Draft Environmental Assessment

City of Columbia
Columbia Canal 2015 Flood Repairs
PA-04-SC-4241-PW-00289(1)
Columbia, Richland County, South Carolina

April 2024

U.S. Department of Homeland Security
Federal Emergency Management Agency Region 4
Atlanta, Georgia

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

BMPs	Best Management Practices
BRIC	Building Resilient Infrastructure and Communities
CAA	Clean Air Act
CDBG	Community Development Block Grant
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLOMR	Conditional Letter of Map Revision
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DR	Disaster Recovery
EA	Environmental Assessment
EJScreen	EPA Environmental Justice Screen Tool
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
FPPA	Farmland Policy Protection Act
GHG	Greenhouse Gas
HUD	Department of Housing and Urban Development
IPaC	Information for Planning and Consultation
MBI	Michael Baker International, Inc.
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places

NWI	National Wetland Inventory
OSHA	Occupational Safety and Health Administration
PA	Public Assistance Grant Program
PR&G	Principles, Requirements, & Guidelines for Fed. Investments in Water Resources
RCRA	Resource Conservation and Recovery Act
SC	South Carolina
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCDOT	South Carolina Department of Transportation
SCE&G	South Carolina Electric and Gas
SCEMD	South Carolina Emergency Management Division
SHPO	State Historic Preservation Office
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
THPO	Tribal Historic Preservation Office
TSCA	Toxic Substances Control Act
USACE	United State Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WOUS	Waters of the United States

1.0 INTRODUCTION

The State of South Carolina (SC) experienced severe storms and flooding between October 1, 2015 and October 23, 2015, bringing rainfall that exceeded once in a thousand-year levels. The total rainfall amounts ranged from twelve to over twenty-one inches heavily impacting critical infrastructure and utility capabilities (NWS 2015). A rainfall amount graph is included in **Appendix A**. President Obama signed a major disaster declaration (FEMA-DR-4241-SC) on October 5, 2015 authorizing the Department of Homeland Security's Federal Emergency Management Agency (FEMA) to provide federal assistance to the designated areas of SC. This assistance is provided pursuant to the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), and Public Law 93-288, as amended (42 U.S.C. §§ 5121-5207). Stafford Act authorizes FEMA through its Public Assistance (PA) Grant Program to fund the repair, restoration, and replacement of state, tribal and local government and certain private nonprofit facilities damaged as a result of the disaster event.

Richland County, SC was designated as a county eligible to receive federal assistance under FEMA-DR-4241-SC. The City of Columbia has applied through the PA Grant Program to receive funding for repairs to the Columbia Canal's (herein Canal) hydroelectric plant, spillway, headgates, the embankments, and the channel or canal bottom. The City of Columbia (herein City), having legal responsibility to maintain the Canal, is eligible for funding though the FEMA PA Grant Program pursuant to Title 44 CFR Part 206.223(a)(3). The FEMA project ID for this proposed action is PA-04-SC-4241-PW-00289(1). The Canal is a City-owned and maintained facility frequently inspected by the Federal Energy Regulatory Commission (FERC) and the South Carolina Department of Health and Environmental Control (SCDHEC). The City will be coordinating with United States Army Corps of Engineers (USACE) and SCDHEC to obtain any necessary permits and will comply with applicable conditions including meeting any existing and future FERC licensing requirements.

This draft Environmental Assessment (EA) has been conducted in accordance with National Environmental Policy Act (NEPA), the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508) and regulations adopted pursuant to the Department of Homeland Security Directive 023-01, Rev 01, and FEMA Directive 108-1. FEMA is required to consider potential environmental and cultural resource impacts before funding and approving actions and projects. FEMA will use the findings in this EA to determine if an Environmental Impact Statement (EIS) is required, or if the project can be authorized under a Finding of No Significant Impact (FONSI). FEMA is required to consider potential environmental impacts before funding or approving actions and projects.

A Principles, Requirements, and Guidelines for Federal Investments in Water Resources (PR&G) analysis is required for federal investments that by purpose, directly or indirectly, alter water resources by affecting water quality or quantity, and have at least $10 million in project costs. The information reviewed under the analysis is included throughout the EA. These water resources projects include those involving navigation, flood control, water supply, hydropower, ecosystem restoration, or recreation. The PR&G is intended to provide a framework for federal agencies to evaluate proposed water resources projects that balances consideration of economic, social, and environmental objectives. FEMA's PR&G Agency Specific Procedures are found in the FEMA Instruction 108-1-1 (FEMA, 2018). The PR&G and NEPA analyses are incorporated together throughout this EA and with consideration of the connected actions to the Canal facility and surrounding areas of potential effects.

2.0 PURPOSE AND NEED

The purpose of FEMA's PA is to provide financial assistance to eligible applicants to fund the repair, restoration, and replacement of state, tribal, territorial, and local government and certain private nonprofit facilities damaged as a result of the disaster event. As a result of the 2015 flooding, the Canal sustained heavy damages and required temporary emergency repairs to prevent further damages to the Canal and protect the nearby commercial and residential properties. Currently, the Canal is operating at a diminished capacity and is vulnerable for further damage if a similar flooding event was to occur. The need of the proposed project is for the restoration repairs of the Columbia Canal facility. The Canal serves as the main drinking water source for the majority of the City and surrounding areas for critical facilities. The Columbia Canal water treatment plant provides drinking water to the majority of the 430,000 people served by Columbia Water. It serves five (5) major hospitals (including the only Level 1 Trauma facility in the region), 16 police stations, 30 fire stations, six (6) universities and colleges, and numerous government facilities (including federal facilities). It also serves two (2) military bases: Fort Jackson, the Army's primary training base, and McEntire Joint National Guard Base. The proposed action will restore the Canal to full capacity in providing drinking water to the City and surrounding communities, restore energy production capacity at the hydroelectric plant, and restore the economic and social benefits associated with the green space use the Canal facility provides. Additionally, the federal action would decrease the risk of future damages during a similar event through improvements and mitigation measures built into the repair design. A completed and restored Canal should assist in the revitalization of the surrounding area of the Canal to both City of Columbia's and the City of West Columbia's local businesses and citizens.

The Canal, including the 10-Megawatt hydroelectric power plant are owned, maintained, and operated by the City. The Canal is approximately three (3) miles long, extending from the northernmost point at the diversion dam to the hydroelectric plant on its most southern end. At the top of the earthen embankments there is a pedestrian trail called the Three Rivers Greenway (Greenway) with grassed shoulders and riprap at the toe of the canal. The entire Canal and associated structures, buildings, and objects are listed on the National Register of Historic Places (NRHP). The Canal was originally built between 1820 and 1824 and later expanded in 1891 as a navigable waterway paralleling the Broad and Congaree rivers. The Canal has been used for hydroelectric power generation for the City since 1892 (discharge up to 6,000 cubic feet per second of flow) and as a water source for the city water works since 1895 via the water treatment plant withdrawing up to 60 million gallons per day. Note there are three hydroelectric plant structures or powerhouses at the Columbia Canal. Two of those are currently decommissioned, are in ruins, and don't have the ability to produce electricity and the 1896 hydroelectric plant (herein hydroelectric plant) will be able to produce electricity after repairs. One hydroelectric powerhouse ruin is located immediately north of Klapman Bridge (34.000168, -81.052279), the other ruin is located within the breached area (33.998013, -81.050065), and the hydroelectric plant is located on the far southern end (33.997170, -81.049314) by the promenade between the river tailrace and the canal channel. Location maps are included in **Appendix B**.

A variety of land use include utility (power and water), transportation with the nearby railroad to the east, parks and greenspace (jogging, special events, and fishing), and urban uses such as the notable commercial and residential development occurring due east of the Canal. The project area along the embankments consists of mixed hardwood forests with a diversity of trees and plant species (MBI 2017). The project site has areas located adjacent to and within a riverine and freshwater forested/shrub wetland habitat as indicated by review in the United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) website (USFWS NWI). See **Appendix C** for wetland maps. The Congaree River forms at the confluence of the Broad River to the north and the Saluda River to the west. The Congaree and Broad rivers near the Canal have a moderate to fast water flow with a large amount of rock outcroppings and small islands scattered throughout. The Congaree has an unconsolidated bottom with at least 25% cover of particles smaller than stones and a vegetative cover less than 30%.

Since the flooding event in 2015, the Canal has not been generating electric power and is limited in its water source capacity. On October 4, 2015 runoff from the record rain event overtopped the embankments resulting in a breach (33.998034, -81.050163) immediately upstream of the hydroelectric plant. Water flow through this breach led to the rapid dewatering of the canal and soon after several emergency measures were taken to minimize further damages to the surrounding area. A rock dam (emergency cofferdam) was built across the canal upstream of the breach (33.99978, -81.05122), just south of the Klapman Blvd. Bridge, to allow the water level to be

raised enough to supply water to the intakes (34.003737, -81.054591) at the City of Columbia Water Works. The sudden drop in the water levels in the canal resulted in localized bank failures of the embankments both to the interior and exterior (riverside), directly south and north of the emergency cofferdam. North of the emergency cofferdam, various sections of the embankments experienced erosion to the toes between the Broad River Bridge and the canal to the spillway. Eroded earthen material was displaced from the embankment breach to the Congaree River due south of the hydroelectric plant directly underneath the Gervais Street Bridge and is known as the tailrace of the Canal. Much of the lower canal running from the Klapman Blvd Bridge (34.000024, -81.051508) down to hydroelectric plant including breached area (33.997944, -81.050366) are overgrown with vegetation and primarily dry with some ponding after rain events.

The hydroelectric plant remains inoperable, the breached embankment is still open, and the emergency cofferdam remains in place. The Greenway starting from the spillway to hydroelectric plant is closed off from the public for safety reasons. Although, north of the spillway the trail is currently open to the public. Joint FEMA and South Carolina Emergency Management Division (SCEMD) site inspections were conducted after the flood event in 2016 and on March 16, 2017 with Environmental Planning and Historic Preservation staff. FEMA, SCEMD, City, and the South Carolina State Historic Preservation Office (SHPO) completed a site visit on August 2, 2021.

3.0 ALTERNATIVES

Under NEPA, this EA is required to analyze the potential environmental impacts of the No Action Alternative, Proposed Alternative, and reasonable alternatives. Reasonable alternatives are those that meet the purpose and need for the proposed action, are feasible from a technical and economic standpoint, and meet reasonable screening criteria (selection standards) that are suitable to a particular action. Screening criteria may include requirements or constraints associated with operational, technical, environmental, budgetary, and time factors. Alternatives that are determined not reasonable can be eliminated from detailed analysis in this EA.

The alternatives considered in addressing the stated purpose and need are the No Action Alternative and two other Action Alternatives - Pre-disaster Condition and Proposed, respectively. The No Action Alternative would leave the Columbia Canal as is, the Pre-disaster Condition Alternative would repair the Canal to its exact pre-disaster design and capacity, and the Proposed Alternative is to improve various elements pertaining to the rebuild of the lower canal embankment. One alternative was ultimately dismissed due to operational, technical, and licensing requirement constraints. The Proposed Alternative was deemed practicable and selected for further analysis including the No Action Alternative.

3.1 Alternative 1: No Action Alternative

Under Alternative 1, there would be no FEMA funding toward the repairs of the Columbia Canal facility and thus, there would not be a repair, the hydroelectric plant would not generate electricity, drinking water production would continue to operate at a lower capacity, and recreational opportunities would continue to be limited. Consequently, the area would not be protected from the impacts of future storm events potentially adversely affecting critical infrastructure and services. Improved property would continue to be vulnerable and increased benefits to socioeconomic values would not occur.

3.2 Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, the Canal would be repaired and improved from the pre-existing design and capacity. Consequently, the hydroelectric plant would be able to generate electrical power, there would be a return to pre-disaster production of drinking water to the community, and it would allow recreational events to occur again in the affected area. The improvements to the embankment and canal would be better protected from repetitive damages during a similar flooding event. The PA Grant Program would fund the Federal share of the repairs to four components of the Canal facility:

1. Hydroelectric Plant
2. Spillway
3. Headgates
4. Embankments and Channel

The proposed work would entail replacement and repairs to the electrical power generating components of the granite block and brick hydroelectric plant, as well as other damages to the facility located at the far south end of the Canal across from the promenade. To mitigate the damages from water flowing down to multiple rooms resulting in a depth of 12 feet of flooding, it is proposed to use “water logs” or door dams to block the openings of each of the doors.

Repairs at the spillway which utilize stop logs (long beams) and tainter gates (radial or ray-like floodgates); both are used in dams and canal locks to control water flow, located approximately 260 yards north of Klapman Bridge would involve replacing the stop logs and doing some minor patching to a masonry block wall. Additional work just north of the spillway and south of the pedestrian bridge, would entail the removal of a temporary embankment repair consisting of a sheet metal headwall and fill material performed immediately after the incident and the waterproofing of a block wall located behind the embankment. The removal and reinstallation of a small bridge over the damaged area will also be required as part of the permanent repair. The

emergency sandbags and other debris lodged under the headgates located at the northern point of the Canal would be removed and taken to state permitted final disposal location. The emergency bulkheads (steel blocking panels) would be removed from the twelve gate openings at the headgates. These were placed there to stop water flow through the head gate mechanism as emergency protective measures for immediate life safety and protection of properties.

The embankments and channel repairs of the Canal would be the most extensive of the proposed work. For the purpose of simplicity and organization, the embankment repairs are divided into two specific sections known in this EA as the upper Canal embankment repairs and the lower Canal embankment repairs. The upper Canal repairs would consist of repairing approximately 13,650 linear feet of the embankment toe and approximately 10,575 linear feet of slope or soil slip area of the embankment. The embankment toe is considered to be the area from the canal channel water surface to the canal channel bottom where the flooding event scoured (washed out) soil and riprap (human emplaced rock for erosion control) and slope is the area of the embankment from the canal channel water surface to the crest of the embankment or where the Greenway is located. See **Appendix B** for repair locations of toe scour and embankment repairs to the upper Canal portion of the proposed action area.

Repair work involving the upper Canal embankments will be limited within the canal waterway and will not occur on the riverside embankment. Sections of the slope repairs may require the clearing of grass, shrubs, and other vegetation including the removal of the asphalt walking path of the Greenway. This would be the result of the need to reshape the toe and slope to meet the engineered dike requirements for a hydroelectric producing facility. To achieve this, two (2) feet will be cut into the existing dike for every one (1) vertical foot to provide a bond bench or setback for compacted select fill to be placed. This can be thought of as a staircase for soil that will provide a foundation for stabilizing the dike's slope. The toe scour areas would be graded evenly with the slope, backfilled appropriately, and surfaced with riprap armoring. In between the toe repair and the slope there would be a #57 stone cap made up of a commonly used crushed stone that is seen used for driveways and railroad tracks. Back on the slope, from the stone cap going about five feet above the water surface riprap with geotextile fabric would be placed on the new slope. Above this riprap, turf reinforcement matting (an erosion control blanket promoting vegetation growth) would be placed and extend to the top of the slope to about where the preexisting asphalt path of the Greenway was. To facilitate the construction work on the upper Canal area, a construction office and laydown yard would be established within an existing parking area immediately southeast of the headgates. Although, the existing area would be too small for the amount of soil, rocks, and equipment necessary for the repairs will have to be expanded. This would require clearing a forested area due south of the existing parking area resulting in cutting vegetation and trees flushed to the ground (stump grinding), placement of geotextile fabric, and placing gravel to establish the material handling area. When work would be complete, the gravel and geotextile fabric would be

removed, and the area will be revegetated and replanted with native grass, shrubs, and tree species. Four barge landing areas would be constructed by the placement of small to medium diameter shot rock from the edges of the upper canal dike embankment into the Canal channel waters. Total estimated quantity per landing is 600 cubic yards of stone material underlain by nonwoven geotextile fabric.

