Wetlands and other surface water features, which may include intermittent and perennial streams, are generally considered "waters of the United States" by USACE, and where they meet the definition of "jurisdictional waters" are protected under Section 404 of the CWA and EO 11990.

Wetlands on Fort Jackson are non-tidal and are defined as occurring on floodplains along rivers and streams, in isolated depressions surrounded by dry land, along the margins of lakes and ponds, and in other low-lying areas where precipitation sufficiently saturates the soil (USEPA, 2012c).

The focus of Fort Jackson's wetlands management program is protection and maintenance of habitat. Per EO 11990, Fort Jackson's goal is to ensure "no net loss" of wetland acreage. Before construction work is done in wetlands or other waters of the United States at Upper and Lower Legion Lakes any required permits/authorizations under Section 404 of the CWA will be obtained from USACE. A Section 404 jurisdictional determination has been conducted for these areas resulting in a determination that waters of the United States are present at Upper and Lower Legion Lakes. Any mitigation requirements for impacts to waters of the United States will be determined during the permitting/authorization process.

### 3.6.2. Environmental Consequences

#### LL Alternative 1 - No Action

Selection of the No Action Alternative would lead to no changes from the current conditions of the floodplains and wetlands at Upper and Lower Legion Lakes. Because they were constructed years ago, the dam of Upper Legion and the dike of Lower Legion Lakes were not constructed to current dam safety standards, which may cause them to be more susceptible to failure in the future. Lower Legion's dike was rebuilt after the October 2015 storm as a temporary emergency measure and maintains current flood elevations. However, permanent construction is needed for a viable long-term solution.

#### LL Alternative 2 - Remove Dam and Dike

Alternative 2 would result in additional, vegetated wetlands. Several wetlands and stormwater detention areas would be constructed in the footprint of Upper and Lower Legion Lakes. These areas would improve water quality as stormwater passed through them. Stormwater detention would match that of Upper and Lower Legion Lakes prior to the October 2015 breach. As such, the downstream floodplain of Legion Lakes would remain unchanged and there would be no change in the flood elevations.

#### LL Alternative 3 (Preferred Alternative)

Alternative 3 would lead to no changes from the current conditions of the floodplains and wetlands at Upper and Lower Legion Lakes as the area would be returned to pre-construction conditions after construction activities were completed.

### 3.7. Fish and Wildlife

#### 3.7.1. Affected Environment

There is a wide variety of wildlife, including mammals, birds, fish, reptiles, amphibians, and invertebrates found on Fort Jackson that utilizes the diverse ecosystems present.

The majority of fish and wildlife species found on Fort Jackson are typical of the Sand Hills region of South Carolina. Over the years, baseline and planning level surveys have been performed for various classifications of flora and fauna.

Although not currently listed as threatened or endangered, Fort Jackson provides habitat for four rare animal species: Southeastern Myotis (*Myotis austroriparius*), Rafinesque's big-eared Bat (*Plecotus rafinesquii*) Loggerhead Shrike (*Lanius ludovicianus*), and Bachman's sparrow (*Aimphila aestivalis*). These species may be listed in the future if their numbers continue to decline.

Wildlife commonly observed around Upper and Lower Legion Lakes includes white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), eastern gray squirrel (*Sciurus carolinensis*), wild turkey (*Melagris gallopavo*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), black rat snake (*Pantherophis obsoletus*) and bullfrog (*Lithobates catesbeiana*). Common fish species in the watershed include largemouth bass (*Micropterus salmoides*), Green sunfish (*Lepomis cyanellus*), and Mosquitofish (*Gambusia affinis*).

#### 3.7.2. Environmental Consequences

##### LL Alternative 1 - No Action

The No Action Alternative would not result in any significant or negative impacts to fish and wildlife when compared to the current condition and pre-storm (October 2015) conditions.

##### LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 would result in temporary construction related impacts to wildlife. During construction, any wildlife in the area likely would leave, but would be expected to return following construction. Construction of LL Alternative 2 would not result in any significant or negative impacts to wildlife but would lead to a long term decrease in fish densities and when compared to current conditions. The constructed stormwater detention areas and the creek channel would provide limited habitat for fish and other aquatic or semi-aquatic species.

##### LL Alternative 3 (Preferred Alternative)

Construction of LL Alternative 3 would result in temporary construction related impacts to wildlife. During construction, any wildlife in the area likely would leave, but would be expected to return following construction. Construction of LL Alternative 3 would not result in any long term significant or negative impacts to fish and wildlife. In the long term construction of this alternative would maintain the current habitat and aquatic species composition of Upper and Lower Legion Lakes.

