US Army Corps
of Engineers®
Savannah District

Hartwell Lake DRAFT Integrated Water Supply Storage Reallocation Report and Environmental Assessment and Finding of No Significant Effect South Carolina and Georgia

DRAFT
February 2024

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (Corps), Savannah District, evaluated the feasibility of reallocating existing storage in Hartwell Lake to water supply. The Hartwell Lake Draft Integrated Water Supply Storage Reallocation Report and Environmental Assessment (IWSSRR/EA) and Findings of No Significant Impact (FONSI) categorizes and analyzes those results in detail. The IWSSRR/EA identifies possible impacts to environmental resources, socioeconomics, and cultural resources of implementing the recommended plan pursuant to requirements of the National Environmental Policy Act (NEPA).

The purpose of this report is to prepare an analysis to evaluate Hartwell Lake water supply storage reallocation requests to meet immediate and future water demands for counties in South Carolina and Georgia adjacent to Hartwell Lake. Based on historic water consumption, estimated increasing populations, and industrial development, combined with the lack of additional readily available and reliable water supply, water demands would not be met in the coming decades through 2072.

To meet those requests for water supply, in addition to the No Action Alternative (NAA)/ Future Without Project Condition (FWOP), known henceforth as the NAA, eight potential management measures were evaluated. Those measures that have the capacity to meet the projected demand will also be assessed for their cost-effectiveness, technical viability, environmental acceptability, and impacts on other project purposes to determine if they should be carried forward for further review. To determine whether the proposed management measures would be screened out or carried forward for further analysis in the initial array of alternatives, evaluation criteria were identified. To be carried forward for further analysis in the initial array of alternatives, the management measure would need to meet the planning objective of providing water supply or storage for water supply to meet near-term water demands and be a viable, reliable, drought resistant, long-term solution to meet future water demands. Hence, the first level of screening is meant to eliminate management measures that do not sufficiently increase water supply to meet water demand or would not likely provide a consistent and reliable source of water supply, in quality or quantity, during periods of drought.

The management measures considered for the Federal action include reallocation of storage for water supply from either the conservation storage, inactive storage, or flood storage from Hartwell Lake. Inactive storage was not carried forward due to minor adverse impacts to flood risk management (FRM), while flood storage was dropped from further consideration due to high impacts expected to dam safety and flood risk management. Additional measures considered included: water conservation, wholesale purchases (requiring transmission lines or in-place construction), installation of additional groundwater wells, and raw water line construction to the Savannah River. Water conservation and new groundwater wells were not carried forward as they would not increase water supply to meet water demand and would not provide a reliable, long-term, drought resistant water supply source.

The selection of the recommended plan or Tentatively Selected Plan (TSP) is considered the most effective and efficient means of reallocating storage to meet water supply requests while ensuring that benefits categories encompassed and considered National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE). After evaluating the impacts of the initial array of alternatives, only the NAA and conservation storage made the final array of alternatives criteria.

Following a decision to offer return flow credit (RFC) for State of Georgia storage accounts at Allatoona Lake, the Corps received a letter from one of the requestors - Anderson Regional Joint Water System (ARJWS) requesting return flow credits. For this study, RFCs equate to water withdrawals minus any water returned to Hartwell Lake by the requestors. On 20 August 2021, the Corps met internally to discuss ARJWS request for direct storage credit for RFC. Discussions revolved around South Carolina's planned legislation requiring RFCs and whether a state return flow credit law affects Corps consideration of return flow credits for the Hartwell WSRS. The Corps decided to hold the report and develop an alternative prior to the draft report's release to the public. The additional RFC alternative development added approximately nineteen months to the schedule.

The recommended plan is to reallocate 10,410 acre-feet of conservation storage in Hartwell Lake to water supply with RFC. The recommended plan meets the study objective, is economically justified, would not significantly impact the other authorized purposes of the Corps' Savannah River Reservoir System, and would not require major structural or operational changes. The recommended plan supports the Corps' Environmental Operating Principles and is compliant with NEPA and the National Historic Preservation Act (NHPA). Reallocation with RFC as detailed in the recommended plan would enable the Corps' reservoirs to meet the water supply requests. Additionally, the recommend plan should positively affect disadvantaged communities, which comprise approximately 32% in South Carolina counties and 73% in Georgia counties which rely on this water resource.