Repair work involving the lower Canal embankments would involve the area between the spillway down past the Klapman Bridge to the hydroelectric plant. Work between the Klapman Bridge to the hydroelectric plant would require Canal channel repairs. The end product would be a rebuilt dike section using a lock and key to bedrock method that would tie into the existing and undamaged dike section to the north and tie into the southern dike section close to the hydroelectric plant. The Canal's channel would be cleared of eroded and displaced soil and rock material. See **Appendix B** for various actions and locations that would be involved for the lower Canal restoration work. The following is a sequence of how the construction work could play out but ultimately the means and methods would be at the decision of the contractor(s) doing the construction work.

Site Preparation Phase:

1. Mobilization of mobile construction offices, equipment, and materials at various existing staging and access points.
2. Williams Street south of the Klapman Boulevard/Williams Street intersection and Washington Street would be closed to local traffic and used as the primary haul route for approximately 3,300 truckloads of materials and additional equipment haul transport. The route will be from Klapman Boulevard approximately 400 linear feet on Williams Street and 600 linear feet on Washington Street to the canal breach holding area and material yard. Both roads would be repaired if damaged during the construction.
3. The construction vehicle route would continue from Washington Street southeastward then meander northward through and past an existing stockpile staging area that would be used as a material and equipment staging site. The route would continue and cross over the emergency cofferdam that is under and directly south of Klapman Bridge continuing onto the existing Greenway.
4. North of Klapman Bridge would need to be site prepped for receiving construction equipment and would require demolition of the existing Greenway asphalt path including removal of a powerplant ruins.
5. Existing electrical transmission towers would be removed and relocated while the foundations would remain.
6. Approximately 12,750 linear feet of double silt fencing would be placed on the edges of the limit of disturbance on the riverside landmass to control silt runoff to the river, would install a turbidity curtain directly downstream of the hydroelectric plant within what is

called a tailrace, and would construct a temporary dewatering berm tied to the existing dike.

7. A material handling/turnaround area would need to be constructed between the dike and the dewatering berm to act as a turnaround for construction equipment and enough room to construct a temporary cofferdam within canal north of the existing emergency cofferdam. This material handling area will require temporary fill be placed to the west of the existing embankment for grading purposes. As this riverside area is noted as having potential existing cultural resources, a disturbance barrier consisting of concrete matting or geotextile liner will be placed over native ground prior to temporary fill placement. Upon completion of the work in this area, the temporary fill will be removed with the notification barrier to indicate original ground surface elevation in this area and serve as a limit of disturbance, vertically.
8. This temporary cofferdam would be made up of non-woven geotextile fabric and riprap with a high-density polyethylene liner on the upstream or northern side of the cofferdam.
9. The goal of the cofferdam would be to facilitate the lower canal repair work in the dry (without water or wet conditions) regarding both the dike rebuild and the channel grading.
10. Upon installation of the new temporary cofferdam and dewater facilities, demolition of the existing embankment and existing emergency cofferdam will commence.

Dike Rebuild and Channel Reshaping to Pre-disaster Phase:

1. It is anticipated the rebuilding of the dike would start on the northern end and proceed southward to the breach.
2. The embankment and breach repairs would require a series of key shaped cuts to reach bedrock, or very near bedrock. Approximately 25,000 to 430,000 cubic yards of material may be required to be removed and replaced to construct the key shaped cuts.
3. The existing dike would be completely removed from the northern end of the powerhouse ruins (which would need removing if previous site preparation phase was able to avoid it) all the way past the breached area by 125 feet or so.
4. The temporary berm would be in place holding back any riverside land flooding during the construction and would be keeping the construction area in the dry from water entry via breach area.
5. An existing power substation northwest of the hydroelectric plant and on the edge of the breach would be removed by the energy company, Dominion Energy.
6. Within the breach area is the remains of the 1894 powerhouse’s stone foundation embedded in the dike and would be removed.
7. After removal of the existing dike is complete, improved compacted fill material would be brought in to build up the new dike with the approved reconstruction slope on both embankments of the new dike.

8. One and half (1.5) feet thick of riprap with geotextile for separation would be placed on the reconstructed embankments from the toe on the canal channel side to almost up to the crest or where the Greenway path would be. The riprap on the riverside embankment would go down to the where the embankment and riverside landmass meet.
9. When all is said and done for the dike rebuild, it would take at approximately 90,000 cubic yards of material for a total distance of 1,275 linear feet to complete the dike rebuild.
10. Next, the Canal's channel located from the emergency cofferdam to the promenade area would be reshaped to the previous engineered elevation and grade.

Demobilization Phase:

1. Replace all fencing, lighting, ramps, power poles, power lines, electrical towers, park benches, overlooks, small bridge on the dike by the spillway, and the restoration of the Greenway paved path and the natural running path.
2. Fertilize and seed the embankments and replant any trees.
3. Gradually release water to fill the canal and remove the temporary cofferdam within the Canal.
4. Replace approximately 16,000 feet of fiber optic data cable from the hydroelectric plant to the headgates.
5. Demobilize construction offices, equipment, and remaining staged materials.
6. Repair any damaged roads and paths remaining.

Additionally, there is potential for further infrastructure improvements and recreational opportunities with the completion of the proposed alternative. There are two known and foreseeable projects currently in design and permitting phases. There is a Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) Mitigation project for the rehabilitation of the Canal headgates. The City has requested the release of funds to HUD pending review. The City is aiming for procurement in the second quarter of 2024 with construction planned for late 2024 or early 2025 pending FERC licensing review. Construction will occur independently of the PA project. Additionally, the City has applied and been approved for grant funding from the FEMA grant, Building Resilient Infrastructure and Communities (BRIC). The proposed action is for the construction of an alternate water intake facility as a measure to meet Federal Energy Regulatory Commission's requirements. The water intake facility is to be constructed within the limits of the Congaree River adjacent to the Canal Water Treatment Plant. This will serve as an alternate intake location to the existing intake within the limits of the Canal and provide redundancy to protect the City's ability to withdraw and treat water from the Broad and Congaree rivers. In addition, a small access bridge is to be built crossing the Canal's channel with twin 48-inch diameter waterlines on top of the bridge. The twin waterlines will pump water from the Congaree River to a retention pond on the Columbia side. A FEMA EA was

completed for the BRIC project on December 4, 2023 and can be found here: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/environmental-assessment-city-columbia.

USACE permitting has been signed and authorized under SAC-2020-01429 dated January 22, 2024. This EA takes into consideration of the foreseeable connected actions as required by NEPA. Note that the considerations included in this EA are using the best available data regarding the construction designs for both projects. See Section 6.0 Cumulative Impacts for impact consideration to resources that the proposed Columbia Canal projects may have as a whole.

3.3 Alternative 3: Repair the Columbia Canal to pre-disaster design and capacity (Dismissed Alternative)

Under Alternative 3, the Canal would be repaired to pre-disaster design and capacity meaning it would go back to exactly how it was prior to the 2015 flooding event. Theoretically, the hydroelectric plant would be able to generate electricity again, return to pre-disaster production of drinking water to the community, and allow full recreational events to occur again in the affected area. The area would still be susceptible to repetitive damages during a similar flooding event with a significant risk of losing the water supply source once more. Furthermore, without the replacement of the lower canal embankment and other Canal features to updated codes, standards, and licensing approval the Canal will not be able to perform it's intended purpose of supplying critical utilities to the community; and therefore, this alternative was dismissed from further analysis.

3.4 Summary

FEMA's PR&G Agency Specific Procedures require that, in addition to meeting the purpose and need, the alternatives for the water resources project must also be evaluated against their ability to achieve the Federal Objective and conform to the Guiding Principles.

The Federal Objective specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

1. Seeking to maximize sustainable economic development;
2. Seeking to avoid the unwise use of floodplains and flood-prone areas and maximizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
3. Protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The Guiding Principles are the six overarching concepts the Federal government seeks to promote through Federal investments in water resources. The Guiding Principles are:

1. Healthy and Resilient Ecosystems
2. Sustainable Economic Development
3. Floodplains
4. Public Safety
5. Environmental Justice
6. Watershed Approach

Each Guiding Principle is further defined in Section 4.3 of the FEMA EHP Instruction starting on page 45 (FEMA, 2018). The alternatives are compared against the Guiding Principles in Table 1 below.

Table 1: PR&G Guiding Principles by Alternatives Not Dismissed

Resource Type	Healthy and Resilient Ecosystems	Sustainable Economic Development	Floodplains	Public Safety	Envir. Justice	Watershed Approach
Alternative 1: No Funding and No Construction at Canal	Impacts riverine wetlands by allowing continued erosion of damaged embankments to continue resulting in a river that will eventually be as wide as it is to the north of the headgates.	The Canal facility will continue to have embankment erosion; current residential and commercial use properties will decrease in values.	The regulatory floodway will exist as is and eventually expand as the stream order (size, depth, velocity) morphs over time; the Canal and cityside embankments will continue to be flood prone.	Adverse impacts due to continued flooding are very likely and is to likely increase as the severity and frequency of storms intensify. Eroded earthen and construction materials in the embankments may present threats to nearby infrastructure. Drinking water services will continue to not be fully restored to residents.	The city limits have a population of 21.8% that is within or below the poverty level. See section 5.6.5 for additional Census information. Adverse impacts to low-income communities will likely occur for increase to water bills and decrease in property values.	The Canal's channel will remain as is for some time but would continue to be flood-prone and eventually the river sections in the immediate area and downstream will behave as a stream/river system before the embankments were put in place during the 19th century.

Resource Type	Healthy and Resilient Ecosystems	Sustainable Economic Development	Floodplains	Public Safety	Envir. Justice	Watershed Approach
Alternative 2: Repair and Improve Canal Facility	Impacts to low tree canopy along the riverside embankments with the tradeoff of a more stabilized embankment, meeting licensing requirements or BMPs in terms of avoiding future breach points and decreasing the potential for affected water quality that may result in turbidity from eroding embankments and slopes.	Protected critical utilities for hydropower and drinking water will assist nearby local businesses to operate to a pre-disaster business plan while seeking to maximize sustainable economic development through wise use of floodplains or flood-prone areas.	The regulatory floodway will likely exist as is and floodplain values restored to pre-disaster condition; the effects by the floodplain values would be further minimized by improved soils in the embankment and critical drinking water services reinforced in future, similar flood events. Furthermore, other actions to construct a resilient water intake structure will provide the community an additional means of receiving safe drinking water and an improved headgate structure to respond quicker to flood events.	Drinking services will to residents will be completely restored as well as protected during future similar flood events resulting in an increase in resiliency for all residents with the water service areas.	No adverse disproportio nate impacts on minority or low-income populations; the water service areas that include these populations will not see an increase in water utility fees tied to a need to offset lack of funding for restoring and improving the Canal facility; all residents and visitors are afforded the same access to designated open, green space areas throughout the Canal facility.	River and any surrounding stream channels will be maintained and receive less adverse effects to water quality due to the removal of opportunities for a high level of turbidity occurring at eroded banks; with an increase resiliency to future flood events there is a much lower risk of displaced soils going into river and stream channels.

3.5 Benefit Cost Analysis

As required under PR&G Agency Specific Procedures, FEMA's Benefit Cost Analysis (BCA) Version 6.0 online tool was utilized for the BCA. The overall costs reflect current pricing at the time of the analysis (2023 prices). See **Appendix D** for FEMA BCA completed.

4.0 AFFECTED ENVIRONMENT AND POTENTIAL CONSEQUENCES

Pursuant to Title 44 CFR Part 1508.8 impacts include ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. As required under NEPA and PR&G Agency Specific Procedures, this section addresses the Affected Environment (existing conditions) and Potential Consequences (impacts) of the Proposed Action. Impacts may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect would be beneficial. By default, impacts are defined as detrimental unless otherwise stated as being beneficial; for example, "minor benefits." When possible, quantitative information is provided to establish potential effects; otherwise, the potential qualitative effects are evaluated based on the criteria listed in Table 2.

Table 2: Impact Significance and Context Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
None/Negligible	The resource area would not be affected and there would be no impact, OR changes or benefits would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts or benefits would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts/benefits. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

4.1 Potential Environmental Consequences

The potential environmental consequences as a result of Alternatives 1 and 2 are briefly summarized below in Table 3 using the above criteria. See Sections 5.2 – 5.6 for more details on the impacts to each resource.

Table 3: Environmental Consequences and Environmental Protection Measures and Required Permits by Environmental Resource

Resource and Resource Type	No Action Impacts	Proposed Action Impacts	Environmental Protection Measures and Required Permits
Physical Resource: Geology and Soils, and Farmland Protection Policy Act (FPPA)	Moderate Impact – Not Significant	Negligible Impact – Beneficial	Erosion and sediment control best management practices.
Physical Resource: Air Quality and Clean Air Act (CAA)	No Impact	Negligible Impact – Not Significant	Construction of the Proposed Action and equipment-generated fugitive dust would be controlled using standard construction best management practices (BMPs), including watering of exposed surfaces, and enclosing or covering stockpiled material. No permitting anticipated.
Physical Resource: Climate Change	Moderate Impact – Not Significant	Negligible Impact – Not Significant	The impacts from emissions would be reduced through best management practices for the use of heavy equipment such as reduced idling time and the use of bio-diesel fuel.
Water Resources: Clean Water Act (CWA) and Surface Water	Moderate Impact – Not Significant	Negligible Impact – Beneficial	Use of BMPs during construction of the Proposed Action to minimize impacts would be required, appropriate permits would need to be acquired prior to construction, and all permitting requirements and conditions would be strictly adhered to. Expected permits include Section 404 Permit from USACE 404 and SCDHEC 401 Water Quality Certification.
Water Resource: Floodplain Management (EO 11988)	Major Impact – Potentially Significant	Negligible Impact – Beneficial	The City would be required to obtain a floodplain permit from the local floodplain administrator before work begins. The Proposed Action would require a FEMA Conditional Letter of Map Revision also known as a CLOMR.
Water Resource: Protection of Wetlands (EO 11990)	Moderate Impact – Not Significant	Minor Impact – Not Significant	Use of BMPs during construction as required by 401 and 404 Clean Water Act permitting would avoid or minimize impacts to downstream and adjacent designated wetlands.

Resource and Resource Type	No Action Impacts	Proposed Action Impacts	Environmental Protection Measures and Required Permits
Biological Resource: Fish and Wildlife	Moderate Impact – Not Significant	Negligible Impact – Beneficial	Noise generated during construction of the Proposed Action for would be limited to daylight hours to limit the duration of disturbance to wildlife. Additionally, conservation measures pertaining to federally threatened and endangered species would assist in further avoiding or minimizing any impacts to the general fish and wildlife species.
Biological Resource: Vegetation	Minor Impact – Not Significant	Moderate Impact – Not Significant	Vegetative debris generated during construction of the Proposed Action would require adhering to SCDHEC Bureau of Land and Waste Management requirements for staging and final disposal of removed vegetation. The construction work would adhere to the existing Tree Management Plan as agreed upon between City and FERC.
Biological Resource: Threatened and Endangered Species	Moderate Impact – Not Significant	Minor Impact – Not Significant	See 7.0 for the full list of conditions for construction of the Proposed Action that include halting working if listed species are present, advising on-site personnel on what and when to look for listed species in the area, BMPs with heavy equipment, working during daylight hours, and working in-water during a specific time of the year.
Biological Resource: Migratory Bird Treaty Act (MBTA)	No Impact	Moderate Impact – Not Significant	Construction of Proposed Action would require adhering to applicable nationwide conservation measures that would avoid, minimize, and reduce impacts from noise and vegetation removal activities. See 7.0 for the applicable conservation measures.
Cultural Resource: Historic and Archaeological Resources	No Impact	Major Impact – Potentially Significant	Construction of Proposed Action would result in an Adverse Effect to the Columbia Canal, a National Register Historic District. An MOA between FEMA, the City, South Carolina Emergency Management (SCEMD), and the South Carolina State Historic Preservation Officer (SHPO) was executed to mitigate these adverse impacts. Please see MOA for required cultural resource conditions and mitigation measures.
Socioeconomic Resource: Land Use and Planning	Major Impact – Potentially Significant	Negligible Impact – Beneficial	Not applicable.