### 3.8. Vegetation

#### 3.8.1. Affected Environment

Fort Jackson contains a wide variety of vegetative communities ranging from upland hardwood forests to wetlands. Twelve vegetation cover types have been recognized for the purpose of cover type mapping, with at least 30 plant community types and 11 subtypes. The high diversity of plant

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

communities includes the presence of some rare (G1 and G2) plant communities. These include the Sandstone Gravel Longleaf Pine Woodland and the South Carolina Central Longleaf Pine Woodland. The Installation's natural landscape is naturally vegetated except where development has cleared land creating grassed areas in the cantonment area, along roadways and on ranges. Over 720 flora species have been identified on Fort Jackson.

Fort Jackson can be classified generally into five primary terrestrial vegetative types: pine, pine/upland hardwood, upland hardwood, bottomland hardwood, and open field. Grassland areas on Fort Jackson include only a small amount in the cantonment area and alongside roads. Forest cover is the dominant vegetative type at Fort Jackson.

### 3.8.2. Environmental Consequences

#### LL Alternative 1 - No Action

Acceptance of the No Action Alternative would not result in any significant or negative impacts to vegetation due to site conditions being virtually unchanged compared to pre-flood (October 2015) conditions.

#### LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 would not result in any significant or negative impacts to vegetation. A small number of trees (predominately pines) growing on the dam for Upper and the dike for Lower Legion Lakes would be removed along with the existing dam/dike. Natural vegetation within the floodplain of this small tributary of Wildcat creek would provide a buffering effect on stormwater during small rain events, which is a minor positive impact of a vegetated floodplain.

#### LL Alternative 3 (Preferred Alternative)

Construction of LL Alternative 3 would not result in any significant or negative impacts to vegetation due to site conditions being unchanged compared to pre-flood (October 2015) conditions. A small number of trees (predominately pines) growing on the dam and dike for Upper and Lower Legion Lakes would be removed to improve the stability of the dam and dike. This alternative would maintain Upper and Lower Legion Lake while bringing the dam and dike for the lakes up to current dam safety standards.

## 3.9. Threatened and Endangered Species

### 3.9.1. Affected Environment

Under Section 7 of the Endangered Species Act (ESA), the Army must ensure that any Army action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of habitats on Fort Jackson. Appendix D contains a list of at-risk, candidate, endangered, and threatened species that have been listed by the USFWS as occurring or possibly occurring in Richland County, SC (lists last updated January 11, 2017) (USFWS 2017). Two federally listed endangered plant species are located on Fort Jackson along with one endangered animal species, they are: Rough-leaved Loosestrife (*Lysimachia asperulaefolia*) and the Smooth Coneflower (*Echinacea laevigata*) and the Red-cockaded Woodpecker (RCW) (*Picoides borealis*). However, no threatened or endangered species occur in the immediate vicinity of Upper and Lower Legion Lakes. No land within Fort Jackson has been identified as critical habitat for any federally listed endangered or threatened species.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

### 3.9.2. Environmental Consequences

Surveys for endangered species are regularly conducted by Fort Jackson and have revealed no endangered species in the vicinity of Upper and Lower Legion Lakes. Habitat for the RCW is absent from the areas that would be impacted by the construction of this Alternative. The nearest population of Smooth Coneflower is approximately 11.5 miles away and the nearest population of Rough-leaved Loosestrife is approximately 9.5 miles away. Though the endangered plants species mentioned above have existed on the base for many years, there is no evidence that they have spread from their single known populations within Fort Jackson to other areas of Fort Jackson.

#### LL Alternative 1 - No Action, LL Alternative 2 - Remove Dam and Dike, and LL Alternative 3 (Preferred Alternative)

Due to the lack of habitat and the lack of proximity of known populations to Upper and Lower Legion Lakes, Fort Jackson has determined that neither RCW, Smooth Coneflower, or Rough-leaved Loosestrife nor appropriate habitat for these species are present with the project area. Therefore, there will be no effect to listed species from acceptance of the No Action Alternative or construction of any of the action alternatives.

## 3.10. Air Quality

### 3.10.1. Affected Environment

This section describes the existing air quality conditions at and surrounding Fort Jackson. Air quality is determined by the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and/or state ambient air quality standards. Under the authority of the CAA (42 USC7401-7671q), the EPA has been given the responsibility to establish the primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for pollutants considered harmful to public health and the environment, with an adequate margin of safety.

The EPA developed NAAQS for six “criteria pollutants”, to represent the maximum allowable atmospheric concentrations. The six “criteria pollutants” include: particulate matter (measured as both particulate matter [PM10] and, fine particulate matter [PM2.5]), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), ozone (O<sub>3</sub>), and lead (Pb). Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants contributing to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants contributing to chronic health effects. Federal regulations designate Air Quality Control Regions (AQCRs) in violation of the NAAQS as nonattainment areas. Federal regulations designate AQCRs with levels below the NAAQS as attainment areas. According to the severity of the pollution problem, nonattainment areas can be categorized as marginal, moderate, serious, severe, or extreme.