Average annual cost (AAC) of storage to reallocate 10,410 acre-feet of conservation storage in Hartwell Lake to water supply was estimated at $184,829, including $11K for annual operations and maintenance (O&M). Given the least action alternative requires a new pipeline to a neighboring city to achieve water demand, the average annual cost of the capital costs for the least cost alternative are substantially higher than the chosen alternative 5. As a test of financial feasibility, the cost of the reallocated storage was compared to the cost of the most likely, least costly alternative absent any Federal action. The NAA have Average Annual Costs of ~$70M with an additional $186K annual O&M cost. Reallocating conservation storage from Hartwell Lake for water supply costs substantially less than the most likely, least costly, non-Federal alternative for each requestor. The costs for new pump stations, and transmission and treatment plants have an average annual cost of $28 million per year compared to the $70 million under the least cost alternative.

The overall effects of reallocating 10,410 acre-feet of conservation storage in Hartwell Lake to water supply would decrease average water surface elevation in Hartwell Lake by 0.02 feet or 0.24 inches over the period of record. It would reallocate 0.68 percent of the conservation storage in Hartwell Lake to water supply and 0.37 percent of the system-wide conservation storage to water supply. It would reduce both hydropower benefits and hydropower revenues by less than 0.01 percent.

Therefore, pursuant to the authority provided in the Water Supply Act of 1958, as amended, the Corps recommends reallocating 10,410 acre-feet of conservation storage in Hartwell Lake to water supply.

Upon approval of the Final IWSSRR and EA, the Corps will enter into four separate Water Supply Storage Agreements with the requesting entities with ARJWS (4,571acre-feet), Pioneer Rural Water District (3,123 acre-feet), City of Lavonia (2,308 acre-feet), Currahee Club (412 acre-feet).

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DRAFT FINDING OF NO SIGNIFICANT IMPACT

Hartwell Lake Draft Integrated Water Supply Storage Reallocation Report and Environmental Assessment and FONSI

Georgia and South Carolina

The U.S. Army Corps of Engineers, Savannah District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Hartwell Lake Draft Integrated Water Supply Storage Reallocation Report and Environmental Assessment (IWSSRR/EA) dated *XXXX XX, 202X*, South Carolina and Georgia, addresses four requests for the reallocation of storage from Hartwell Lake for water supply. The four requestors are, Anderson Regional Joint Water System (ARJWS), Pioneer Rural Water District (Pioneer RWD), the City of Lavonia, and the Currahee Club. This action is authorized by Public Law 85-500, Title III, Water Supply Act of 1958, as amended (72 Stat. 319).

The Hartwell Lake IWSSRR and EA, incorporated herein by reference, evaluated alternatives to determine if storage could be reallocated from Hartwell Lake for water supply without significantly impacting other project purposes. The recommended plan is Alternative 5, which would reallocate 10,410 acre-feet of storage from the Hartwell Lake Conservation Storage to water supply storage. No new infrastructure would be required for three of the requestors: ARJWS, Pioneer RWD, and the City of Lavonia, as infrastructure currently in place for these requestors can sufficiently convey the additional water supply. Currahee Club would be required to construct a small intake pipe as described in Section 2.7 of the IWSSRR/EA.

In addition to the “no action (NAA)” or “future without project condition (FWOP)” alternative, which would not reallocate any reservoir storage for water supply, one “action” alternative was evaluated; Alternative 5. The action alternatives 2, 3, and 4 were eliminated from detailed analysis because of technical and engineering considerations. Section 3.0 of the IWSSRR/EA describes the alternatives screening process.

SUMMARY OF POTENTIAL EFFECTS:

For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 1.

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant Effects	Insignificant Effects as a Result of Mitigation*	Resource Unaffected by Action
Hydrology	☒	☐	☐

	Insignificant Effects	Insignificant Effects as a Result of Mitigation*	Resource Unaffected by Action
Recreation	☒	☐	☐
Water Supply	☒	☐	☐
Hydropower	☒	☐	☐
Flood Risk Management	☐	☐	☒
Water Quality in the Lakes	☐	☐	☒
Water Quality in the Savannah River	☐	☐	☒
Aquatic Resources	☐	☐	☒
Threatened/Endangered species/critical habitat	☐	☐	☒
Essential Fish Habitat	☐	☐	☒
Socioeconomics	☐☒	☐	☒☐
Environmental Justice		☐	☒☐
Protection of Children	☐	☐	☒
Hazardous, Toxic & Radioactive Waste	☐	☐	☒
Geology	☐	☐	☒
Wetlands	☐	☐	☒
Floodplains	☐	☐	☒
Soils	☐	☐	☒
Cultural Resources/Historic Properties	☐	☐	☒
Climate Change	☐	☐	☒
Air Quality	☐	☐	☒
Noises	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. No compensatory mitigation is required as part of the recommended plan.