Resource and Resource Type	No Action Impacts	Proposed Action Impacts	Environmental Protection Measures and Required Permits
Socioeconomic Resource: Noise	No Impact	Minor Impact – Not Significant	Noise generated from construction of Proposed Action would be intermittent, heard only during daytime, and only for the duration of the project activities. Intake and generator sound levels would be expected to be very low and have a negligible impact.
Socioeconomic Resource: Transportation and Traffic	*No Impact*	*Minor Impact – Not Significant*	City will be coordinating with SCDOT for work near and around bridges.
Socioeconomic Resource: Public Services and Utilities	*Major Impact – Potentially Significant*	*Negligible Impact – Beneficial*	City will be coordinating with Dominion Energy to ensure all electrical requirements are noted and adhered to.
Socioeconomic Resource Environmental Justice (EO 12898), Equity, and Protection of Children	*Major Impact – Potentially Significant*	*Negligible Impact – Beneficial*	To the greatest extent practicable, transport of materials to and from the construction area shall consider avoiding school zones and areas with low income and minority populations.
Socioeconomic Resource: Hazardous Materials/Wastes & Solid Waste	*No Impact*	*Negligible Impact – Not Significant*	Handling of hazardous materials and waste generated or inadvertently discovered would be handled in accordance with applicable state and federal regulations including SCDHEC Bureau of Land and Waste Management requirements.

Table 4: Resource Topics Eliminated

Resource Topic	Reason
Bald and Golden Eagle Protection Act	Per internal correspondence with USFWS, the only nearby known bald eagle nest is well beyond the 660-foot management zone. No nest is expected to be in the project area.
Coastal Barrier Resources Act	There are no barrier islands in or near Richland County, South Carolina.
Coastal Zone Management Act	There are no coastal communities in Richland County, South Carolina.
Magnusson-Stevens Fisheries Conservation Act	Work will not take place in or near essential fish habitat designated by National Marine Fisheries Service.
Safe Drinking Water Act	The project area is not located above a sole source aquifer, nor would it affect one.
Wild and Scenic Rivers Act	The Congaree, Saluda, and Broad rivers are not wild and scenic rivers as defined by this law.

4.2 Physical Resources

4.2.1 Geology and Soils, and Farmland Protection Policy Act (FPPA)

The project area, located adjacent to the Broad and Congaree rivers and to the City, is within the Piedmont physiographic province that spans from Maryland down to South Carolina and across west to Alabama. Much of Piedmont rocks are metamorphic gneiss and schist with igneous intrusions of granite (Foster, 2016). According to the South Carolina Geological Survey, the landform in which the project area is located is considered Carolina terrane and upper Cretaceous. Carolina terrane consist of felsic pyroclastic rocks approximately 3 km thick or greater and upper Cretaceous consisting mostly of kaolinitic sands with some clay typical of a fluvial or upper delta environment (SCDNR, Geology of South Carolina, 2014). According to the Natural Resources Conservation Service's (NRCS) soil data, the project area is mostly made up of clay and sand with varying slope percentages ranging from flat to 30 percent. Although some of the soil types such as Persanti are classified as prime farmland, the project area affected by the action does not function agriculturally. Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses (NRCS, 2019). See **Appendix E** for the soil maps.

Table 5: Soils in the Project Area (NRCS, 2019)

Soil Abbreviation	Soil Name	Farmland Classification
Cd	Chastain silty clay loam	Not prime farmland
OgD	Orangeburg-Urban land complex, 6 – 15% slopes	Not prime farmland
Ps	Persanti very fine sandy loam	All areas are prime farmland
StA	State sandy loam, 0 – 2 % slopes	All areas are prime farmland
To	Toccoa loam	Prime farmland if protected from flooding or not frequently flooded during the growing season
Ur	Urban land	Not prime farmland
WeE	Wedowee loamy sand, 10 – 30% slopes	Not prime farmland

Much of the currently impacted soils due to the flooding event is located on the southern end of the Canal known as the lower canal breach area. This area is south of the Klapman Bridge north of the extant hydroelectric plant. Comparing the Google Earth aerial of the lower canal breach areas before the 2015 flood event with the most recent aerial taken on 2/17/2023, the existing soil displaced at the breach alone is approximately 38,500 cubic yards is with the lower Canal area of impact at approximately 50,000 square yards of impacted. For comparison of the area impacted, a typical football playing field is 6,400 square yards. The lower canal breach area impacted soil would therefore equate to approximately eight football fields. Soil depths that were eroded and accreted varies from within the channel and from the embankment. The trend is that the channel received much of the displaced embankment erosion while the river tailrace received much of the breached embankment soil. A geotechnical analysis was completed in April 2021 within the lower canal breach area by Geoarchaeology Research Associates, Inc. Their subsurface explorations were conducted on September 15 and 16, 2020 and consisted of eleven Geoprobe^{TM} borings with depths ranging from 6 to 20 feet below surface. Based on the geotechnical analysis, only Toccoa occurs at the lower canal area in undisturbed contexts (Schuldenrein & Heidi, 2021).

The threshold level for a significant impact to soils is defined as a substantial loss of soil, or a rating of 160 or higher on the Farmland Conservation Impact Rating Form (AD-1006 Form), which would indicate further consideration for protection under the Farmland Protection Policy Act (FPPA). The City of Columbia is designated as an Urban Area by the 2020 U.S. Census Bureau (Bureau, 2023) and the Farmland Protection Policy Act does not apply to the project area. No conversion of farmland would occur per 7 CFR Part 658.2(a).

4.2.1.1. Alternative 1: No Action Alternative

Under Alternative 1, there would not be any construction actives such as re-grading and excavation, thus there will be no direct impacts to existing geology and soil conditions. Ongoing erosion would likely occur from future flood events causing further substantial loss of soil and the soil loss contributed to the flood event would remain in place resulting in moderate impacts to soils.

4.2.1.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would require not only regrading but excavating the existing embankment in and around the breached area near Klapman Bridge. Although direct impacts to soils and geology would be minor, the replaced soil within the new designed embankment and improved suitable soil will be better equipped to resist adverse impacts during the next flood event culminating in moderate benefits to the surrounding soil and geology. Clearing activities for expanding the staging and laydown area near the headgates would result in about 10,500 square yards of soil impacts but the plan would be to leave the tree root balls in place and grind tree stumps to the ground. Soil impact minimization measures would be implemented during the clearing and usage of this area during construction work. At the upper Canal area, 13,650 linear feet of the embankment toe work would result in approximately 62,000 cubic yards of soil replacement and approximately 10,575 linear feet of slope or soil slip area of the embankment work would result in approximately 40,000 cubic yards of soil and rock replacement. At the lower Canal, an approximate total of 80,000 square yards or twelve and half football fields worth of soil would potentially be affected for work involving the site preparation work such as cofferdam installation, construction of turnaround and material handling area, temporary berm construction and the dike rebuild and channel work.

At the tailrace, approximately 125 feet southwest of the hydroelectric plant lies sediment buildup that is likely a combination of typical river sediment accretion and Canal embankment breach sediment eroded during the 2015 flood event. To address the sediment, a path forward has been agreed upon with City and FEMA that involves not using mechanical or manpower means to remove this tailrace sediment. Once the Canal facility is back in full operations, specifically the generation of power via the existing powerhouse, there is to be a slow and gradual release of water from the powerhouse that would do the job of removing the built-up sediment over time. This method would reduce complexity, costs, and risks. The pros are but not limited to include the following: avoids any complications with archeological sites, allows secondary succession to be mediated back with an adapted baseline for protected aquatic species, restores the rocky shoals,

presents no threat of potential unexploded ordinances to workers and properties, and adheres to the proposed method from SCDHEC through a previous precedent set at the Parr Reservoir.

Erosion and sediment control best management practices (BMPs) are provided in design plans such as utilizing double silt fencing, staying within the established limits of disturbances, and utilizing erosion control measures. Based on the analysis conducted, this alternative would have moderate benefits to both geology and soils within and near the project area.

4.2.2. Air Quality and Clean Air Act

The Clean Air Act (CAA) requires the Environmental Protection Agency (EPA) to establish national ambient air quality standards for certain common and widespread pollutants based on standards set for the following six common "criteria pollutants:" particle pollution, ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead. Areas that meet the air quality standard for the criteria pollutants are designated as being in attainment. Areas that do not meet the air quality standard for one of the criteria pollutants are designated as being in nonattainment for that standard. The proposed action area and surrounding areas of Richland and Lexington counties are located within an attainment area; pollutants in the air do not exceed air quality standards.

The threshold level for a significant impact on air quality is defined as a violation of an ambient air quality standard or regulatory threshold.

4.2.2.1. Alternative 1: No Action Alternative

Under Alternative 1, there would not involve the reconstruction of the embankment and canal channel or the demolition of any structures. Without a construction project there would not be any heavy equipment releasing emissions resulting in no impacts to air quality.

4.2.2.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, the project would consist of rebuilding of the Canal's embankment, removing displaced soil from the channel, removal of vegetation along the lower Canal's riverside embankment, and use of construction equipment. Impacts on air quality due to the temporary use of construction equipment during the entire project's construction will result in a temporary increase of exhaust emissions and short-term fugitive dust emissions. Likewise, the removal of vegetation would result in a loss of a carbon sink, anything that removes carbon dioxide from the atmosphere but the loss of vegetation would be temporary as reseeding and replanting would occur as one of the closing items for construction.

Pollutants that would be emitted from the internal combustion engine exhausts of construction equipment include certain criteria pollutants, volatile organic compounds (VOCs), and certain greenhouse gases (GHGs). Annual construction and demolition emissions are expected to be less than the *federal de minimis* thresholds for criterial pollutants and VOCs (40 CFR 93 § 153). Fugitive dust would be generated by construction operations and wind action on unpaved surfaces and stockpiled materials. Generated fugitive dust would consist primarily of nontoxic particulate matter and would be controlled at the sites using BMPs such as watering of exposed surfaces and enclosing or covering stockpiled materials. Based on the analysis conducted and the county and the region being in an attainment area, Alternative 1 would have negligible impacts on air quality.

4.2.3. Climate Change

Climate change refers to changes in the Earth's climate (not weather) caused by a general warming of the atmosphere and an increase in sea surface temperature as a result of GHGs emitted by both natural processes and human activities, and their accumulation in the atmosphere regulates temperature. GHGs include water vapor, carbon dioxide, methane, nitrous oxides, and other compounds. Climate change is capable of influencing species distribution, temperature fluctuations, sea level dynamics, and regional weather patterns. There are no established thresholds or standards for GHGs. However, according to current guidance from the CEQ, a quantitative analysis and disclosure of GHG emissions is not warranted unless the proposed action's direct annual emissions would be greater than 25,000 metrics tons of carbon dioxide equivalent (Goldfuss, 2016). Further and recent guidance from the CEQ was provided in the Federal Register, (Volume 86, Number 32, February 19, 2021) stating that CEQ will address in a separate notice its review of and any appropriate revisions and updates to the current guidance previously referenced. Hydroelectric power generation is regarded as a renewable energy resource and not a contributor of GHG emissions as it avoids the burning of fossil fuels found at electric generation plants involving coal burning. See **Appendix F** for the bar graph of each type of electric generating type with the production of carbon dioxide emissions.

4.2.3.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no direct impact on climate change due to a lack of construction equipment use; therefore, no GHGs would be emitted. However, the project would continue to be affected by more frequent flooding which may be associated with climate change. The no action alternative would result in an indirect moderate impact on climate change due to a lack of hydroelectric power generation. Although the City has seen a relatively stable change in total population, the City has seen an increase in employment, entertainment, and cultural opportunities which is bringing in more visitors and strain on the City's infrastructure including to the electric power (Columbia, Columbia Compass Envision 2036, 2020). Without the

hydroelectric power generation, the City would be forced to look for alternatives for electric power that may include electric power produced within or near Richland County by fossil fuels or natural gas. Based on this analysis, this alternative would have a moderate impact to the variables influencing climate change.

4.2.3.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, the impacts would be the same as it was described in the CAA section above in terms of construction work. Construction and demolition are estimated to generate below 25,000 metric tons of carbon dioxide equivalent, the suggested reference point per current CEQ guidance for quantitative analysis and disclosure of GHG emissions. The impacts from emissions would be reduced through best management practices for the use of heavy equipment such as reduced idling time and the use of bio-diesel fuel. Once the construction work is completed, the hydroelectric plant would be able to produce electric power in lieu of having to possibly rely on less green, renewable energy such as coal or natural gas producing electric plants. Additionally, revegetating either through seeding, replanting, or natural growth over time through succession would occur in most impacted areas restoring or strengthening the carbon sink capabilities in this area. Furthermore, with improvements to various elements implemented through the design of the project such as door dams, keyway embankment design, and armored toes and embankments the Columbia Canal would be more resilient to increasing disasters in frequency and intensity. Based on the analysis, this alternative would have a negligible impact towards significantly influencing climate change.

4.3. Water Resources

4.3.1. Clean Water Act (CWA) and Surface Water

Under the shared responsibility of the EPA and USACE, the Clean Water Act (CWA) of 1977, 33 U.S.C. § 1251 et seq., establishes the basic structure for regulating discharges of pollutants into the waters of the United States (WOUS) and regulating quality standards for surface waters (https://www.epa.gov/laws-regulations/summary-clean-water-act). Section 404 of the CWA establishes the USACE permit requirement for the discharge of dredged or fill material into WOUS, including wetlands. Activities in WOUS regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into WOUS, unless the activity is exempt from Section 404 regulation (e.g., certain farming and forestry activities). USACE regulation of activities within navigable waters is also authorized under the Rivers and Harbors Act of 1899.

Under Section 402 of the CWA, the National Pollutant Discharge Elimination System (NPDES), the EPA regulates both point and non-point pollutant sources, including stormwater and stormwater runoff. Section 401 of the CWA requires that, for any federally licensed or permitted project that may result in a discharge into WOUS, a water quality certification be issued to ensure that the discharge complies with applicable water quality requirements. SCDHEC's Bureau of Water is responsible for the permitting, compliance, monitoring, and enforcement activities of the NPDES Permit program and administers the Section 401 Water Quality Certification program in South Carolina.

The threshold level for a significant impact to WOUS would be a violation of state water quality criteria, a violation of federal or state discharge permits, or an unpermitted dredge or fill within the boundary of a jurisdictional waterbody or wetland.

4.3.1.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, no direct impacts to WOUS would occur. Although, there would be minor, indirect impacts to WOUS from continued erosion of the areas surrounding the breached embankment and the runoff sedimentation into the Congaree River. It is important to note that the USACE issued an emergency 404 permit to the City during flood event to create the emergency cofferdam near Klapman Bridge. The fill and rocks that are currently there would remain there which may conflict with the conditions agreed upon with the emergency 404 permitting authorization.

4.3.1.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, there would be construction activities near the Congaree River during the lower canal breach repairs and embankment reconstruction resulting in direct impacts to WOUS. Work would also remove the emergency cofferdam placed in the canal channel during emergency responses activities and authorized by under an emergency 404 permit. This alternative would have an indirect beneficial impact to WOUS by mitigating a repetitive damage scenario during the next flood event reducing erosion and sedimentation. The project will require USACE Section 404 Permit, SCDHEC 401 Water Quality Certification, and a SCDHEC NPDES Permit. All permitting requirements would include the use of BMPs and other regional and national conditions to be adhered to, thereby reducing direct impacts to WOUS during construction activities. In consideration of the direct impacts and indirect benefits, it is expected that overall, there would be a moderate benefit to the WOUS as result of this alternative.