South Carolina represents one of 28 eastern US states under the Clean Air Interstate Rule (CAIR), a program to permanently cap emissions of SO<sub>2</sub> and NO<sub>x</sub>. CAIR assists South Carolina in meeting and maintaining NAAQS for ground-level ozone and fine particle pollution (SO<sub>2</sub> and NO<sub>x</sub> contribute to the formation of fine particles (PM), and NO<sub>x</sub> contributes to the formation of ground-level ozone).

In 2004, Richland County exceeded the ozone standard and joined the “Early Action Compact” (EAC) with the EPA. This was an option provided by the EPA for areas currently meeting the one-hour ozone

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

standard, like those in South Carolina, to attain the eight-hour ozone standard by December 31, 2007, and obtain cleaner air sooner than federally mandated. This option required an expeditious time line for achieving emissions reductions sooner than expected under the eight-hour ozone implementation rulemaking, while providing “fail-safe” provisions for the area to revert to the traditional SIP process if specific milestones are not met. By signing the EAC, EPA agreed to defer the effective date of the nonattainment designation for the participating area. In 2007, Richland County met all the milestones associated with the EAC and was classified as in attainment for all six criteria pollutants again. Today, the majority of South Carolina is in attainment for air quality.

### 3.10.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would not result in any significant or negative impacts to air quality.

#### LL Alternative 2 - Remove Dam and Dike and LL Alternative 3 (Preferred Alternative)

Construction of any action alternative would lead to a short term and insignificant increase in emissions during construction from the operation of construction equipment. No long term increases in emissions would occur from construction of any action alternative, as construction equipment would no longer be in use once construction was completed. Best management practices such as reducing fugitive dust emissions, avoiding the unnecessary idling of construction equipment, and maintaining construction in good operating condition would be implemented to reduce impacts to air quality

## 3.11. Noise

### 3.11.1. Affected Environment

Noise is generally defined as undesirable sound. Sound is all around us, becoming noise when it interferes with normal activities such as speech, concentration, or sleep, is intense enough to damage hearing, or is otherwise intrusive. The type and characteristics of the noise, distance between the noise source and the receptor, the receptor sensitivity, and time of day all cause variations in human response. Noise is often generated by human activities that are fundamental to the quality of life, such as construction or vehicular traffic.

Noise associated with military installations is a factor in land use planning both on- and off-Post. Noise emanates from vehicular traffic associated with new facilities and from project sites during construction. Ambient noise (the existing background noise environment) can be generated by a number of noise sources, including mobile sources, such as automobiles and trucks, and stationary sources such as construction sites, machinery, or industrial operations. In addition, there is an existing and variable level of natural ambient noise from sources such as wind, streams and rivers, and wildlife.

### 3.11.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would not result in any significant or negative impacts to noise levels.

#### LL Alternative 2 - Remove Dam and Dike

Construction of LL Alternative 2 would lead to an increase in noise during construction. Best management practices such as limiting work to daylight hours and avoiding the unnecessary idling of construction equipment would be implemented to reduce noise during construction. No long term increases in noise would occur from LL Alternative 2.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

[LL Alternative 3 \(Preferred Alternative\)](#)

Construction of LL Alternative 2 would lead to an increase in noise during construction. Best management practices such as limiting work to daylight hours and avoiding the unnecessary idling of construction equipment would be implemented to reduce noise during construction. No long term increases in noise would occur from LL Alternative 2.

[3.12. Cultural Resources](#)

[3.12.1. Affected Environment](#)

A total of 702 archaeological sites have been identified on Fort Jackson, the majority resulting from timber tract surveys in the late 1980's and early 1990's. There are currently 66 archaeological sites eligible for listing on the National Register of Historic Places (NRHP) with the remaining 636 sites determined ineligible. These sites represent a time period extending back approximately 8000 years to the historic present (1966). There are 27 historic period cemeteries at Fort Jackson. There are no known Traditional Cultural Properties or Sacred Sites on Fort Jackson at this time.

Previous cultural resources work has been conducted at Upper and Lower Legion Lakes and no cultural resources or historic properties are present in this part of Ft. Jackson.

[3.12.2. Environmental Consequences](#)

[LL Alternative 1 - No Action](#)

The No Action Alternative would not affect historic properties or cultural resources.

[LL Alternative 2 - Remove Dam and Dike and LL Alternative 3 \(Preferred Alternative\)](#)

None of the action alternatives would have an effect on historic properties or cultural resources as none are known in this area.