Endangered Species Act (ESA)
Pursuant to section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers has determined that the recommended plan will have no effect on federally listed species or their designated critical habitat.

National Historic Preservation Act (NHPA)
Based on a review of 36 CFR §800, this project poses no adverse effect to historic properties. The Corps coordinated this determination under Section 106 of the National Historic Preservation Act (NHPA) with the South Carolina and Georgia State Historic Preservation Offices for concurrence.

Clean Water Act Section 404(b)1 Compliance
No discharge of dredged or fill material in waters of the U.S. are anticipated in the recommended plan. Therefore, a Section 404(b)(1) evaluation is not required. Currahee Club will be responsible for obtaining any required permits for the intake pipe.

Clean Water Act Section 401 Compliance
Section 401 Water Quality Certifications from the states of Georgia and South Carolina are not needed for the recommended plan as no discharge of effluent or materials into waters of the U.S. is anticipated for the recommended plan. Currahee Club will be responsible for obtaining any required permits for the intake pipe.

Coastal Zone Management Act (CZMA Consistency) Compliance
Pursuant to Section 307 of the Coastal Zone Management Act of 1972, as the project is outside of the Coastal Zone and has no indirect impacts to the Coastal Zone, compliance with CZMA is not applicable.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials will be or have been completed.

FINDING:
Technical, environmental, economic, and cost effectiveness criteria used in the formulation of alternative plans were those specified in the Water Resources Council's 1983 Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State, and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

Date_____

Ronald J Sturgeon, PE
Colonel, U.S. Army
Commanding

1.0 PURPOSE and AUTHORITY

1.1 Study Overview

The Corps prepared the following IWSSRR/EA to evaluate the feasibility of reallocating existing storage in Hartwell Lake to water supply. The Corps prepared this report in accordance with the National Environmental Policy Act of 1969, as amended and the Council on Environmental Quality's Regulations (40 CFR 1500-1508 (2023)), as reflected in Corps' Engineering Regulation ER 200-2-2 dated 4 March 1988 and planning guidance in ER 1105-2-100 dated 22 April 2000. This IWSSRR/EA provides sufficient information on the potential adverse and beneficial environmental effects to allow the District Commander, U.S. Army Corps of Engineers, Savannah District, to make an informed decision on the appropriateness of preparing an Environmental Impact Statement (EIS) or Finding of No Significant Impact (FONSI). The study was fully funded by Corps' Operations and Maintenance (O&M) funds through the Hartwell Dam and Lake Project.

1.2 Purpose and Need

The purpose of this report is to address the inadequate supply of water for Hartwell Lake requestors along the Savannah River. The report will evaluate Hartwell Lake water supply storage reallocation requests to meet immediate and future water demands for municipalities in South Carolina and Georgia adjacent to Hartwell Lake. Based on historic water consumption, increasing populations, and industrial development, several non-Federal requestors sought Corps assistance for a suitable cost-effective solution. Combining the requestors current and future needs with a lack of readily available and reliable water supply, water demands would not be met through 2072. Significant losses in economic growth and development for both Georgia and South Carolina are anticipated if future demands are not met.

1.3 Non-Federal Requestors

Four separate entities requested water supply storage from Hartwell Lake, which initially equated to 24.55 MGD or 20,230 acre-feet. Below are the identified requestors:

- Anderson Regional Joint Water System (ARJWS): 16 MGD or 13,226 acre-feet
- Pioneer Rural Water District (Pioneer RWD): 5 MGD or 4,120 acre-feet
- The City of Lavonia: 3 MGD or 2,472 acre-feet
- The Currahee Club: 0.5 MGD or 412 acre-feet

Later in the study once RFCs were included, the water supply storage required was nearly cut in half to 10,410 acre-feet. In all, granting RFC allows Anderson, Pioneer, and Lavonia to need smaller accounts, by 4,568 ac-ft, 3,122 ac-ft, and 2,308 ac-ft, respectively. Currahee needed 412 ac-ft more to continue meeting the same level of demand during the critical period. (Section 3 provides detail explanation of RFC).