4.3.2. Floodplain Management (EO 11988)

Executive Order (EO) 11988 Floodplain Management, as implemented in 44 CFR Part 9, requires federal agencies "to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Each federal agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities." FEMA uses the 8-Step decision-making process to evaluate potential impacts on and mitigate effects to floodplains in compliance with EO 11988 and 44 CFR Part 9. The South Carolina Department of Natural Resources (SCDNR), Flood Mitigation Program administers and regulates the National Flood Insurance Program in South Carolina.

The Columbia Canal is located within the Special Flood Hazard Area per FEMA Flood Insurance Rate Map (FIRM) within Richland County, dated 12/21/2017 and with panel numbers: 45079C0237L, 45079C0239L, 45079C0243L, and 45079C0356L. The Columbia Canal is within a designated regulatory floodway Zone AE meaning that portion of the floodplain is effective in carrying flow and the carrying capacity must be preserved. This is expected at the Columbia Canal due to the dependency of utilizing controlled water flow as a way of performing the intended critical functions such as providing the community with hydroelectric power and drinking water.

The threshold level for a significant impact on floodplains would be an excessive loss of floodplain area and values with an associated increase in floodplain potential.

4.3.2.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, no direct impacts to floodplains would occur. Floodplain values of properties (public and private) adjacent and potentially downstream to the project area would remain at risk for major impacts from future flooding events. Continued erosion would be expected to impact the breached embankment potentially leading to debris dislodged impacting downstream structures. The risk to both the public and remaining infrastructure would have major impacts to the floodplain values in significant terms of critical actions, socioeconomic, and life safety concerns.

4.3.2.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would temporarily occur within the floodplain utilizing temporary use cofferdams and heavy equipment resulting in negligible, direct impacts to floodplain values. Once the construction phase of the project is complete, there would be a greater level of protection to the Canal facility, historic resources, and to the floodplain values of the adjacent and downstream properties. Additionally, the Canal will be better positioned to continue performing functionally dependent critical actions during similar, future flooding events preventing electrical and drinking water disruptions to the Columbia area. Furthermore, there may be more opportunities in the future for open space use and recreational activities for expanding the quality of life for residents, business owners, and visitors. This alternative would result in a benefit to the floodplain values of the Canal and surrounding properties. An 8-step checklist, as required by 44 CFR Part 9 (see **Appendix G**), has been completed. The City plans to coordinate with the local floodplain administrator to ensure all local floodplain ordinances are adhered to.

4.3.3. Protection of Wetlands (EO 11990)

EO 11990, Protection of Wetlands, requires federal agencies "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." Information about the wetlands potentially affected by the proposed action was gathered from USFWS NWI Web Map Services (USFWS, 2020). The project area is within and near a designated riverine and freshwater, forested or shrub wetlands. There is no South Carolina state specific program for regulating wetlands, and regulation is dependent on adherence to the Clean Water Act (SCDNR, 2020). FEMA uses the 8-step decision-making process to evaluate potential impacts on, and mitigate effects to, wetlands in compliance with EO 11988 and 44 CFR Part 9. Activities that disturb jurisdictional wetlands require a permit from USACE under Section 404 of the CWA.

The threshold level for a significant impact to wetlands would be a violation of unpermitted dredge or fill within a wetland.

4.3.3.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, the result would be no direct impacts to designated wetlands. Although, continued flooding and excessive sedimentation downstream from the project area could occur and cause moderate impacts to riverine wetlands and potential loss of adjacent forested or shrub wetlands.

4.3.3.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would temporarily occur within or near designated wetlands. To minimize or avoid direct impacts as practicable as possible, The City will coordinate with the SCDHEC and USACE Columbia District Office for 401 and 404 Clean Water Act permitting including SCDHEC for NPDES permitting. As a condition of the grant, construction activities would be required to adhere to all permitting requirements including best construction practices to minimize impacts to downstream and adjacent designated wetlands. After repairs, the Canal would be able to better function as open space use to the community and visitors via recreational and educational opportunities. Furthermore, with various improvements planned for the Canal, the wetlands would see moderate benefits in the way of being better protected from future flood events reducing adverse sediment loss from forested or shrub wetlands into nearby riverine wetlands. An 8-step checklist, as required by 44 CFR Part 9 (see **Appendix G**), has been completed.

4.4. Biological Resources

4.4.1. Fish and Wildlife

Wildlife in the area ranges from interior forest species, riparian and aquatic species to species adapted to living alongside humans in developed areas. The mesic mixed hardwood forested areas found intermittingly along the west embankments may serve as foraging and refuge habitats for numerous species such as a variety of migratory birds and small mammals. Within the nearby riverine habitats, common freshwater varieties of fish can be found that include bass, carp, shiners, and darters. Anadromous fish species may also be found that include blueback herring (*Alosa aestivalis*) and federally listed shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). A large variety of mussels, some clams and snails, the spotted turtle (*Clemmys guttata*) and the Chamberlain's dwarf salamander (*Eurycea chamberlaini*) may also be found in the nearby riverine habitat. Although bald eagles (*Haliaeetus leucocephalus*) may be visible in the sky, no nests have been observed at the project area and the known bald eagle nest is approximately 1,100 feet away from any proposed construction activities. This is well beyond the 660-foot management zone (Mark Caldwell, personal communication, December 6, 2017).

The threshold level for a significant impact to fish and wildlife is designated by a loss of individuals which negatively affects the regional population of a species.

4.4.1.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities and no direct impacts to wildlife and fish populations. Although, species habitat may be adversely impacted during the next flood event with increased adjacent and downstream sedimentation through continued erosion of the damaged embankments. Water habitat, specifically the rocky shoals, would be covered by eroded material from the canal embankments resulting in long-term, major impacts to fish and wildlife. In consideration of both the lack of any short-term impacts and the long-term, major impacts it is expected that overall, this alternative would lead to moderate impacts to fish and wildlife populations.

4.4.1.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would temporarily occur, and vegetation removal would be required to expand the northernmost staging area and the dike rebuild resulting in potential displacement to terrestrial wildlife. The affected wildlife would likely consist of typical forest mammals such as mice and squirrels. It is anticipated that any species of concern or vulnerable won't be moderately impacted as they have mobility means to navigate between both terrestrial and aquatic habitats such as turtles and salamanders. Fish and avian species would be expected to behaviorally adapt to the construction disturbances through avoidance and alternate site selection. See section 5.4.3. and section 5.4.4. below for details and impacts considered for federally listed sturgeon and migratory birds, respectively. Once work is complete, the Canal facility would be able to better withstand similar flood events decreasing the probability for disaster-related repairs and allowing for ecological succession to take place. Revegetating with shrubs and trees would assist in restoring forest species. Rocky shoal habitat would eventually be restored and better protected from indirect impacts from embankment damages due to flooding. In consideration of the moderate impacts from construction and vegetation removal with the benefits to restoring and protecting habitat from future disturbances, it is expected that this alternative would lead to minor benefits to fish and wildlife populations and not result in any regional populations to be adversely affected.

4.4.2. <u>Vegetation</u>

The mesic mixed hardwood forested habitat found at the project area is typical of the Piedmont region. A variety of flowering plants and vines, ferns, and herbs can be observed adjacent to the maintenance access roads, paved roads, the Greenway, and now within the breached area on the southern part of the canal. The areas not mowed and maintained for vegetation control are likely along the western embankment and riverside of the Canal from the southernmost section to the northernmost at the headgates. These undisturbed habitats consist primarily of evergreen trees such

as the pyramid magnolia (*Magnolia pyramidata*) and tend to be wrapped with weedy, fernlike plants such the whiskfern (*Psilotum nudum*). The multiple laydown (staging) areas identified are urban vacant lots and along gravel maintenance roads consisting of hardwood shrubs and tree varieties. A unique feature of the Canal is the ability to witness the rocky shoals spider lilies (*Hymenocallis coronaria*) bloom in May of each year in the Broad and Congaree rivers. This spider lily is known to be a hearty plant though they can be adversely impacted by high water levels whether through controlled flow or flood events. On November 29, 2016, an analysis and survey of the trees along the Columbia Canal was performed with an inventory of the trees provided in December 2016. See **Appendix H** for the arborist report.

The threshold level for a significant impact on vegetation is defined by (1) excessive loss or impairment of unique or sensitive vegetative communities, or (2) introduction or spread of exotic plant species.

4.4.2.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, there would be no direct impacts to vegetation. Although, the vegetative habitats along the canal embankments and especially near and around the breach area would remain vulnerable to scour and erosion caused by the next flood event. Furthermore, vegetation may become waterborne projectiles causing downstream damages to improved property. Therefore, this alternative would result in minor impacts to vegetation.

4.4.2.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would require staging of equipment and materials, equipment use and human traffic, and removal of vegetation. These impacts would primarily be expected along the western embankment both riverside and within the dried canal channel south of Klapman Bridge to near the Hydroelectric Plant and at the northernmost staging area. Due to the severely damaged embankment, there would be a need to remove vegetation along the western side of the Canal embankment west of the Greenway in order to properly fill in the breached area, rebuild the embankment, and tie everything back in. Additionally, the damage to the embankment via root intrusion would leave the new embankment susceptible to soil leaching and potentially undoing all the embankment construction work. Per an International Society of Arboriculture certified arborist and state registered forester, roots from a healthy tree may penetrate an embankment and then become infected with root decay and as the roots recede or deteriorate seepage paths are left which could reduce embankment stability. Additionally, dead trees and trees declining in health may present risks of limbs falling and striking anyone utilizing the greenspaces and trails. To mitigate from this, trees would have to be removed along the Congaree embankment

on the southern section of the Canal. The area of tree removal is likely to extend slightly north of the Klapman Bridge down south to near where the old hydroelectric plant ruins currently reside. It would approximately cover six (6) acres of shrub and forested habitats. In the future there would be the potential to revegetate the area with appropriate native plants that would not adversely affect the integrity of the embankment. For the 10,500 square yards of expansion to the northernmost staging area near the headgates, there would be tree removal activities that would include mature pine trees and oaks which many of these are overtaken by invasive vines and weeds populating the ground.

Due to the need to remove vegetation at the damaged site requiring tree removal, moderate impacts are expected.

4.4.3. Threatened and Endangered Species

The Endangered Species Act (ESA) of 1973 provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead Federal agencies for implementing ESA are the USFWS and the U.S. National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS). As relevant to the proposed action, the USFWS has regulatory authority for species occurring on land and in freshwater within the project area and NMFS has regulatory authority for species occurring or deriving from marine habitats including anadromous species such as sturgeon and salmon. The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "take" of any listed species of endangered fish or wildlife. A "take" includes the following actions: "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct."

In accordance with Section 7 of the ESA, the project was evaluated for the potential occurrences and impacts to federally listed threatened and endangered species that may be present in the project area. Federally listed species were identified by accessing the USFWS's Information for Planning and Consultation (IPaC) database on July 21, 2023. The federally protected species from the IPaC database are the proposed endangered and soon to be listed as endangered, tricolored bat (*Perimyotis subflavus*) and the endangered red-cockaded woodpecker (*Picoides borealis*), Canby's dropwort (*Oxypolis canbyi*), rough-leaved loosestrife (*Lysimachia asperulaefolia*), and smooth coneflower (*Echinacea laevigata*). Additionally, the candidate monarch butterfly (*Danaus plexippus*) is included. The federally endangered shortnose sturgeon (*Acipenser brevirostrum*) was not included in the list but the nearby rivers are suitable habitat for sturgeon. There are no designated critical habitats, habitat area essential to the conservation of a listed species, in or near

the proposed action areas nor would any designated critical habitats be indirectly impacted by the work.

Species eliminated from ESA consultation due to a determination that the work will not have any effect on them were the Canby's dropwort, rough-leaved loosestrife, and the smooth coneflower as the proposed action area does not provide suitable habitat. Canby's dropwort is typically found within or near lentic wetlands and associated with acidic soils typical of bogs, swamps, and cypress ponds. Rough-leaved loosestrife was recorded 200 years ago residing within Fort Jackson but has since not been observed. Smooth coneflower is typically found in open woody areas with little shrubbery and tree overgrowth. The bald eagle (*Haliaeetus leucocephalus*) while not protected under the ESA, they are protected under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act (see Section 5.4.4. below for details), and the Lacey Act. The Congaree River exhibits all the physical characteristics for sturgeon spawning habitat. The river's rocky shoals and the shallow rock or gravel substrates are suitable for sturgeon eggs to adhere making this section of the Congaree River an ideal spawning ground. Due to the similar life history to shortnose sturgeon, Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) may also utilize this suitable spawning habitat. Both sturgeon species are anadromous and are under the jurisdiction of NMFS. Section 7 consultation was initiated by FEMA with NMFS for the potential effects to sturgeon and with USFWS for the potential effects to both tricolored bats and red-cockaded woodpeckers.

The threshold level for a significant impact on threatened and endangered species is defined by the take of a federally listed species or adverse modification or destruction of designated critical habitat.

4.4.3.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, there would be no impacts to threatened or endangered species. Sturgeon spawning habitat would remain as is and any spawning habitat currently covered by displaced embankment soils will remain unsuitable for sturgeon, specifically the tailrace area under the Gervais Street Bridge near the hydroelectric plant. With the current condition of the Canal, continued erosion would likely occur and with a similar flood event further embankment breaches are a realistic possibility. Erosion would displace soil from the Canal covering the rocky and gravel substrate that make sturgeon spawning ideal. Long-term this would prove detrimental to the population of sturgeon that utilize the area as a spawning ground. Therefore, moderate impacts would be expected to sturgeon including suitable habitat, and their offspring.

4.4.3.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would occur and route of effects to sturgeon would include the possibility of physically striking sturgeon with construction equipment, vessels, or materials although it is extremely unlikely for this to occur due to the ability and likelihood of sturgeon to move away from the project site if disturbed. Use of habitat for spawning would be temporarily blocked near the Congaree-Canal side embankments though due to the abundance of habitat outside the construction areas, sturgeon spawning migration season (February 1 to April 30) should still occur elsewhere. As a condition of the grant and in concurrence with NMFS it is recommend that if practicable, construction work in or near the Broad and Congaree rivers should not occur during spawning migration season. Sturgeon individuals are likely to avoid areas during periods of high construction noise and by limiting work to only daytime hours, species will be able to move to avoid any behavioral effects from the exposure to the noise during the quiet periods at night. On November 19, 2020, FEMA initiated informal consultation via email with NMFS and received concurrence via email on December 4, 2020 that the work may affect sturgeon species, but with the conditions to be followed for work in or near the riverine habitats; work is “not likely to adversely affect the sturgeon.”

In terms of effects to tricolored bats and red-cockaded woodpeckers, the impacts would largely come from the work to expand the northeastern staging area by the headgates which would require tree removal work. Once construction work is completed, native tree replanting will occur allowing succession (ecological restart after disturbance) to take place that will mend any impacts to refuge and foraging habitats for bats and woodpeckers. On July 24, 2023, FEMA initiated informal consultation via email with USFWS and received concurrence via email on August 10, 2023 that the work “may affect but not likely to adversely affect” red-cockaded woodpeckers and response regarding the proposed tricolored bat determination made by FEMA. If the tricolored bat is listed as endangered before the potential project impacts are started, FEMA will circle back up with USFWS to ensure all FEMA obligations under Section 7 of the ESA are completed. City will inform FEMA as to when tree removal activities has started so FEMA can determine the need to reconsult for the tricolored bat. As of, January 17, 2024 the tricolored bat remains as proposed to be placed on the endangered species list.