[3.13. Hazardous Materials and Hazardous Waste Management.](#)

[3.13.1. Affected Environment](#)

For purposes of this EA, hazardous materials are those regulated under federal, state, Department of Defense, and Army regulations. Hazardous materials are required to be handled, managed, treated, or stored properly by trained personnel under the following regulations: Occupational Safety and Health Administration (OSHA) Hazardous Communication, 29 CFR 1900.1200 and 29 CFR 1926.59; and Department of Transportation Hazardous Materials, 49 CFR 172.101; EPA, 40 CFR 260 et seq.

The Installation is required to track annually the amount of hazardous materials used on the Installation and report to the regulatory agencies. Fort Jackson no longer has a permitted on Post Hazardous Waste storage facility. Fort Jackson is a RCRA Large Quantity Generator of hazardous waste and operates under permit number SC 3210020449, which was issued February 2010 and expires March 2020. Facility inspections are conducted each year by South Carolina Department of Health and Environmental Control (SCDHEC) and every four to five years by the EPA.

Military operations have been on-going at Fort Jackson for over 90 years. During that time the industrial operations have grown in support of the training programs. Former industrial activities generated wastes, which were stored, treated or disposed of at the Post according to standard practices at that time. As a result, there are multiple contaminated soil and/or groundwater sites on Fort Jackson. No contaminants are known to exist and no evidence of contaminants is present within the footprint of or vicinity of Upper or Lower Legion Lakes.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

### 3.13.2. Environmental Consequences

#### LL Alternative 1 - No Action

There are no known hazardous waste, or hazardous material sites within the immediate vicinity of Upper and Lower Legion Lakes. The No Action alternative would not result in any HTRW being created.

#### LL Alternative 2 - Remove Dam and Dike, and LL Alternative 3 (Preferred Alternative)

There are no known hazardous waste, or hazardous material sites within the immediate vicinity of Upper and Lower Legion Lakes. As is typical with large rehabilitation projects, on-site hazardous materials will be present to support equipment operations. The majority of those materials will be in the form of petroleum based fuels, oils, and lubricants. These materials will be handled and stored in accordance with all applicable state and federal laws and no negative environmental impacts, resulting from these materials, are expected as a result of construction. Best management practices such as keeping equipment in good operating condition, properly storing and handling fuels, and cleaning leaks and spills immediately would be implemented to reduce the risk of spills or other means of contamination during construction.

## 3.14. Environmental Justice and Socioeconomic Condition

### 3.14.1. Affected Environment

Upper and Lower Legion Lakes and their tailwaters pass through or are adjacent to 3 census block groups (450790115011, 450790116031, and 450790115021) (Figure 3.1). Key demographic measures for these census block groups are given in Table 3.1. The total population from the US Census Bureau's American Community Survey (ACS) within these census block groups is 8876 (Table 3.1). The percent minority within the analyzed census block groups ranges from a low of 30% to a high of 58% (Table 3.1). The mean percent minority of the five census block groups is 33%. The percent low income within the analyzed census block groups ranges from a low of 19% to a high of 41% (Table 3.1). The mean percent below the poverty level within the census block groups of interest is 45%.