1.4 Authority and Federal Interest

Authority for the U.S. Army Corps of Engineers (USACE) to reallocate water storage at an authorized Federal project is contained within Public Law 85-500, Title III, Water Supply Act (WSA) of 1958, as amended, codified at 43 U.S.C. § 390b. Section 301(b), of this Act states ". . . it is hereby provided that storage may be included in any reservoir project surveyed, planned, constructed or to be planned, surveyed and/or constructed by the Corps of Engineers. . . to impound water for present or anticipated future demand or need for municipal and industrial water supply." 43 U.S.C. § 390b(b). Section 301(d) of the Act states "[M]odifications of a reservoir project heretofore authorized, surveyed, planned, or constructed to include storage as provided in subsection (b), which would seriously affect the purposes for which the project was authorized, surveyed, planned, or constructed, or which would involve major structural or operational changes shall be made only upon the approval of Congress as now provided by law." 43 U.S.C. § 390b(e). This law established a federal interest in development of water supplies for municipal and industrial use in connection with Federal multi-purpose projects.

1.4.1 Water Resources Development Act of 1986, Public Law 99-662

The Water Resources Development Act (WRDA) of 1986, Pub. L. No. 99-662, sharply modified the Federal role that had been largely defined in the Water Supply Act of 1958 to place greater financial responsibility on non-Federal requestors. Sections 103 and 932 of WRDA 1986 codified the following amendments to the Water Supply Act: elimination of the 10-year, interest-free period; reduction of the cost of storage payback period from 50 to 30 years from the date on which the storage is made available; requisite annual reimbursement of the O&M cost (although it had been established policy that these costs be repaid on an annual basis); establishment of the non-Federal cost share assigned to an allocation of storage space in a project for municipal and industrial (M&I) water supply as 100 percent; modification of the interest rate formula; addition of a rate of 0.125 percent for transaction costs; and recalculation of the interest rate every 5 years.

1.4.1 Water Reservoir Act of 1963 Public Law 88-140, Recognizing Permanent Rights to Storage

A non-Federal interest may acquire a permanent right to the use of water storage under the authority of Public Law 88-140 (October 16, 1963), 43 U.S.C. 390 c-f. Such a right is obtained by the non-Federal interest upon completion of payment of the first costs (investment costs) of the reallocation and that storage may be used as long as the project is operated by the Government. The non-Federal interest remains responsible for its proportionate share of the project's annual operation and maintenance costs, and of reconstruction, rehabilitation, and replacement costs for project features, that are allocated to water supply storage. Such storage also remains subject to equitable reallocation among project purposes due to sedimentation.

1.4.2 Section 408 Considerations

For reallocated municipal and industrial water supply storage under the 1958 WSA authority, the water supply user must be advised that the reallocation study itself will not

specifically address Section 408 considerations but that Section 408 considerations will be taken into account in the drafting of a water storage agreement and associated outgrants or consents. Any requirements for water supply user's facilities (intake structures, etc.) will be included in the agreement and associated outgrants (EC 1165-2-220 POLICY AND PROCEDURAL GUIDANCE FOR PROCESSING REQUESTS TO ALTER US ARMY CORPS OF ENGINEERS CIVIL WORKS PROJECTS PURSUANT TO 33 U.S.C. § 408).

1.5 Delegation Authority

The Assistant Secretary of the Army for Civil Works (ASA(CW)) may approve reallocations that do not seriously affect other project purposes and that do not involve major structural or operational changes. In accordance with *"IAW Memorandum, ASA-CW, April 7, 2020, SUBJECT: Delegation of Approval and Execution Authority for Water Supply Reallocation Reports, and Agreements",* the ASA(CW) delegates the authority to approve reallocation studies "whereby reallocation of existing conservation storage to water supply is contemplated without changes to flood risk management storage or project operations" to the Director of Civil Works. Those studies must also recommend reallocation fewer than a cumulative volume of 50,000 acre-feet or 20 percent of the total storage volume, and those reallocations cannot significantly affect other authorized purposes or significantly affect structural or operational changes. All conditions for delegation to the Director of Civil Works are met for this study.