See **Appendix I** for informal consultation letters and emails. The conditions to be followed as a result of this informal Section 7 consultation with both NMFS and USFWS are listed in Section 7.0. Based on the analysis and consultation conducted, this alternative would have an insignificant, minor impact on threatened and endangered species.

4.4.4. Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) provides a program for the conservation of migratory birds that fly through lands of the United States. The lead Federal agency for implementing the MBTA is the USFWS. This law was enacted in 1918 to fulfill the United States' requirement in the 1916 "Convention between the United States and Great Britain for the protection of Migratory Birds" in the hopes of stopping the "take" of migratory birds. The MBTA defines "Take is defined in the Service's general wildlife regulations as "to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to hunt, shoot, wound, kill, trap, capture, or collect" (50 CFR 10.12). Additionally, it is "unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell…" (16 U.S.C. § 703). Therefore, incidental, or unintentional take shall be considered with the potential impacts to migratory birds.

The entire state of South Carolina is considered a flyway zone for migratory birds. According to USFWS IPaC, 16 migratory bird species were identified as being potentially present within the project area and have a designated breeding season for each of the listed birds which could occur within the project area. See **Appendix J** for IPaC chart of listed birds. Apart from bald eagles, the IPaC probability chart identifies peak breading season occurring from April to August. The earliest breeding season for any given year is the first week of March for the brown-headed nuthatch. The black-billed cuckoo's breeding season is the last to end for any given year during the second week of October. Internal communications with USFWS confirmed that the only known bald eagle nest is approximately 1,100 feet from any construction activities and is well beyond the 660-foot management zone. On April 22, 2021, FEMA EHP discussed the conservation measures with a USFWS supervisory wildlife biologist within the Migratory Birds and Science Applications to ensure a good-faith effort was achieved in mitigating adverse impacts to migratory birds as practicable as possible.

The threshold level for a significant impact to migratory birds is designated by the take of birds in violation of the Migratory Bird Treaty Act.

4.4.4.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activities; therefore, no potential to take migratory birds would exist.

4.4.4.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would occur and require the removal of trees, shrubs, and other vegetation to facilitate the embankment and breach repairs. Construction work under bridges would result in a noise disturbance to any breeding populations of migratory birds. To avoid, minimize, and reduce the production of impacts to migratory birds and their nests from both noise and vegetation removal activities applicable nationwide conservation measures will be conditioned and require contractors to adhere to at the extent practicable. The City has agreed to implement these conservation measures into the construction contracts. Most notable of these conservation measures is to schedule all vegetation removal outside of peak breeding season. This conservation measure would substantially decrease the anticipated moderate impacts to migratory birds and nests. If incidental take were to occur, USFWS is to be contacted to assist in rectifying the take. The conservation measures to be followed to the practicable extent are listed in Section 7.0.

4.5. Cultural Resources

As a federal agency, FEMA must consider the potential effects of its actions upon cultural resources prior to engaging in any project. Cultural resources are defined as prehistoric and historic sites, structures, districts, buildings, objects, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. There are several laws a federal agency must consider when working with and identifying cultural resources. For the Columbia Canal Repair Project, FEMA will meet this obligation through its Section 106 of the National Historic Preservation Act of 1966 (NHPA) consultation. Section 106 of the NHPA, as amended and implemented by 36 CFR Part 800, outlines the required process for federal agencies to consider a project's effects to historic properties. The NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register." Eligibility criteria for listing a property on the National Register of Historic Places (NRHP) are found at 36 C.F.R. Part 60. While the definition of a cultural resource under NEPA can be broader, FEMA regularly uses Section 106 to meet its obligations to consider effects to cultural resources. For this project, FEMA determined that it was appropriate to use its NHPA review to fulfill its NEPA obligations.

Cultural resources determined to be potentially significant under the NHPA are subject to a higher level of review and federal agencies must consider the potential effects of their projects on those resources and consider steps to avoid, minimize, or mitigate those effects. To be considered significant, a cultural resource must meet one or more of the criteria established by the National

Park Service that would make that resource eligible for inclusion in the NRHP. The term "eligible for inclusion in the NRHP" includes all properties that meet the NRHP listing criteria, which are specified in the Department of Interior regulations Title 36, Part 60.4 and NRHP Bulletin 15. Properties and sites that have not been evaluated at the time of the undertaking may be considered potentially eligible for inclusion in the NRHP and, as such, are afforded the same regulatory consideration as nominated properties. The South Carolina Institute of Archaeology and Anthropology (SCIAA) and the South Carolina Department of Archives and History (SCDAH), which is the State Historic Preservation Officer (SHPO), maintains a database of South Carolina's historic properties, the South Carolina ArchSite online Geographic Information System (GIS). FEMA uses this database, along with the NRHP National Resources Information Service (NRIS), as part of its efforts to identify significant cultural resources that may be impacted by a project.

Pursuant to 36 CFR Part 800.16(d), the Area of Potential Effect (APE), "is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist." Within the APE, impacts to cultural resources are evaluated prior to the undertaking for both Standing Structures (above ground resources) and Archaeology (below ground resources). The project area is located on the east bank of the Broad River and Congaree River within the city of Columbia, South Carolina. The APE for this undertaking consists of the footprint of ground disturbance for the repair of ten (10) areas of toe scour and nine (9) embankment slope repairs along the upper canal berm. Temporary cofferdams will be placed in the canal in the areas of repair to allow de-watering.

The berm south of Klapman Bridge to the breach will include the replacement of 1,125 linear feet of embankment and will require the excavation down to (or near) bedrock. The east bank of the canal south of Klapman Bridge will be reshaped to pre-flood conditions with some slope stabilization and sediment will be removed from the canal bed and reshaping of the canal bed to provide maximum hydraulic capacity. A temporary cofferdam will be placed across the canal north of Klapman Bridge and the temporary cofferdam installed in 2015 will be removed. A temporary cofferdam will be constructed on the western side of the canal berm to facilitate embankment repairs. This cofferdam will be constructed using material from the demolition of the existing embankment.

Stockpile and laydown areas will be located in a parking lot adjacent to the headgates at the northern end of the canal, north of Broad River Road/US 176, an area south of Klapman Bridge, and in an open lot east of the lower canal. All these locations are paved or gravel surfaces that have been previously used by the City of Columbia for construction/maintenance work in the area. Temporary barge landings will be established within the canal to assist with transportation over to the canal berm from where equipment will utilize the existent walking path to transport materials up and down the canal berm.

The project will also include the relocation of high voltage and local electrical poles and lines during construction. All vegetation will be cleared and grubbed within the limits of construction and the Three Rivers Walkway asphalt walkway will be removed and replaced in areas of embankment repairs. All lights, fences, and ramps will be replaced near the Hydroelectric Plant along the embankment.

In order to fulfill its Section 106 responsibilities, FEMA has initiated consultation on this project in accordance with the South Carolina Statewide Historic Preservation Programmatic Agreement (2014 Statewide Agreement) executed on October 16, 2014, and subsequently amended, among the South Carolina State Historic Preservation Officer (SHPO); SCEMD; and participating tribes. In addition to identifying historic properties that may exist in the proposed project's APE, federal agencies must also determine, in consultation with the appropriate State Historic Preservation Officer (SHPO) and interested Tribal Historic Preservation Officers (THPO), what effect, if any, the action will have on historic properties.

4.5.1. Historic and Archaeological Resources

FEMA evaluated potential resources in the Area of Potential Effects (APE) utilizing the National Park Service (NPS) National Register of Historic Places (NRHP) GIS resource, the South Carolina ArchSite (GIS) online resource, and previous cultural resource investigations. The APE crosses the Columbia Canal, a National Register listed canal and historic district that was originally constructed in 1824 to provide a way to circumnavigate shoals in the river and was expanded in 1891 as a power source. The canal was listed as a historic district in the NRHP in 1979 (NRHP #79002392) and it includes related buildings, structures, and sites such as the 1824 Diversion Dam, the 1820s Bull Sluice, 1891 features including the Waste Weir, Canal Bulkhead, Canal Entry Lock, and Diversion Dam. The district also includes the 1892/1893 Columbia Electric Street Railway, the Light and Power Company Powerhouse Ruins, the 1894 Columbia Mills Powerhouse Ruins, the 1895 Old Water Works Complex, and the 1896 Columbia Hydro Plant. The district is eligible for the information the artifacts and structures can contribute to engineering, transportation/commerce, industry, and invention. The portion of the historic district situated within the APE contains the entirety of the Columbia Canal and the embankment that separates it from the Congaree River.

The review identified multiple archaeological sites within the APE, as well as the Columbia Canal Historic District. As part of FEMA's consultation process, A Phase I archaeological survey that included geoarchaeological testing was conducted along the lower canal that identified and revisited ten (10) historic features. One archaeological site was unable to be relocated, one was relocated, and one archaeological site was determined to be too deeply buried to test. The archaeological site boundaries for the Columbia Canal were expanded and determined to be

individually eligible for NRHP listing as well as determined to be a contributing resource to the Columbia Canal Historic District.

4.6.1.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction actives such as re-grading and excavation, and no direct impacts to existing cultural resources. However, ongoing erosion from future flood events would cause further substantial erosion and soil loss which would impact existing cultural resources. The soils redeposited from flood events would remain in place, preventing damage to some buried cultural resources.

4.6.1.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under the proposed action occurring within the canal, because the characteristics of historic properties which qualify them for inclusion in or eligibility for the National Register would be altered, there is a finding of Adverse Effect to Historic Properties for this project in accordance with 36 CFR 800.5(d)(2). In accordance with Section 106 of the NHPA, and the implanting regulations, 36 CFR Part 800, on February 12, 2016, FEMA consulted with the South Carolina Department of Archives and History (SHPO) with a project scope of work that was only repair in kind. The SHPO responded on March 11, 2016, and concurred with FEMA's determination of No Historic Properties Affected. Due to changes in the scope of work, on May 11, 2021 FEMA reinitiated consultation with the SHPO and federally recognized Tribes with an ancestral interest in the project area: the Catawba Indian Nation, the Cherokee Nation, the Eastern Band of Cherokee Indians, the Eastern Shawnee Tribe of Oklahoma, the Muscogee (Creek) Nation, the Seminole Nation of Oklahoma, the Seminole Tribe of Florida, the Shawnee Tribe, the Thlopthlocco Tribal Town, the Tuscarora Nation, and the United Keetoowah Band of Cherokee Indians in Oklahoma with a finding of an Adverse Effect to Historic Properties for this undertaking in accordance with 36 CFR 800.4(d)(1). In addition, FEMA notified the River Alliance, Historic Columbia, the South Carolina State Museum and the South Carolina Institute for Anthropology and Archaeology, who were identified as interested parties of the Adverse Effect on July 12, 2021. Responses were received from the Muscogee Creek Nation on June 9, 2021, and the Catawba Indian Nation on June 22, 2021. FEMA continued consultation and began drafting a Memorandum of Agreement (MOA) between consulting parties to resolve the Adverse Effects. The Cherokee Nation, the Eastern Band of Cherokee Indians, and the Muscogee (Creek) Nation participated in this consultation. The Cherokee Nation in a consultation meeting on May 13, 2022; and the Muscogee (Creek) Nation and the Eastern Band of Cherokee Indians in a Consultation Meeting on June 15, 2022, requested to be Concurring Parties to the MOA. In accordance with Stipulation II.C.6 of the FEMA-SC Statewide HP PA and 36 CFR § 800.6(a)(1), FEMA notified the Advisory Council on

Historic Preservation (ACHP) of the Adverse Effect on April 21, 2022, and the ACHP determined in a letter to FEMA dated May 13, 2022, that it would not participate in consultation pursuant to 36 CFR § 800.6(a)(1)(iii).

With the receipt of an updated scope of work on June 30, 2023, FEMA reinitiated consultation with the intent of continuing drafting the MOA to resolve adverse effects. Consultation was submitted to the SHPO, the Catawba Indian Nation, the Cherokee Nation of Oklahoma, the Eastern Shawnee Tribe of Oklahoma, the Eastern Band of Cherokee Indians, the Muscogee (Creek) Nation, the Shawnee Tribe, the Seminole Nation of Oklahoma, the Seminole Tribe of Florida, the Thlopthlocco Tribal Town, the Tuscarora Nation, the River Alliance, Historic Columbia, the South Carolina State Museum, and the South Carolina Institute for Anthropology and Archaeology on September 19, 2023 and November 14, 2023.

FEMA in consultation with invited signatories: the City of Columbia, the South Carolina Emergency Management Division, The Cherokee Nation, The Eastern Band of Cherokee Indians, The Muscogee (Creek) Nation, and concurring parties: the River Alliance, Historic Columbia, the South Carolina State Museum and the South Carolina Institute for Anthropology and Archaeology consulted to develop an MOA to resolve adverse effects.

The MOA executed on April 3, 2024, contains project conditions and mitigation measures to resolve adverse effects including digital recordation of above ground resources, public engagement, public interpretation, additional monitoring and archaeological survey requirements to resolve Adverse Effects. A context study of the existing water works plant will also be carried out and will inform historic signs along the Three Rivers Greenway. This MOA also specifies procedures to be followed in the event of unexpected archaeological discoveries or unexpected discovery of burial context. (Please see **Appendix K** for copies of consultation sent to SC SHPO and a copy of the MOA).

4.6. Socioeconomic Resources

4.6.1. Land Use and Planning

The Columbia Canal is situated between a riverine habitat and the City. To the west of the Canal are the Broad and Congaree rivers and to the east is the City. The Richland-Lexington county line lies in the middle of the Congaree and follows the Saluda River northwestward. Columbia is divided into four (4) council districts with 116 neighborhoods with a population of approximately 137,000 people. Per the City of Columbia GIS information mapper and the Columbia Compass Envision 2036 (Columbia, 2021) (Columbia, 2020), there is a variable set of land use in and around the Columbia Canal. The variety of land use types include a mix of residential (new condo builds), commercial (local restaurants and shops), civic (Columbia Water and the Canal), industrial

(railroads), and park (Three Rivers Greenway) all stemming eastward from the Canal. Additionally, the Gervais Street Bridge, Klapman Boulevard Bridge, and the Broad River Street Bridge connect the City of West Columbia in Lexington County with the City of Columbia. It is worth noting that much; if not all, of the Canal area is currently owned and maintained by the City of Columbia. There is a proposed continuation of the Three Rivers Greenway tentatively called the Palmetto Trail in which it will go from the northernmost section of the existing trail adjacent to the Canal and move along the Broad River. A natural greenway currently connects this northernmost section providing a beltway-like greenway for the community. The southernmost section of the Three Rivers Greenway currently connects to an existing trail and that connects to an existing natural greenway.

The threshold level for a significant impact on land use is defined as the destruction or displacement of existing or planned land use without providing suitable means to replace or relocate the affected land use.

4.6.1.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no future flood protection provided to the nearby residential and commercial properties including to the drinking water reservoir. The impacts of the no action would be major to the Canal facility and associated structures such as the spillway, the historic pumphouse ruins immediately northwest of the Klapman Bridge, and the hydroelectric plant. With continued erosion and further damages, the Canal facility will no longer perform its intended function and thereby dramatically changing the nearby land use. Based on the analysis conducted, this alternative would have a major impact on land use.

4.6.1.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, the repairs and improvements to the Canal facility will assist in achieving the City’s and their constituents’ vision and goals for the next 25 years as described in the comprehensive plan, chapter 6 of the Columbia Compass: Envision 2036 (Columbia, 2020). Historic land use to its current use has been planned with open streets, greenways, and the ability to provide its own critical functions through civic means. The repairs and various improvements will have benefits in protecting the current mixed residential, commercial, and civic land use. Additionally, the improvements to the Canal will allow these diverse land use types to thrive.