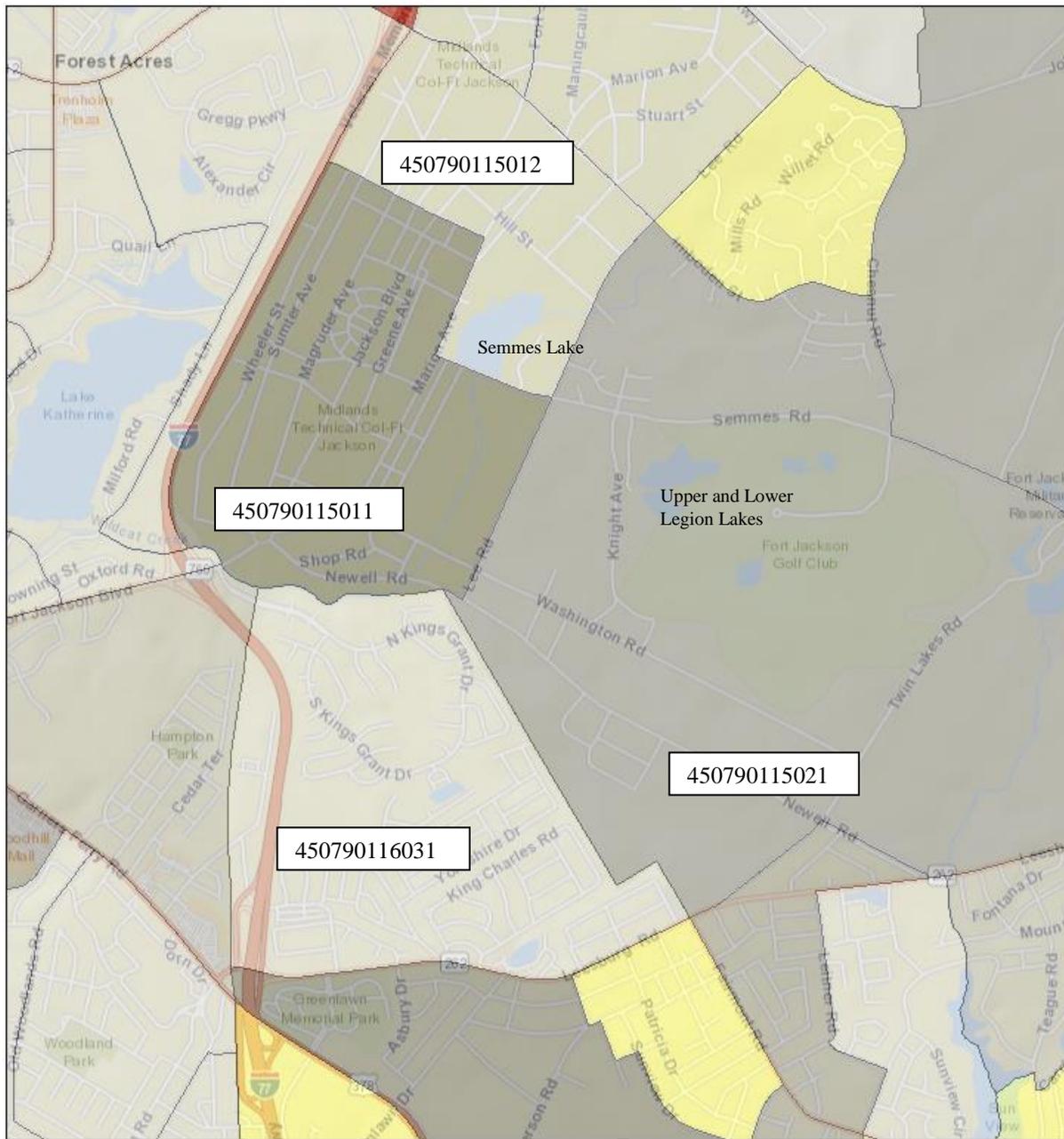
ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

**Table 3.1. Demographic data for census tracts near Upper and Lower Legion Lakes.**

<b>Blockgroup ID:</b>	450790115011	450790116031	450790115021
<b>State:</b>	SC	SC	SC
<b>Total Population (ACS):</b>	1861	4192	1814
<b>Supplementary Demographic Index:</b>			
<b>% minority:</b>	16% (52%ile)	12% (28%ile)	18% (57%ile)
<b>% low income:</b>	58% (73%ile)	30% (52%ile)	48% (67%ile)
<b>% linguistic isolation:</b>	41% (64%ile)	19% (28%ile)	40% (63%ile)
<b>% less than high school:</b>	0% (44%ile)	0% (44%ile)	0% (44%ile)
<b>% under age 5:</b>	0% (3%ile)	1% (7%ile)	4% (21%ile)
<b>% over age 64:</b>	0% (3%ile)	5% (37%ile)	14% (95%ile)
<b>Demographic Index:</b>	0% (0%ile)	13% (56%ile)	1% (1%ile)
<b>Demographic Index:</b>	49% (73%ile)	25% (40%ile)	44% (68%ile)

All data is taken from the USEPA's environmental justice mapping and screening EJSCREEN. Definitions of table metrics are available online at: <https://www.epa.gov/ejscreen/overview-demographic-indicators-ejscreen>

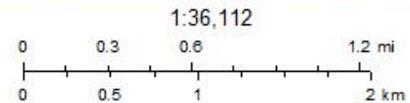
ENVIRONMENTAL ASSESSMENT  
 UPPER AND LOWER LEGION LAKES REPAIRS  
 Fort Jackson, South Carolina



February 17, 2017

**EJSCREEN\_Indexes**

- |   |                         |   |                     |
|---|-------------------------|---|---------------------|
|  | Data not available      |  | 70 - 80 percentile  |
|  | Less than 50 percentile |  | 80 - 90 percentile  |
|  | 50 - 60 percentile      |  | 90 - 95 percentile  |
|  | 60 - 70 percentile      |  | 95 - 100 percentile |



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community  
 EPA OEI, OEJ

**Figure 3.1 – Map of Upper and Lower Legion Lakes showing EJ Screen Indexes for census block groups adjacent to and immediately downstream of the lakes.**

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

### 3.14.2. Environmental Consequences

#### LL Alternative 1 - No Action, LL Alternative 2 - Remove Dam and Dike, and LL Alternative 3 (Preferred Alternative)

According to Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, each federal agency must conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, national origin, or income level. Agencies must ensure that disproportionately high and adverse effects are not being imposed on minority or low-income areas by federal actions. In addition, Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks, requires Federal agencies to assess the environmental health and safety risk of their actions on children.