A water storage reallocation may require Secretarial approval due to other aspects of the proposal, including reduced pricing for non-Federal cost of storage payments for low-income communities, as authorized by Section 322 of the Water Resources Development Act of 1990. Requests for reduced pricing shall be addressed on a case-by-case basis as they are received. All requestors in this study are ineligible for price reductions.

2.0 PROJECT HISTORY

2.1 Hartwell WSRS Project Background

As a result of increased population and water demand, the Corps received four requests for reallocating storage in Hartwell Lake to water supply. Per Planning Bulletin 2013-01, Dam Safety Considerations for Water Supply Storage Allocation and Reallocation Studies, "When water supply storage reallocation is requested by a non-Federal entity, the United States Army Corps of Engineers (USACE) decision-makers at all levels must fully consider the condition of the dam and associated project levees, Dam Safety Action Classification (DSAC), Interim Risk Reduction Measures (IRRM) and other remediation, and their impacts on pool levels and inspection, operation, and maintenance of the project."

In Fiscal Year 2014, sufficient Federal funds were provided to initiate the technical work leading to the Alternatives Milestone Meeting (AMM). The study experienced numerous start/stops due to funding and technical issues (Appendix I, Section 1.0) but is now

funded to completion. The current completion date for the signed Chief's Report is March 31, 2025.

Table 2: Project Study and Correspondence History

Date	Meeting	Result
Sep 2016	AMM	Team required to conduct additional economic analysis
Jan 2017	In-Progress Review (IPR)	Additional quantitative analysis of hydropower losses and flood damages of reallocation from flood risk management (FRM) pool was requested
Jun 2017	IPR	Vertical Team (VT) satisfied with flood risk analysis but requested flood inundation analysis
Mar 2018	Dam Safety Senior Oversight Group	Clemson Lower Diversion Dam Saddle Dike was reclassified from Dam Safety Action Class (DSAC) 4, low urgency, to a DSAC 3, moderate urgency
Apr 2018	IPR	Final Array of Alternatives (flood pool alternative eliminated)
Nov 2018	HQ USACE Deputy Dam Safety Office	USACE South Atlantic Division (SAD) submitted and received approval for Interim Risk Reduction Measures Plan (IRRMP) for Clemson Lower Diversion Dam Saddle Dike
May 2020	TSP	VT actualized selected plan; study placed on hold until April 2021 due to funding constraints
Apr 2021	Kickoff Meeting	Began finalizing the Integrated Draft Report/EA and appendices
Jun 2021	DQC	The DQC team provided multiple high levels of significance and critical comments in plan formulation, environmental, and economics
Aug 2021	IPR - RFC Discussions	The Corps initially planned to move forward without RFC
Mar 2022	IPR - RFC Alternative	Due to receipt of requestor RFC request and awareness of pending South Carolina legislation, Corps decided to hold the draft report and develop a RFC alternative
Aug 2023	Dam Safety Senior Oversight Group	All three Clemson Dams, including saddle dike, were reclassified to DSAC 2, high urgency

Oct 2023	DQC	DQC team to review report with updated model results with RFC.

2.2 Study Area

The Corps constructed, operates, and maintains three Lake and Dam projects on the Savannah River: J. Strom Thurmond (JST), Richard B. Russell (RBR), and Hartwell. Approximately two percent of the watershed lies in North Carolina, 42 percent lies in South Carolina, and the remaining 56 percent lies in Georgia. The watershed drains within 10,579 square miles. The Savannah River watershed embraces three distinct geographic areas: Mountain Section, the Piedmont Province, and the Coastal Plain.

The Congressional Districts in the study area are represented by Honorable Andrew Clyde (R) in District 9 and Honorable Mike Collins (R) in District 10 in Georgia; Honorable Jeff Duncan (R) in District 3 in South Carolina; and Honorable Chuck Edwards in District 11 in North Carolina.

Figure 1shows the locations of all Lake and Dam projects on the Savannah River Basin. Those with red dots indicate Corps Lake and Dam projects while those with yellow dots indicated Lake and Dam projects operated by Duke Energy.