4.6.2. Noise

The Noise Control Act of 1972 establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. The Act also serves to one (1) establish a means for effective coordination of Federal research and activities in noise control; two (2) authorize the establishment of Federal noise emission standards for products distributed in commerce; and three (3) provide information to the public respecting the noise emission and noise reduction characteristics of such products. Sound levels are measured in decibels (dB). A-weighted sound measures emphasize the frequency range of human hearing and are expressed in terms of A-weighted decibels (dBA).

The threshold level for a significant noise impact is defined as a permanent increase in noise or prolonged periods of nighttime noise in noise-sensitive areas.

4.6.2.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activity; therefore, there would be no impacts on noise levels in the area.

4.6.3.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, there would not be any permanent increase in noise levels once the construction is completed. During construction, increase in heavy equipment use in and around the Canal and vehicular traffic along routes from and to landfill, from and to sources of materials, and construction crew would temporarily increase noise levels at the project site but would adhere local noise control ordinances. No work is anticipated to occur during nighttime hours. There are townhomes located approximately 350 feet from the Promenade and adjacent to the Gervais Street Bridge (a connecting artery between downtown Columbia and West Columbia. To the north of the Klapman Bridge are apartments or condominiums (previously the South Carolina Penitentiary site) immediately adjacent to the Canal. Further up north along the Canal are single-family homes and apartments between I-26 and Broad River Bridge. The townhomes and apartments or condominiums located down on the southern end of the Canal will receive much of the temporary noise during the construction phase of the project. The smallest potential distance from an area of construction work at the Canal to a residential property is approximately 70 feet. That construction work would be when the temporary cofferdam is being installed in the channel near the apartment/condominium complex. Once repairs are complete, it is likely the Canal will see an uptick in visitors and locals utilizing parks, greenways, and public parking areas which will cause in an increase in the frequency of noise but should not be higher than the existing ambient noise levels.

Based on the data presented in the EPA publication, *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances* the main phases of outdoor construction typically generate noise levels that range from 78 dBA to 89 dBA, approximately 50 feet from the construction site. (EPA, 1971). Noise levels are estimated to decrease by approximately 6 dBA with every doubling of distance from a noise source. Therefore, construction noise from the Canal is expected to be less than the 78 dBA to 89 dBA noise level range for the closest residential property (approximately 70 feet).

The Occupational Safety and Health Administration (OSHA) compares 60 dBA to the sound levels of a normal conversation (at 3 feet away), 70 dBA to be that of classroom chatter, 80 dBA compares to a freight train at 100 feet away, and 90 dBA is comparable to a boiler room. OSHA regulations allow up to eight hours of exposure to 90 dBA for workers. The National Institute for Occupational Safety and Health (NIOSH) recommends that all worker noise exposure should be controlled below 85 dBA for eight hours to minimize hearing loss.

Based on the expected noise levels, activities under this alternative would have minor noise impacts on residential communities, with the apartment/condo complex near the Klapman Bridge experiencing the greatest impact. Noise that is audible in the nearest residential communities would be intermittent, heard only during the daytime, and only over the duration of the project activities within the specific Canal site repairs.

4.6.3. Transportation and Traffic

There are five (5) bridges crossing over the Canal facility connecting the City in Richland County with the City of West Columbia in Lexington County. The Broad River Bridge on US 176 is located approximately a half mile to the south of the Canal headgates, the Highway 126 along with a CSX railway crossing is just northeast of the drinking water reservoir, the Jarvis Klapman Boulevard Bridge is located directly over the emergency cofferdam, and the Gervais Street Bridge on US 1 is located directly south of the hydroelectric plant and over the tailrace.

The threshold level for a significant impact on transportation would be an elimination of a road without a suitable replacement, a permanent increase in traffic volume in a given area, or an increase in road hazards.

4.6.3.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction activity resulting in no impacts to existing infrastructure or transportation would occur within the project area.

4.6.3.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, there would be temporary construction activity but not involve the construction of any new transportation features as the work would be completed using the existing roads in the area. Williams Street south of the Klapman Boulevard/Williams Street intersection and Washington Street would be closed to local traffic and used as the primary haul route for approximately 3,300 truckloads of materials and additional equipment haul transport. The route will be from Klapman Boulevard approximately 400 linear feet on Williams Street and 600 linear feet on Washington Street to the canal breach holding area and material yard. Both roads would be repaired if damaged during the construction. The road closures would not impact access to homes, places of work, or businesses.

The Three Rivers Greenway will be closed throughout much of the Canal for safety and liability reasons. Therefore, anyone using the greenways as a means of walking or biking transportation will be temporarily affected. South Carolina Department of Transportation (SCDOT) would be coordinated with for the work occurring near and under the bridges with the expectation that best management and industry practices would be strictly adhered to resulting in negligible impacts to infrastructure or transportation. Once construction work is completed, it is expected that there will be an uptick in traffic due to the restored and improved recreational benefits the Canal facility will offer to both locals and visitors. Based on the analysis conducted, this alternative would have a minor impact on transportation.

4.6.4. Public Services and Utilities

There are numerous high-voltage transmission towers and poles located on the Canal embankment running along sections of the Three Rivers Greenway. Additionally, there are utility substations between the hydroelectric plant and breached embankment. The drinking water reservoir is located north of the spillway (GPS decimal degrees: 34.005519, -81.054572) on the eastern side of the Canal. Currently, the Canal is not supplying any electrical power to the community and is not at full capacity in supplying drinking water.

The threshold level for a significant impact to utilities would be an exceedance or the elimination of the existing utility service capacity.

4.6.4.1. Alternative 1: No Action Alternative

Under Alternative 1, there would be no repairs to the hydroelectric plant and to the features of the Canal; therefore, the Canal will continue to not be able to provide electrical power and not run at full capacity for supplying drinking water to the community. Furthermore, the next similar flood event may potentially knock out the drinking water production completely resulting in major impacts to the public services and electrical utilities.

4.6.4.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, there would be repairs to the hydroelectric plant and improvement to various Canal features. During the construction, there would be a need to remove overhead transmission lines and towers for the safety of the construction workers and for the integrity of the work to be completed. The City or delegated contractor(s) will coordinate with Dominion Energy to deenergize electrical power and provide alternate or rerouting of services to the nearby residential, governmental, and commercial buildings nearby. Therefore, no impacts to utilities or public services during the construction work is anticipated. Once work is completed, this alternative would not only restore the electrical power services from the hydroelectric plant and returning drinking water production to full capacity but provide protection and resiliency to these functions if a similar flood event were to occur. Also, the proposed project will not exceed the existing utility service capacity. Based on the analysis conducted, this alternative would have benefits to the community's public services and utilities.

4.6.5. Environmental Justice (EO 12898) and Protection of Children (EO 13045)

On February 11, 1994, President Clinton signed EO 12898, entitled, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." The EO directs federal agencies, "to make achieving the environmental justice part of its mission by identifying and addressing, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States."

In January 2021, President Biden issued EO 13985, Executive Order on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce, and EO 14008, Tackling the Climate Crisis at Home and Abroad, to further address the need to achieve environmental justice and equity across the federal government. These new executive orders direct federal agencies to renew their energy, effort, resources, and attention to implement environmental justice and underscore the administration's commitment to environmental justice.

Guidelines for the protection of children are specified in EO 13045, "Protection of Children from Environmental Health Risks and Safety Risk (Federal Register, Volume 62, Number 78, April 23, 1997). This EO requires that federal agencies make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and ensure that policies, programs, and standards address disproportionate risks to children that result from environmental health and safety risks.

The U.S. Census Bureau (U.S. Census Bureau, 2022) estimated the population of Richland County to be 421,566 and 139,698 for the City of Columbia in 2022. Minority populations including African American, American Indian, Alaska Native, Asian, Native Hawaiian/Pacific Islanders, Hispanic or Latino or a mix of these races, account for approximately 52.0% of the population in Columbia, South Carolina. Persons identified within poverty level in the City account for 24.3% of the population. Persons within the City under the age of 5 and 18 is 5.3% and 17.5% of the total City population, respectively. The area of potential effect or buffer distance used is the City limits and the analysis below is based on the three purposes and needs of the Canal facility: drinking water, electric utilities, and recreational opportunities.

According to the EPA Environmental Justice Screen Tool (EJScreen) (https://ejscreen.epa.gov/mapper/) accessed on September 1, 2023, the demographic index within the Columbia city limits is in the 69th percentile for the State of South Carolina and within the 72nd percentile for the Unites States. The demographic index in EJScreen is a combination of percent low-income and percent minority, the two socioeconomic factors explicitly named in EO 12898. For each Census block group, these two numbers are averaged together. The demographic index is equal to the percentage of people in color plus the percentage of low-income; the combined percentage is then divided by two. Other factors within high national percentile ranges (greater than 80%), or of significant interest are: (1) Limited English Speaking is in the 79th percentile; and (2) Persons Over Age 64 is in the 23rd percentile. The full EJScreen report can be found in **Appendix L**.

The threshold level for a significant impact to environmental justice is disproportionately high or adverse human health or environmental effects on minority or low-income populations. The threshold level for a significant impact on the protection of children is disproportionate environmental health or safety risks to children.

4.6.5.1. Alternative 1: No Action Alternative

Under Alternative 1, there would not be any construction activities resulting in the continuation of limited production of drinking water and no electricity production from the hydroelectric plant. Furthermore, the next storm event could potentially cause enough erosion to the Three Rivers Greenway that it would be closed for safety and liability reasons, causing some individuals a

burden to seek alternate routes. With continuing to rely on other sources for water and electricity, minority or low-income populations may see their utility bills increase. Additionally, families with children in the household may be indirectly impacted if parents or guardians have to adjust a grocery budge or health insurance. Based on this analysis conducted, this alternative would have major impacts to minority and low-income populations including children.

4.6.5.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, construction activities would commence for repairing the hydroelectric plant and for improving the features of the Canal. With protection from future similar flood events and the opportunities afforded with a restored Columbia Canal facility, there would be more open green space use, protected utility services, and socioeconomic benefits to the surrounding properties including local businesses. Utility bills would not be expected to increase with the Canal better protected from future flood events. Therefore, minority and low-income populations including those households with children would not have to adjust budgets caused solely on the proposed action. Based on this analysis conducted, this alternative would have benefits to all population members including minority and low-income populations including to children.

4.6.6. Hazardous Materials and Solid Wastes

Hazardous materials and solid wastes are regulated under a variety of federal and state laws, including 40 CFR Part 260, the Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. §§ 6901 *et seq*.), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. §§ 9601 *et seq*.), Solid Waste Act, the Toxic Substances Control Act (TSCA), and the Clean Air Act (CAA) of 1970 (42 U.S.C. §§ 7401 *et seq*.). The OSHA standards seek to minimize adverse impacts on worker health and safety (29 CFR Part 1926). Evaluations of hazardous substances and wastes must consider whether any hazardous material would be generated by the proposed action activity and/or already exists at or in the general vicinity of the site (40 CFR Part 312.10). If hazardous materials are discovered, they must be handled by properly permitted entities per the South Carolina Hazardous Waste Management Act (SC Code of Laws Title 44 Chapter 56), the South Carolina Pollution Control Act (SC Code of Law Title 48 Chapter 1), State Regulation 61-79 Hazardous Waste Management Regulations, and State Regulation 61 – 104 Hazardous Waste Management Location Standards.

A 0.5 (half) mile radius search for the Canal from the northern headgates to the hydroelectric plant was completed using EPA's NEPAssist tool (EPA, 2020). The search identified 16 facilities and sites regulated by RCRA within a half mile of the Canal. Nine (9) of those sites are no longer existing or have changed functions, such as an auto maintenance shop now a bank; and two (2) of the sites (Columbia Water Plant and SC State Museum) are adjacent to the Canal. Four (4)

brownfield sites were identified within a half mile of the Canal. There are no Superfund sites within half mile radius of the Canal facility or within or near any staging/laydown areas. The closest Superfund site is across the Congaree River going southeast slightly over five (5) miles from the Canal facility. There are no TSCA regulated sites within the half mile radius. The closest TSCA site is two (2) miles south at Lindau Chemicals Inc on 750 Granby Lane, Columbia, SC 29201 directly south of the Columbia Quarry owned by Vulcan Materials Company. See tables starting on the next page.

There is a separate project south and near the tailrace where eroded sediment from the Canal embankment was displaced in the Congaree River. This separate project entails the removal of tar-like material (similar to coal tar) that was deposited in the river. The source of tar is most likely a former manufactured gas plant located at 1409 Huger Street which was operated by South Carolina Electric and Gas (SCE&G), now Dominion Energy. The gas plant was in operations until the mid-1950s and later became the location of a city bus terminal (Veolia Transportation) until 2008. Now the location is a vacant lot and will be utilized for equipment, materials, and construction office staging. In 2013, SCE&G began the design and permitting process until Dominion Energy inherited the project and has since taken the lead with designing and working with the USACE and other state and federal agencies on the permitting. More information on this project including details on the design, agency involvements, and permits can be found at: https://scdhec.gov/environment/ongoing-projects-updates/congaree-river-sediment-cleanup/site-history-congaree-river.

The threshold for a significant impact to hazardous materials and waste would include a release of hazardous materials or waste, or a violation of local, state, or federal regulations pertaining to hazardous materials or waste. Regarding CERCLA and RCRA, the threshold level for a significant impact would be if unsafe exposure may occur, the release of hazardous substances, pollutants, or contaminants cannot be avoided, and/or if institutional and/or engineering controls may be breached.

The RCRA regulated sites and identified brownfield sites are listed in Tables 6 and 7.