The area of impact from all action alternatives does not contain disproportionate populations of minority, juvenile, elderly, or low-income communities when compared to the surrounding area. The construction area is entirely within the boundaries of Fort Jackson.

LL Alternatives 2 and 3 are not designed to create a benefit for any group or individual. There are no indications that construction of any action alternative would be contrary to the goals of Executive Order 12898, or would create disproportionately high and adverse human health or environmental impacts on minority or low-income populations of the surrounding community. Implementation of any action alternative would cause no significant adverse environmental impacts to any of the residents in the area regardless of race, national origin, or level of income of residents. In all, Fort Jackson has determined that in the absence of adverse impacts to human health, environmental health risks, and safety risk, construction of LL Alternatives 2 or 3 would have no significant or disproportional negative impacts to any communities, including environmental justice communities or children. Schools/childcare facilities and hospitals are not disproportionately located near Upper and Lower Legion Lakes.

## 3.15. Aesthetics and Recreation

### 3.15.1. Affected Environment

Upper and Lower Legion Lakes are adjacent to woodlands, a golf course and other leisure opportunities for soldiers. The lakes also provide water for irrigation of the golf course. Emergency repairs were made to Lower Legion Lake shortly after the breach of the dike for the purpose of maintaining an irrigation water source. As a result the aesthetics are largely unchanged from before the October 2015 flood. The Lower Legion Lake was recently (May 2017) stocked with catfish and grass carp.

### 3.15.2. Environmental Consequences

#### LL Alternative 1 - No Action

The No Action Alternative would maintain the current aesthetics and recreational opportunities in the area. Recreational opportunities at Lower Legion Lake have decreased when compared to pre-flood (October 2015) conditions. The lake was recently (May 2017) stocked with catfish, which provide opportunities for anglers.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

[LL Alternative 2 - Remove Dam and Dike](#)

Construction of LL Alternative 2 would create a series of wetlands and stormwater detention areas in the footprint of Upper and Lower Legion Lakes. Natural revegetation of the area would continue and some standing water would be present. To some, this could be considered as a negative impact to the aesthetics of the golf course and adjacent buildings, as views of water, such as lakes, are generally highly valued.

[LL Alternative 3 \(Preferred Alternative\)](#)

Construction of LL Alternative 3 would maintain the current aesthetics and recreational opportunities of the area. During construction the aesthetics of the area would be lessened but post construction they would return to a state similar to the pre-flood (October 2015) condition. The lakes would be restocked with a variety of sport fish after construction activities were completed.

[3.16. Maintenance](#)

[3.16.1. Affected Environment](#)

All alternatives would require some type of maintenance. General maintenance requirements for each alternative are discussed below.

[3.16.2. Environmental Consequences](#)

[LL Alternative 1 - No Action](#)

The No Action Alternative would maintain the current conditions at Upper and Lower Legion Lakes. The repairs to lower Legion Dike were emergency repairs and would require significant maintenance to maintain over time.

[LL Alternative 2 - Remove Dam and Dike](#)

Maintenance for this alternative would include required maintenance to the storm water detention structures/wetlands, particularly after storm events, management of vegetation on the earthen berms, and likely mosquito abatement. Maintenance would include vegetation management and control of vegetation on the earthen dikes that create the detention areas. Roots from large shrubs and trees would weaken the integrity of the earthen embankments and would be periodically removed.

[LL Alternative 3 \(Preferred Alternative\)](#)

Maintenance for this alternative would include periodic maintenance and inspection. Maintenance will require vegetation management on the dam. Roots from large shrubs and trees would weaken the integrity of the dam and would be periodically removed. This alternative would require the least maintenance of the considered alternatives. Additionally application of additional mosquito control measures to the area is not anticipated with this alternative, as the amount of stagnant water would be minimal and the presence of fish and other aquatic life that eat mosquito larva would further control mosquito populations.