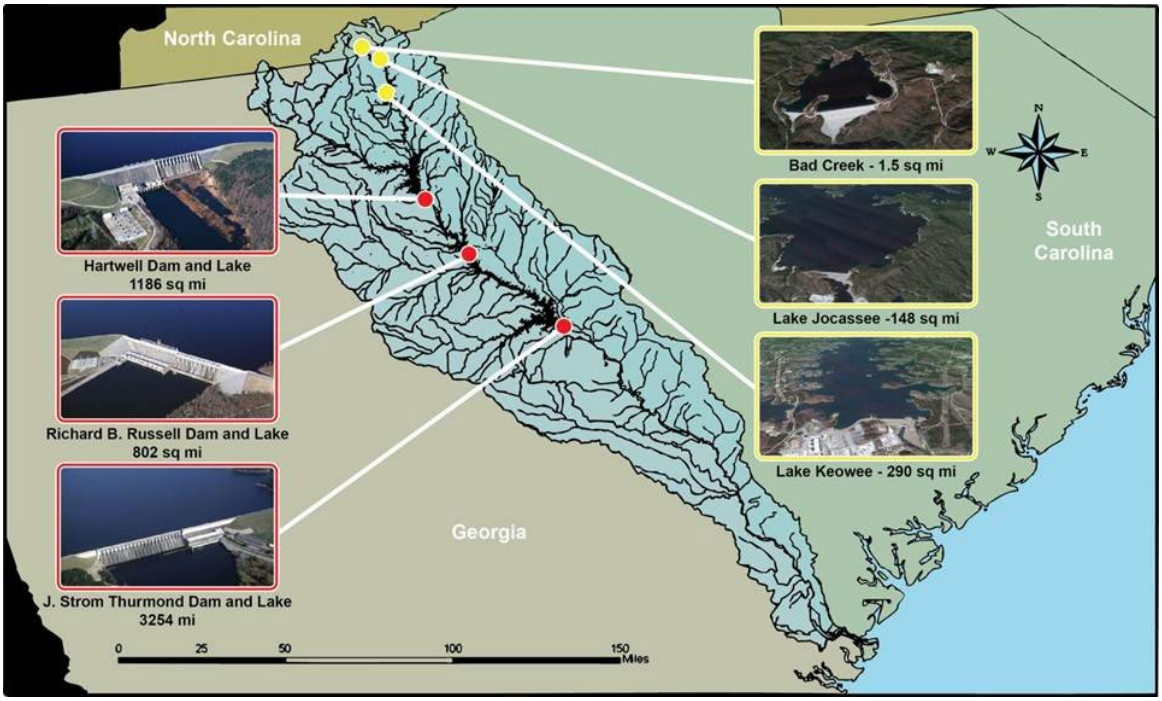

Figure 1: Savannah River Basin Project Map

Figure 2 indicates the spatial extent of the local drainage basin for each of the Lake and Dam projects.

Figure 2: Savannah River Basin Project Map

Hartwell Lake's 56,000 acres of water and approximately 962 miles of shoreline extends into six counties in two states: Hart County, GA; Franklin County, GA; Stephens County, GA; Anderson County, SC; Pickens County, SC; and Oconee County, SC. See Figure 3 below.

The service areas of the four requestors (Figure 3) include Franklin County and Stephens County, GA and Anderson County, Pickens County and Oconee County, SC.