Table 6: RCRA Regulated Sites Within a 0.5 mile of the Canal

Site Name	Handler ID	Address	Waste Type	Distance to Canal
Midlands Mazda Columbia Group	SCD987570603	655 Broad River Rd Columbia, SC 29210	Ignitable Waste	0.35 mile West of action area over the Broad River Bridge
Peach Auto Painting & Collision	SCD981031644	3808 Lucius Rd Columbia, SC 29210	Ignitable Waste, Methyl Ethyl Ketone, and other nonhalogenated solvents	Not Existing, Vacant Lot, and Open Field Flanked with Silt Fencing
Veolia Transportation	SCR000770826	3613 Lucius Rd Columbia, SC 29201	Ignitable Waste	0.20 mile East of action area Comet Public Bus Maintenance Shop
City of Columbia - Columbia Correctional Institution (CCI)	SCD980709612	1515 Gist St Columbia, SC 29221	Ignitable Waste and Corrosive Waste	1867 SC Penitentiary, Not Existing, Replaced with Residential and Commercial Units
Southern Table & Bedding Corp	SC0000110460	400 Calhoun St Columbia, SC 29201	Ignitable Waste and Spent Nonhalogenated Solvents	0.40 mile East of action area Northeast of Drinking Reservoir Over the Railroad Tracks
Bell South Telephone CLMASCCD 90987	SC0000328922	400 Laurel St Columbia, SC 29201	Ignitable Waste	0.25 mile East of action area Aflac and AT&T Complex
City of Columbia Water Plant	SCR000761239	300 Laurel St Columbia, SC 29201	Ignitable Waste and Corrosive Waste	Located adjacent and east of the Canal Connected to Canal's Function for Drinking Water
Veolia Transportation	SCD981750813	1409 Huger St Columbia, SC 29201	Ignitable Waste and Methyl Ethyl Ketone	No Longer Existing, Currently a Vacant Lot, May Function as the Primary Staging/Laydown Construction Areas
Kline Iron & Steel Co Inc	SCD982168049	1225 Huger St Columbia, SC 29202	Fabricated Structural Metal Manufacturing	No Longer Existing, Now an Open Field

Site Name	Handler ID	Address	Waste Type	Distance to Canal
City Garage & Body Shop	SCD982159832	520 Gervais St Columbia, SC 29201	Spent Nonhalogenated Solvents	No Longer Existing, Replaced with South State Bank Building and Parking Lot
SCE&G Fleet Maintenance Paint & Body Shop	SCD987567070	516 Senate St Columbia, SC 29201	No waste identified	No Longer Existing, Replaced with a Parking Lot
Colonial Wood Works Inc	SCD987573466	1102 Huger St Columbia, SC 29201	Ignitable Waste, Spent Nonhalogenated Solvents	No Longer Existing, Replaced with a Restaurant
SC Dept of Agricultural Lab Division	SCD987580545	1101 Williams St Columbia, SC 29211	Ignitable Waste and Corrosive Waste	No Longer Existing, Replaced with Girl Scouts Leadership Center
SCE&G Columbia Hydro	SCD982077265	301 Gervais St Columbia, SC 29201	Ignitable Waste and Spent Halogenated Solvents Used in Degreasing	Currently Now Part of the South Carolina State Museum, see below
South Carolina State Museum	SCD982083156	301 Gervais St Columbia, SC 29201	Ignitable Waste, Corrosive Waste, Reactive Waste, Acetone, and Toluene	Located adjacent and east of the Canal around the Breached Area
Family Dollar 2735	SCR000780080	475 Sunset Blvd West Columbia, SC 29169	Ignitable Waste, Corrosive Waste, Arsenic, Lead, Mercury, and others	0.50 mile West of the Canal across the Gervais Street Bridge

Table 7: Brownfield Sites Within a 0.5 mile of the Canal

Site Name	Property ID	Address	Description	Distance to Canal
4000 River Drive	126423	4000 River Drive Columbia, SC 29203	Property size is 4.27 acres, formerly used as a mix commercial-residential lot that is planned to be redeveloped into a residential use. EPA analytics indicate that there were no required cleanup activities nor contaminants at the former site.	0.20 mile East of the action area past the railroad tracks
Former Raco Gas Station	130865	619 Gervais Street Columbia, SC 29201	Property size is 0.33 acre, formerly used as a commercial lot (gas station) that was redeveloped into a commercial lot (restaurant). EPA analytics indicate that there were no required cleanup activities nor contaminants at the former site.	0.35 mile East of the action area
SC Dept of Agricultural Lab Division	111155	1101 Williams St Columbia, SC 29211	Property size is 1.00 acre, formerly used as a commercial lot then redeveloped into the Girl Scouts Leadership Center. EPA analytics indicate that there were no required cleanup activities nor contaminants at the former site.	0.15 mile East of the action area
Meeting Street Properties	125624	Corner of Meeting Street and Alexander Road, West Columbia, SC GPS Coordinates: 33.994771, -81.053629	Property size is 4.00 acres, formerly a commercial lot redeveloped into residential. EPA analytics indicate that there were no required cleanup activities nor contaminants at the former site.	0.25 mile West of the action area over the Gervais Street Bridge

4.6.6.1. Alternative 1: No Action Alternative

Under Alternative 1, there would not be any construction activities, therefore, there would be no potential to disturb existing hazardous materials or create any potential new hazardous waste sites within the area. There would be no impacts to human health or the surrounding environment from hazardous or solid waste.

4.6.6.2. Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative)

Under Alternative 2, there would be construction activities for repairing the hydroelectric plant and improving the features of the Canal. The handling of hazardous materials and waste generated or inadvertently discovered during construction activities would be handled in accordance with applicable RCRA, TSCA, and State regulations for managing solid and hazardous waste materials. Potential for spills from construction equipment would be minimized and handled in accordance with applicable regulations and BMPs. There would be no potential for any construction activities related to this project to impact waste sites designated under CERCLA as the nearest superfund site is over five (5) miles from the project location. Based on the analysis conducted, this alternative would have a negligible impact on hazardous materials and solid waste regulated under a variety of federal and state laws.

5.0. CUMULATIVE IMPACTS

Per the CEQ regulations, cumulative impacts refer to the impact on the environment that "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 actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). In accordance with NEPA, this EA considered the combined effect of the proposed alternative and other actions occurring or proposed in the vicinity of the proposed action area.

Independent of the proposed action, multiple projects are planned with the intent of upgrading infrastructure and improving flood resilience. These include: 1) the Rehabilitation of Columbia Canal Headgate Structure project and 2) the Resilient Water Supply project.

Rehabilitation of Columbia Canal Headgate Structure – Work is to include the following various actions: replacement of the existing headgates and gate operators, replacement of the existing timber gate, installation of rock anchors, installation of trash racks, installation of a mechanical trash rake, and construction of a debris container. The existing gates are at the end of their service life and once the work to remove the temporary steel bulkheads and debris beneath the gates (FEMA PA project) are complete, the gates will be replaced allowing the operators to monitor and

react from a remote location. The existing timber gate is deteriorated and will be replaced with a gate consisted of concrete with a timber facing to keep the timber appearance. The installation of the twelve (12) rock anchors will involve extending the anchors down from the stone masonry piers that separate the headgates, filling the holes with concrete, and made flush with the existing deck. Trash racks will be installed to catch debris and logs from getting stuck beneath the headgate and a 200 cubic yard debris container will be built to temporarily hold the caught debris and logs. The replacement of the headgates and improvements listed above is a necessary phase of the Columbia Canal's ability to respond more quickly to future flood events, prevent debris from getting stuck underneath the headgates, initiate the other phases of the Canal's restoration efforts, and assist in the effort to attain a low hazard potential classified by from licensing agencies. The headgate rehabilitation efforts are to a historic feature of the Canal; therefore, the City and Kleinschmidt have engaged with the SC SHPO in Section 106 Consultation under the NHPA. The proposed gate lifting arrangement will have a historic appearance and proposed modifications will not change the dimensions or appearance of the existing stone masonry structure. Construction associated with these actions would have minor effects on wildlife and vegetation that would be limited to temporary avoidance of active construction areas. The new headgates will neither increase nor decrease the flow of water into the canal channel and therefore floodplain values are expected to remain the same. This project is to be funded through HUD CDBG Mitigation within the February-March 2024 timeframe, with procurement planned for second quarter of 2024, and construction late 2024 or early 2025.

Resilient Water Supply (FEMA BRIC) – An EA was completed by FEMA in December 2023 for the federal funding action to construct a resilient water intake structure for the Columbia Canal Water Treatment Plant. During the 2015 flood event, the City's water supply was severely damaged, resulting in a boil water advisory for ten (10) days that greatly impacted the community including the hospitals, fire departments, and to national defense in the form of Fort Jackson. The purpose and goal of this project is to ensure drinking water supply functions will remain fully in place for the community and to the nearby critical facilities in the event of a similar flood event. Additionally, the intake structure is to be built with the potential for seismic events. The estimated population that would benefit to the alternate water supply is approximately 430,000 people. Multiple alternatives were considered, and this option was found to be the most viable to achieve the proposed mitigation and resilient strategy. Work will involve the construction of an intake and pump station structure with a canopy structure, walkway rails and stairs, and an attached electrical building and generator. This is to be placed along the river side of the Canal embankment within the Congaree River due west of the existing water treatment plant and reservoir. For maintenance and equipment access, a permeant bridge will be built crossing the channel from the water intake structure to the city side embankment. Double 48-inch diameter flanged ductile iron piping will be installed consisting of approximately 1,250 linear feet (LF) to connect the intake and pump station

to the water treatment plant. The ductile iron piping will be placed on the maintenance bridge to cross the channel and will not be a hazard for those using the walking path. Power transmission line relocation is expected with Dominion Energy assisting or leading that effort. To facilitate the construction a cofferdam to dewater the project area in the river will be required. Masonry components will be applied to the completed structure that fits in with the historic aesthetics of the Canal facility. The intake screens and the pump station structures are being designed to utilize the natural flow rate within the Congaree River to act as a self-cleaning mechanism to the screens thereby reducing maintenance efforts and costs to the City.

The FEMA EA can be found on the FEMA NEPA Repository at: https://www.fema.gov/emergency-managers/practitioners/environmental-historic/nepa/environmental-assessment-city-columbia.

Each of the projects above are designed as stand-alone improvements to reduce flooding impacts within a defined area. As a single whole, the projects have cumulative impacts on environmental resources throughout the Columbia Canal facility and surrounding areas. The cumulative impacts on the physical, water, biological, cultural, and socioeconomic resources are discussed below using the best available information and a good-faith effort on determining the foreseeable future impacts.

The physical resources such as the geology and soil, air quality, and factors influencing climate change variables are not expected be significantly impacted by the projects as a single whole. Geologic impacts are going to be confined to the construction of any structural supports for the resilient water intake structure. Impacts to air quality and greenhouse gases are expected to be negligible as the resilient water intake structure will likely rely on hydroelectric power for daily use. No significant changes to air quality and GHGs are expected. The headgate rehabilitation project is expected to have negligible impacts as well, mostly from the temporary construction work.

Water resources such as the floodplains and wetlands including the protections afforded from the Clean Water Act have a range of impacts from the project as a single whole. Both the headgate rehabilitation and resilient water supply projects are anticipated to have beneficial impacts to occupying the floodplain by allowing the canal operators to respond to flood events more quickly and effectively. There is anticipated to be minimal changes to upstream and downstream floodplain values for the surrounding properties. It is estimated to be approximately a 0.07-foot rise for about 1,200 LF upstream of the proposed water intake structure. Coordination with the local floodplain administrator will occur and it is expected that a Conditional Letter of Map Revision (CLOMR) will be required. A CLOMR is a formal letter from FEMA commenting on if construction would affect the hydrologic or hydraulic characteristics of a flooding source and result in a modification

of the mapped regulatory floodway. Additionally, once construction is completed for the water intake structure, the community must request a revision to the FIRM to reflect the newly built structure. Wetland impacts will likely be limited to the area where the resilient water intake structure will be built. BMPs will be conditioned and required for both projects as part of the 401 and 404 Clean Water Act Permitting including the NPDES permitting.

Fish and wildlife including vegetation, migratory birds, and protected sturgeon may see some minor impacts due to the need to clear a handful of trees or large bushes, work occurring in and near the rivers. Headgate rehabilitation work will be restricted to the water of the canal channel and to the Broad River section east of the where the diversion dam is located. Protected sturgeon have not been observed north of the diversion dam and will not be spawning in the waters where the headgate rehabilitation project is to occur. Although, work is anticipated to temporarily produce some turbidity in the immediate project area but nothing significant to already what is already occurring in the turbid waters of the Broad River. Construction of the water intake will require work in water and has completed Section 7 ESA informal consultation with NMFS with a concurrence of not likely to adversely affect protected sturgeon. The design of the intake screens will minimize the need for maintenance thereby minimizing impacts to native species in the river including sturgeon. Construction scheduling is to be mindful of sturgeon spawning season and will plan in-water activities accordingly. The headgate rehabilitation project is not expected to remove any vegetation and therefore, no impacts to vegetation is expected for that project. To construct the water intake structure, it is expected that there will be a need to remove a few trees and bushes along the embankment but nothing on the same scale as the embankment rebuild at the heavily impacted areas to the southern breached area.

Impacts to cultural resources are expected to range from minor to moderate. Both projects have gone through Section 106 consultation processes with the SHPO and interested THPOs through the lead federal agencies. See the completed FEMA BRIC EA for more information regarding what was completed for the cultural resources section pertaining to the water intake project. Both projects are implementing masonry components to strive for the keeping of the surrounding landscape and there is expected to be ground disturbance with the construction of water intake and possibly with the ductile iron piping crossing the Canal’s channel.

Socioeconomic resources are expected to be beneficially impacted by both projects. Public services and utilities will be more able to provide drinking water and respond during the next flood event. Cumulatively, the projects will add to the length of construction noise in and around the project action areas. No additional impacts to transportation are expected from these projects and would likely utilize the same laydown and staging areas as Alternative 2: Repair the Columbia Canal and improve various elements (Proposed Alternative). There is anticipated to be a beneficial impact to land use by supporting the vision and goals identified in the City’s comprehensive plan

for the next 25 years through community connectivity and resiliency to future disasters that may be more frequent due to climate change (Columbia, 2020). Low income and minority populations will be better served during emergency situations as the protections would now be in place for continuing to provide safe drinking water.

In conclusion, because frameworks are in place to manage potential environmental impacts, no significant impacts to the human and natural environment are anticipated from the incremental impact of the proposed action in combination with other past, present, and reasonably foreseeable future actions near and at the Columbia Canal. The combined impacts of the proposed project (FEMA PA project) with the headgate rehabilitation project (HUD CDBG Mitigation project) and the resilient water supply project (FEMA BRIC project) will in fact have many beneficial impacts to the community that extends not just from flood resiliency but will promote connectivity through open green space use and to the locally owned businesses. Additionally, all three funding projects will achieve the updated codes and standards including regulatory licensing requirements to meet the purposes and needs.

Additional to infrastructure repairs and improvements to the Canal, there are plans to construct an earthwork amphitheater at the Riverfront Park located northwest of the pedestrian bridge and spillway or at the following coordinate: 34.003033, -81.055037. Prior to the 2015 flood event, this space was being utilized for public and recreational engagements with a bandstand. No significant impacts to natural and cultural resources are to be expected with this type of work but will have benefits to socioeconomic resources that when combined with the three Canal major federal actions will have benefits to the community. FERC has approved of the project and the City is currently soliciting bids for the construction work. Outside of the Canal facility there is a project planned title Columbia Riverfront Gateway Project [Williams Street Extension] occurring to the south of the Canal facility. The project proposes to improve existing roads and construct a new roadway between the perimeter of Wheat, Huger, and Senate streets. Landscaping and smart traffic lights are also proposed with this project. Currently, the City is pursuing federal funding opportunities for this project to improve driver and pedestrian safety and to provide connectivity to the Riverfront Park and Canal. Additionally, this project is to alleviate traffic congestion and reduce travel times. The project is anticipated to include 5,800 feet of new roads, 1,500 feet of improved roads, 4,700 feet of new sidewalks, three electric car charging stations, two bike share stations, and five smart signals. The current level of design work completed for the project includes road alignment established, as well as rough grading limits. No additional studies aside have been completed and there have not been any special studies conducted within the project area (e.g. wetland surveys, biological, cultural surveys, Phase I hazmat, etc.) The City is currently soliciting responses from qualified consultants to assist with an environmental assessment that meets the requirements for the NEPA.

Proposed start dates of construction for the connected projects and the restoration project this EA is focused on is to be determined. Although the public will be notified of start dates, construction schedule, and dates of completion via social media and local news networks.

6.0. PERMIT AND PROJECT CONDITIONS

The subrecipient is responsible for compliance with federal, state, and local laws and regulations including obtaining all required federal, state, and local approvals or permits prior to beginning constructions activities, and adhering to any conditions laid out in these approvals or permits. While a good faith effort was made to identify all necessary permits and approvals for this environmental assessment, the following list may not include all approval or permit required for this project. Before, and no later than, submission of a project closeout package, the subrecipient shall provide FEMA with a copy of the required permit(s) from all pertinent regulatory agencies.

1. USACE Section 404 Permit
2. SCDHEC 401 Water Quality Certification
3. NPDES Permit, if applicable
4. Local Floodplain Administrator Letter of Approval or Permit
5. FEMA Conditional Letter of Map Revision (CLOMR)
6. Existing FERC Tree Management Plan
7. FERC Drilling Program Plan, if applicable
8. FERC Part 12 Independent Safety Inspection
9. City or County Tree Removal Letter Approval or Permit
10. SCDOT Encroachment Permit
11. Dominion Energy Letter of Approval or Agreement for Remove/Relocate Facilities
12. City or County Tree Removal Letter Approval or Permit
13. Landfill Permitting Information
14. Fill Source Location(s) to be Existing and Permitted Quarry or Quarries

The subrecipient (City of Columbia) must adhere to the following conditions should the proposed action be implemented. Failure to comply with FEMA grant conditions may jeopardize federal funding. FEMA requires the following standard conditions for the proposed action:

<u>General Project Conditions</u>

1. The subrecipient is responsible for obtaining and complying with all required local, state, and federal permits and approvals.
2. If deviations from the proposed scope of work result in substantial design changes, the need for additional ground disturbance, additional removal of vegetation, or any other unanticipated changes to the physical environment, the subrecipient must contact FEMA

so that the revised project scope can be evaluated for compliance with NEPA and other applicable environmental laws.