[3.17. Best Management Practices and Mitigation Measures](#)

In order to reduce environmental impacts best management practices and mitigation measures will be used during construction of any Action Alternative. These measures are outlined in Table 3.2.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

**Table 3.2. Best Management Practices (BMP) and Mitigation Measures**

<b>Resource</b>	<b>Impact</b>	<b>BMP and Mitigation Measures</b>
Climate	Greenhouse gas emission	To reduce greenhouse gas emissions the following BMP will be utilized as needed; reducing fugitive dust emissions, avoiding the unnecessary idling of construction equipment; and maintaining construction equipment in good operating condition.
Physiography, Geology, Topography, and soils	Soil erosion during construction	To reduce soil erosion the following BMP will be utilized as needed; silt fencing and/or other control devices; mulching; removing mud/soil from pavement; temporary seeding; minimize exposed soil during construction; and other erosion control practices.
Surface water and Stormwater	Increased turbidity and sedimentation during construction	To reduce stormwater velocity the following BMP will be utilized as needed; limiting of the amount of disturbed area not stabilized at a time; staging and/or phasing of the construction sequence; sediment basins and sediment traps; diverting off-site flow around the construction site; and controlling the drainage patterns within the construction site. To reduce stormwater velocity the following BMP will be utilized as needed; surface roughening along slopes; sediment basins and traps; level Spreaders; erosion control blankets; turf reinforcement mats; riprap; and staging and/or phasing of the construction sequence.
Air Quality	Emissions during construction	To reduce impacts to air quality the following BMP will be utilized as needed reducing fugitive dust emissions by; avoiding the unnecessary idling of construction equipment; imposing a strict slow speed limit for vehicular traffic in the construction site; wetting areas to reduce dust, and maintaining construction equipment in good operating condition.
Noise	Noise during construction	To reduce noise the following BMP will be utilized as needed; limiting work to daylight hours; and avoiding the unnecessary idling of construction equipment.
Hazardous Materials and Hazardous Waste management	Waste during construction	To reduce Hazardous Materials and Hazardous Waste the following BMP will be utilized as needed; keeping equipment in good operating condition; properly storing and handling fuels; and cleaning leaks and spills immediately.

## 4. Cumulative Impacts

Cumulative impacts are defined in the Council on Environmental Quality (CEQ) regulation (40 CFR § 1508.7) as:

*“...the impact on the environment, which results 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*

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

*actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.”*

There are two reasonably foreseeable future projects within the Wildcat Creek watershed. Fort Jackson is currently formulating and evaluating alternatives to address the breach of Semmes Lake during the October 2015 flooding event. A variety of alternatives are being evaluated by Fort Jackson and will be released for public and agency review and comment in the near future as part of the Semmes lake EA. It is expected that the selected alternative from that analysis will not result in any loss of stormwater detention when compared to pre-flood (October 2015) conditions. Fort Jackson is also currently designing a new privatized army lodging hotel and associated parking for near term construction. A drawing giving an overview of the project can be found in Appendix E. An assessment of this action is provided in the Final Environmental Assessment for Implementation of the Privatization of Army Lodging Program at Fort Jackson, South Carolina, 2012. Construction of the hotel would lead to an increase in the amount of impervious surfaces and stormwater runoff within the Wildcat Creek watershed. However, measures to mitigate these increases, such as storage of stormwater, are planned to ensure that no net increase in stormwater runoff occurs.

The impacts of the preferred alternative for Upper and Lower Legion Lakes, when considered along with past, present and reasonably foreseeable future actions, are cumulatively insignificant. All impacts from the preferred alternative are minor, temporary, and construction-related impacts and are not expected to contribute significantly to cumulative impact. In part because of compliance with stormwater management measures, recent past present and reasonably-foreseeable future actions on Ft. Jackson in the Wildcat Creek watershed area expected to likewise be minor and largely construction-related. The hotel development within the watershed will not negatively impact or increase storm water runoff because of stormwater management measures, and the replacement of Semmes Lake dam is also expected to maintain the pre-breach level of runoff and downstream flow. No additional development on Fort Jackson within the Wildcat Creek watershed is reasonably foreseeable at this time. Areas outside the drainage area of Upper and Lower Legion Lakes, especially in the City of Columbia are growing. If development trends in these areas continue and the amount of impermeable surfaces increases, the adequate stormwater detention provided by the Preferred Alternative would have a positive benefit to areas downstream of Upper and Lower Legion Lakes. It is also expected that development outside of Ft. Jackson will comply with appropriate stormwater management requirements. Continuation of positive benefits to recreation, aesthetics, erosion prevention, water resources, and stormwater detention would occur with construction of the preferred alternative. Any impacts associated with the preferred alternative, when added to other past, present and reasonable foreseeable future actions are collectively insignificant as the preferred alternative would return Upper and Lower Legion Lakes to pre-storm conditions.