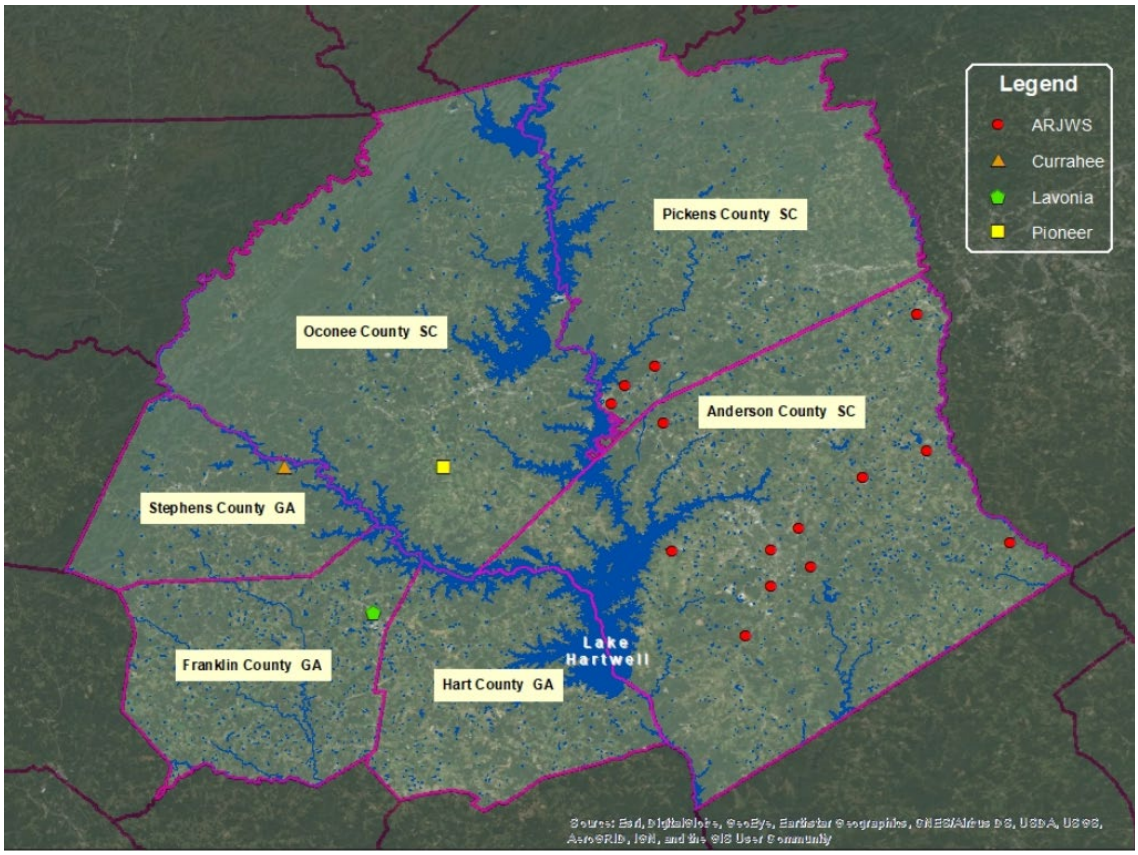

Figure 3: Savannah River Basin Project Map

2.3 Study Scope

The scope of this study is to evaluate and compare alternative non-Federal and Federal water supply sources to address future water deficits, evaluate the impacts of reallocating storage from existing Federal project purposes within Hartwell Lake for water supply, and determine the environmental effects of the water supply storage reallocation alternatives. This report identifies the price of water supply storage to be paid by the user and includes an analysis of the cost for using non-Federal options for water supply versus water supply storage reallocation within Hartwell Lake based on the new water supply storage reallocation requests.

2.4 Project Authorization, Construction, and Pertinent Data

2.4.1 J. Strom Thurmond Dam and Lake

The J. Strom Thurmond (JST) Dam and Lake (formerly Clarks Hill) Project was recommended for construction in House Document No. 657, 78th Congress, 2nd Session, dated 9 June 1944 which included a general comprehensive river basin plan for developing the upper Savannah River Watershed. Primary purposes include flood control, hydropower generation, and improvement of downstream navigation. Subsequent legislation specific to JST added recreation, fish and wildlife management, and mitigation for the Richard B. Russell project as project purposes. Subsequent legislation authorized the provision of water supply and environmental management.

The Flood Control Act of 1944 (Public Law 534, 78th Congress) authorized construction of the Clarks Hill Dam which lies 22 miles upstream of Augusta, Georgia near the town of Clarks Hill, South Carolina on December 22, 1944.

On December 22, 1987, President Ronald Reagan signed Public Law 100-209 which changed the name of Clarks Hill Dam and Lake to J. Strom Thurmond Dam and Lake in honor of Senator James Strom Thurmond of South Carolina.

2.4.2 Richard B. Russell Dam and Lake

The Flood Control Act of 1966 dated 7 November 1966 (Public Law 89-789, 89th Congress) recommended construction of the Richard B. Russell (RBR) Dam and Lake Project. It was authorized for flood control, fish and wildlife management, hydroelectric power, and recreation. Subsequent general legislation authorized water supply and water quality management as project purposes. It was the last of the three Savannah River reservoirs completed in 1983.

2.4.3 Hartwell Dam and Lake

The Flood Control Act of 22 December 1944, (Public Law 534, 78th Congress, 2d session), approved the general plan for the comprehensive development of the Savannah River Basin as recommended by House Document No. 657, 78th Congress, 2nd Session, dated 9 June 1944 which listed Hartwell Dam and Lake as the second dam to be constructed. The Hartwell Dam and Lake Project was authorized for construction by the Flood Control Act, as approved on 17 May 1950. The original authorization included flood control, navigation, hydroelectric power, and other purposes. Subsequent general legislation authorized fish and wildlife management, water supply, water quality, and recreation as project purposes. The Water Resource Development Act of 1976 (P.L. 94-587) authorized construction of the fifth hydropower unit.