Physical Resources

3. Commit to the best available emissions control technologies for project equipment in order to meet the following standards:
    a. On-highway vehicles should meet, or exceed, the EPA exhaust emissions standards for model year 2010 and newer heavy-duty, on-highway compression-ignition engines (e.g., long-haul trucks, refuse haulers, shuttle buses, etc.).
    b. Non-road vehicles and equipment should meet, or exceed, the EPA Tier 4 exhaust emissions standards for heavy-duty, non-road compression-ignition engines (e.g., construction equipment, non-road trucks, etc.).
    c. The equipment specifications outlined above should be met unless: 1) a piece of specialized equipment is not available for purchase or lease within the United States; or 2) the relevant project contractor has been awarded funds to retrofit existing equipment, or purchase/lease new equipment, but the funds are not yet available.
4. To reduce the emissions of criteria pollutants, construction equipment engine idling will be minimized to the extent practicable, and engines will be kept properly maintained.
5. Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative, where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
6. When hauling material and operating non-earthmoving equipment near and within the construction work areas, prevent spillage and limit speeds of 15 miles per hour. Limit speed of earth-moving equipment to 10 miles per hour.

Water Resources

7. The subrecipient will obtain applicable permits (CWA 401, 402, and 404) and adhere to all conditions as required in those permits.
8. The subrecipient must obtain written approval or floodplain permit from the local floodplain administrator before work begins and adhere to all conditions identified in the approval or permit.
9. The proposed construction activities are to adhere to all permitting requirements to avoid, minimize, or mitigate potential impacts to wetlands.

Biological Resources

10. To minimize or avoid impacts to potential protected sturgeon species the following conditions are to be applied during in-water construction activities:
    a. Prior to the onset of construction activities, the applicant or designated agent will conduct a meeting with all construction staff to instructed about the potential presence of species protected under the ESA. Identification of the sturgeons, their protected status, what to do if any are observed within the project area, and applicable penalties that may be imposed if State or Federal regulations are violated. All on-site project personnel are responsible for observing water-related activities for the presence of protected species. All personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species. To determine which species may be found in the project area. Applicant shall review prior to initiating any construction work the relevant Protected Species List at: https://www.fisheries.noaa.gov/southeast/consultations/south-carolina
    b. Any interactions, meaning collision or injury to any sturgeon, occurring during the construction phase of the project shall be reported immediately to NMFS's Protected Resources Division (PRD) at (1-727-824-5312) or by email to takereport.nmfsser@noaa.gov. For Sturgeons: report dead sturgeon to 1-844-STURG 911 (1-844-788-7491) or email to nmfs.ser.sturgeonnetwork@noaa.gov
    c. Prior to initiating any of the work, installation of any turbidity curtains should meet specifications as described below. In some instances, the use of turbidity curtains may be waived by the USACE project manager if the project is deemed too minimal to generate turbidity (e.g., certain ATON installation, scientific survey device placement, marine debris removal) or if the current is too strong for the curtains to stay in place.
        i. Position turbidity curtains in a way that does not entrap sturgeon within the construction area or block access for them to navigate around the construction area.
        ii. Must be made of materials that reduce the risk of entanglement to sturgeon.
        iii. In-water lines (rope, chain, and cable) must be stiff, taut, and non-looping. Examples of such lines are heavy metal chains or heavy cables that do not readily loop and tangle. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, must be enclosed in a plastic or rubber sleeve/tube to add rigidity and prevent the line from looping and tangling. In all instances, no excess line is allowed in the water.
    d. All equipment operators must watch for and avoid collision with sturgeon. If a listed species is observed within a 50-foot radius of construction equipment,

operation of any mechanical equipment shall cease and not resume until the sturgeon have departed the area of its own volition.

e. For all project in-water activities work operations hours must be completed during daylight.
f. In-water project construction shall take place from uplands or from floating equipment (e.g., barge); prop or wheel-washing is prohibited outside of the Canal channel. Any floating equipment can be anchored via spuds.
g. If practicable, avoid work in or near the Broad and Congaree rivers during sturgeon spawning migration from February 1 to April 30.

11. To minimize or avoid impacts to potential protected species under USFWS jurisdiction the following conditions are to be applied during construction activities:
    a. Educate all employees, contractors, and/or site visitors of relevant rules and regulations that protect wildlife, discuss identification of the ESA-listed species, their protected status, what do if any are observed within the project areas, and applicable penalties that may be imposed if State or Federal regulations are violated. All personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing ESA-listed species.
    b. If construction work comes into contact, injures, and/or disturbs ESA-listed species and general wildlife; construction personnel or designated agent shall immediately call the Carolina Wildlife Center at 803-772-3994 for assistance. More information can be found at:

       https://carolinawildlife.org/contact/#:%7E:text=If%20you%E2%80%99ve%20found%20an%20injured%20or%20orphaned%20wild,a%20call%3A%20%28803%29%20772-3994%205%20Email%20us%3A%20info%40carolinawildlife.org

       Also, one should immediately report the incident to the U.S. Fish and Wildlife Service Ecological Services Field Office at 843-727-4707 and document process and outcome(s).
    c. Photos and descriptions of species may be obtained on the following U.S. Fish and Wildlife Service webpages:

       Tri-colored Bat:
       https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus
       Red-cockaded Woodpecker:
       https://www.fws.gov/species/red-cockaded-woodpecker-dryobates-borealis
       Monarch Butterfly:
       https://www.fws.gov/species/monarch-danaus-plexippus

d. Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).
e. Restrict unauthorized access to natural areas adjacent to the project site by erecting a barrier and/or avoidance buffers (e.g., gate, fence, wall) to minimize foot traffic and off-road vehicle uses.
f. Contractor is to clearly mark all riparian buffers, streams, and wetlands including limits of disturbance in field prior to commencing construction in these areas.
g. Regarding construction equipment and vehicles:
    i. Construction equipment and vehicles should utilize eco-friendly fuels or otherwise should undergo regular inspection for possible leaks or seeping of fuel, oil, etc.
    ii. Avoid soil contamination by using drip pans underneath equipment and containment zones at construction sites and when refueling vehicles or equipment.
    iii. Avoid contaminating natural aquatic and wetland systems with runoff by limiting all equipment maintenance, staging laydown, and dispensing of fuel, oil, etc., to designated upland areas.
    iv. Construction equipment and vehicles shall be cleaned regularly after use and prior to demobilization any vegetation (terrestrial and aquatic) will be removed off and disposed of properly to avoid transporting any invasive and exotic species.
    v. After each day of work and at project completion, all equipment including materials and any waste must be removed and/or disposed of properly according to South Carolina Department of Health and Environmental Control (SCDHEC) requirements.
h. Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA). Nests protected under ESA cannot be removed without a valid permit. Contact U.S. Fish and Wildlife Service Ecological Services Field Office at 843-727-4707 for technical assistance and document process and outcome(s).
i. Operation of any mechanical construction equipment shall cease immediately if ESA-listed species (specifically bats and birds) are seen within a 50-ft radius of the equipment. Activities will not resume until the protected species has departed the project area of its own volition.
j. City will inform FEMA as to when tree removal activities has started so FEMA can determine the need to reconsult for the tricolored bat.

12. Listed below are conservation measures to be utilized during the construction activities for the Proposed Action with the goal of reducing impacts to birds and their habitats protected under the Migratory Bird Treaty Act (MBTA).
    a. To the extent practicable, schedule all vegetation removal, trimming, and grading of vegetated areas from September 1st – March 31st, which is outside of the peak breeding season for migratory birds. USFWS's Information, Planning and Conservation system (IPaC) was used to collect bird breeding information.
    b. Educate contractors of relevant rules and regulations that protect wildlife. Prior to the onset of construction activities, the contractor's designated lead will conduct a briefing with all construction staff to instruct them on the potential presence of species protected under the MBTA. If work is occurring during a bird's breeding season, briefing boards strategically placed at laydowns area will inform construction staff of the species' scientific and common name, a picture of the bird, timing of breeding, and habitat notes.
    c. Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit.
    d. Provide solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of in the manner approved by the South Carolina Department of Health and Environmental Control (SCDHEC).
    e. Minimize project creep by staying within the project action area that includes the Columbia Canal facility and laydown areas.
    f. Implement standard soil erosion and dust control measures.
    g. To the extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas.
    h. The contractor will be required to adhere to all applicable Federal, State, and Local permits and will comply with conditions set forth in each. These requirements include all State of South Carolina and USACE permits.
    i. Report any incidental take of a migratory bird, to:

        U.S. Fish and Wildlife Service
        Migratory Bird Permit Office
        1875 Century Blvd.
        Atlanta, GA 30345
        404-679-4163
        Resee_Collins@fws.gov

13. To minimize the spread of invasive species, it is recommended that construction equipment be washed prior to contact with waters and unpaved areas.

14. Removed vegetation (many identified as invasive species) should be disposed of properly to avoid incidentally dispersing invasive plants.
15. Disturbed green spaces that will be revegetated shall use South Carolina and region native species.
16. The subrecipient shall adhere to all requirements from the existing and any further versions of the FERC Tree Management Plan requirements.
17. Voluntary (optional or discretionary) conservation measures for candidate species, Monarch butterfly include:
    a. Planting (recommended) or seeding of native milkweed and native nectar plants (organically and locally grown sourced plants are best) with an aim for diversity of species and bloom timing.
    b. Conservation mowing (i.e., mowing only November – March) to enhance native floral resource habitat.
    c. Targeted herbicide treatments (outside the growing season of native milkweeds) to restore suitable habitat.
    d. Invasive species management.

Cultural Resources

18. Please see Cultural Resources MOA for guidelines on how to respond to inadvertent archaeological discoveries or human remains and burial contexts.
19. All borrow or fill material must come from pre-existing stockpiles or commercially procured material from a pre-existing source. If this is not the case, the subrecipient shall inform FEMA of the fill source so required agency consultations can be completed and FEMA approval will be required prior to beginning ground disturbing activities.

Socioeconomic Resources

20. To minimize noise impacts, construction activities will adhere to all local noise ordinances.
21. The subrecipient will coordinate with SCDOT to receive an SCDOT Encroachment Permit and adhere to all conditions as required by SCDOT.
22. If SCDOT requires the development of a traffic plan, the subrecipient is to adhere to all requirements of the plan; and to the extent practicable, adhere to any BMPs.
23. To the greatest extent practicable, transport of materials to and from the construction area shall consider avoiding school zones and areas with low income and minority populations.
24. The subrecipient will coordinate with Dominion Energy for approval regarding removing, replacing, and relocating electrical utility structures and components. Any Dominion Energy requirements shall be adhered by the subrecipient.

25. To minimize risks to safety and human health, construction activities will be performed using qualified personnel trained to use the required equipment properly.
26. The construction area will be secured from public access and signage indicating closed site and only authorized personnel allowed at all entrances and exits.
27. All construction activities will be conducted in accordance with the standards specified in the OSHA regulations.
28. For ground disturbing activity, if contaminated soil is encountered during construction, it should be treated, stored, and disposed of according to applicable federal, state, and local regulations.
29. Any hazardous materials discovered, generated, or used during construction of the proposed action will be disposed of and handled by the subrecipient in accordance with applicable federal, state, and local regulations.
30. Construction equipment will be kept in good working order, any equipment to be used over, in, or within 100 feet of water will be inspected daily for fuel and fluid leaks. Any leaks will be promptly contained and cleaned up, and the equipment will be repaired.
31. In the event of an inadvertent spill, the subrecipient must immediately call the SCDHEC response line at: 888-481-0125. See more at: https://scdhec.gov/report-it/reporting-chemical-spills-pollution.

7.0. AGENCY COORDINATION AND PUBLIC INVOLVEMENT

Agency Coordination:

The following is a good faith effort to capture all coordination and consultation with state and federal partners:

- Advisory Council of Historic Preservation
- Federal Energy Regulatory Commission
- U.S. Army Corps of Engineers, Columbia District
- U.S. Fish and Wildlife Service, Charleston Ecological Field Office
- U.S. Fish and Wildlife Service, Migratory Bird Program
- National Marine Fisheries Service, Southeast Regional Office
- National Park Service
- South Carolina Department of Archives and History
- Catawba Indian Nation
- Cherokee Nation
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Muscogee (Creek) Nation

- Seminole Nation of Oklahoma
- Seminole Tribe of Florida
- Shawnee Tribe
- Thlopthlocco Tribal Town
- Tuscarora Nation
- United Keetoowah Band of Cherokee Indians

Initial Disaster-Wide Public Notice

FEMA issued a disaster-wide initial public notice for the 2015 Historic Floods (DR-4241-SC) on November 7, 2015 within The State newspaper and additionally on November 9, 2015 within The Post and Courier to notify the public of projects under the PA Grant Program that may be occurring within floodplains.

Section 106 Public Engagement

As part of the Section 106 Process under the National Historic Preservation Act, public engagement occurred on July 29, 2021 via Zoom WebEx webinar to maintain social distancing due to COVID-19. The webinar was also streamed and recorded on YouTube (https://www.youtube.com/watch?v=UY8BoH8liaQ) with 176 views as of 10/12/2021.

The City created a website to track progress of Canal projects including the FEMA PA project and can be found at:

> https://columbiascwater.net/columbiacanalproject/.

The website also functions as a repository for all related news release and public documents. The FEMA public notice for inviting the public and stakeholders to the Section 106 engagement was issued on July 14, 2021 and upload on the Columbia Water webpage at:

> https://columbiascwater.wh1.idfsites.com/wp-content/uploads/2021/07/07-14-2021-FEMA-Notice-of-Public-Meeting.pdf.

The press release sent to the local media can be found at:

> https://columbiascwater.net/fema-schedules-virtual-public-meeting-regarding-columbia-canal-repairs/

Finally, the City pushed the Section 106 engagement notice out to the public for their awareness on social media. The following are the links:

> https://twitter.com/ColumbiaSCWater/status/1415363285013176320

https://twitter.com/ColumbiaSCWater/status/1415363281854902284

https://www.facebook.com/ColumbiaSCWater/photos/a.534244599986602/4074701669274193/v

https://www.facebook.com/ColumbiaSCWater/photos/a.534244599986602/4120516781359348/

https://www.instagram.com/p/CReexkHn0i9/

Drafted EA Notice

The public will be notified of the availability of this EA for review and comment by posting of the public notice on FEMA's website, the City of Columbia's website, and a designated on-site location, and a hard copy of the EA will be made available at the Columbia City Hall located at 1737 Main Street, Columbia, SC 29201. The public comment period ends after 30 calendar days from date of posting. The public notice can be found in **Appendix M**. Any public comments and responses of the public notice and EA draft will be made available in this appendix upon request if a FONSI is issued.

8.0. LIST OF PREPARERS

Name	Organization	Title
Scott Fletcher	Region 4 FEMA	Deputy Regional Environmental Officer
Dustin Ducote	Region 4 FEMA	Environmental Protection Specialist and NEPA Lead
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Kyle Crager	Michael Baker Int.	Water Services Manager
Lee Williams	Michael Baker Int.	Environmental and Planning Manager
Thomas Bodor	Michael Baker Int.	Department Manager – Archaeology
Timothy Zinn	Michael Baker Int.	Department Manager – Architectural

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Appendices are available for review upon request to FEMA-R4EHP@fema.dhs.gov