## 5. Public Involvement and Coordination

The CEQ regulations require that agencies “(a) make diligent efforts to involve the public in preparing and implementing their NEPA procedures and (b) Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or affected.” (40 CFR 1506.6(a) and (b)). As such, this document has been coordinated with Federal, State, and local government agencies having jurisdictional responsibilities, or otherwise having an interest in the project; Native American Tribes; Local Home Owners Associations;

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

media outlets; and the members of the public. All comments received during the comment period are included in Appendix F and responses to comments are incorporated into the Final EA or addressed in Appendix F. In addition to required coordination, a public meeting was held on December 14, 2016 to inform the public of alternatives being considered for the rehabilitation of Semmes Lake and Upper and Lower Legion Lakes. A summary of comments received from this meeting is included in Appendix G.

## 6. Conclusion

This EA evaluates the potential effects on the natural and human environment from the proposed rehabilitation of Upper and Lower Legion lakes. The EA examines the proposed action (Preferred Alternative), other viable alternatives, and a No Action Alternative. This EA evaluates potential long- and short-term effects on Land Use, Climate, Physiography, Geology, Topography, and Soils, Surface Water and Storm Water, Ground Water, Floodplains and Wetlands, Fish and Wildlife, Vegetation, Threatened and Endangered Species, Air Quality, Noise, Cultural Resources, Hazardous Materials & Hazardous Waste Management, Environmental Justice and Socioeconomic Conditions, Aesthetics and Recreation, and Cumulative Impacts.

Based on the foregoing, the proposed action (the preferred alternative) will not result in significant impacts on the quality of the human environment. Additionally, the implementation of best management practices and related mitigation measures (section 3.16) will help to ensure that the minor negative effects to the individual factors discussed above are further minimized to the extent practicable. Therefore, an Environmental Impact Statement is not required. A Finding of No Significant Impact has prepared. Fort Jackson selected the preferred alternative Upper and Lower Legion Lakes by considering the following criteria (Table 6.1):

- Does the alternative meet dam safety standards?
- Does the alternative restore historic stormwater storage functions?
- Does the alternative have no significant impacts to environmental resources?
- Does the alternative cause no impacts to the floodplain?
- Does the alternative provides recreational opportunity and aesthetic value for the community and visitors?
- Does the alternative minimize maintenance requirements?

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

**Table 6.1 - Summary of Each Alternative’s Ability to Meet Selection Criteria**

<b>Criterion</b>	<b>LL No Action</b>	<b>LL Alt. 2</b>	<b>LL Alt. 3 Preferred Alternative</b>
Does the alternative meet dam safety standards	Does Not Meet Criteria	Meets Criteria*	Meets Criteria
Does the alternative restore historic stormwater storage functions	Meets Criteria	Meets Criteria	Meets Criteria
Does the alternative have no significant impacts to environmental resources	Meets Criteria	Meets Criteria	Meets Criteria
Does the alternative cause no impacts to the floodplain	Meets Criteria	Meets Criteria	Meets Criteria
Does the alternative provides recreational opportunity and aesthetic value for the community and visitors	Meets Criteria	Does Not Meet Criteria	Meets Criteria
Does the alternative minimize maintenance requirements	Does Not Meet Criteria	Meets Criteria	Meets Criteria

\*Does not involve construction or maintenance of a dam so dam safety standards are not applicable.

## 7. References

Federal Emergency Management Agency

2017. FEMA Flood Map Service Center.

<https://msc.fema.gov/portal/search#searchresultsanchor>. Search conducted February 7, 2017.

National Weather Service

2015. Historic rainfall and flooding October 2015.

<http://www.weather.gov/cae/HistoricFloodingOct2015.html>. Search conducted February 7, 2017

U.S. Department of Agriculture.

2016. *Web Soil Survey*. <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>.

Search conducted February 7, 2017.

U.S. Environmental Protection Agency

2016. What Climate Change means for South Carolina.

<https://www3.epa.gov/climatechange/Downloads/impacts-adaptation/climate-change-SC.pdf>. Accessed October 25, 2016.

ENVIRONMENTAL ASSESSMENT  
UPPER AND LOWER LEGION LAKES REPAIRS  
Fort Jackson, South Carolina

- U.S. Environmental Protection Agency  
2016. EJScreen. <https://ejscreen.epa.gov/mapper/>. Search conducted January 19, 2017.
- U.S. Environmental Protection Agency  
2016. EnviroMapper. <http://www.epa.gov/emefdata/em4ef.home>. Search conducted January 19, 2017.
- U.S. Fish and Wildlife Service  
2017A *Online-Wetlands Mapper*. <http://www.fws.gov/wetlands/Data/Mapper.html>. Search conducted January 07, 2017.
- U.S. Fish Wildlife Service South Carolina Field Office  
2016. Endangered, Candidate and At-Risk Species County Listings.  
[http://www.fws.gov/charleston/EndangeredSpecies\\_County.html](http://www.fws.gov/charleston/EndangeredSpecies_County.html). Accessed February 7, 2017.