2.5 Reservoir Storage Allocations

The Corps operates the three reservoirs as a system and shifts hydropower production on a weekly basis to best meet power needs while effectively managing pool elevations. The three-lake system contains 6,909,300 acre-feet of water storage space (823,000 acre-feet for flood storage, 2,587,800 acre-feet for conservation storage, and 3,498,500 acre-feet for inactive storage).

2.5.1 J. Strom Thurmond Dam and Lake

Table 3 and Figure 4 describe the elevation ranges and capacity of the three storage areas in JST lake.

Table 3: J. Strom Thurmond Lake Storage

Feature	Elevation (feet, NGVD)	Capacity (Acre-feet)
Flood Storage	330.0 - 335.0	390,000
Conservation Storage	312.0 - 330.0	1,045,000
Top of Inactive Storage	312.0	1,465,000

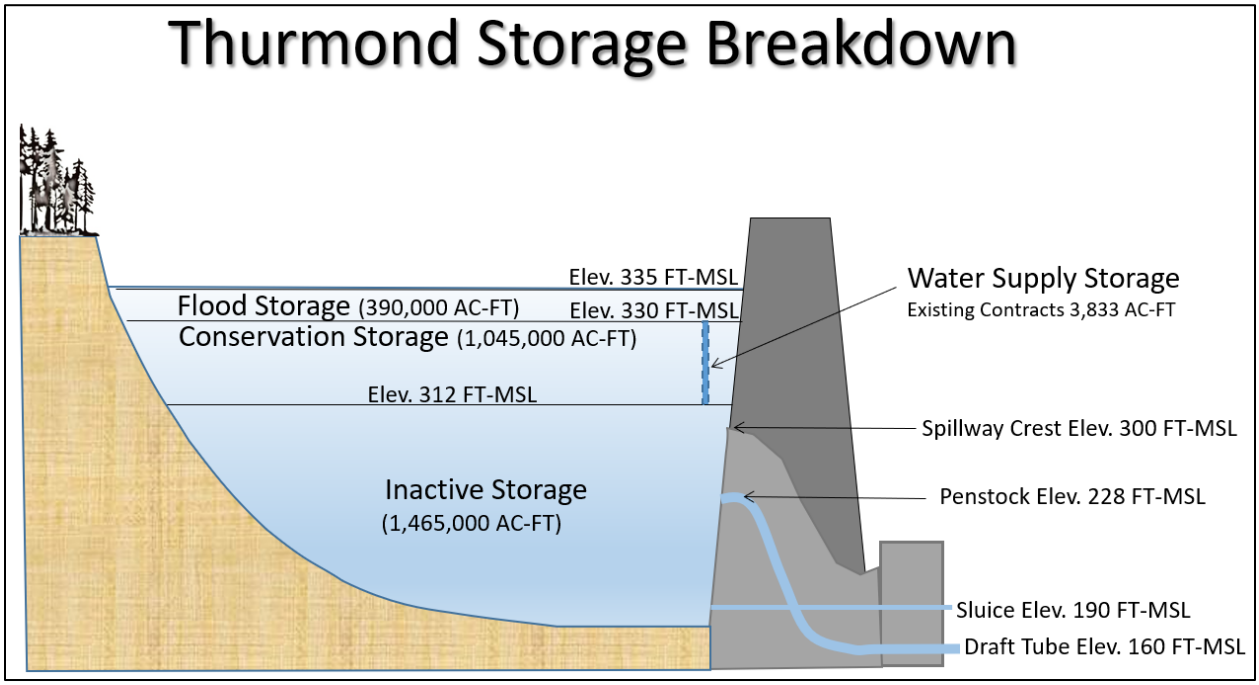

Figure 4: JST Lake Storage Area Breakdown

2.5.2 Richard B. Russell Dam and Lake

Table 4 and Figure 5 describe the elevation ranges and capacity of the three storage areas in RBR lake.

Table 4: Richard B. Russell Lake Storage

Feature	Elevation (feet, NGVD)	Capacity (Acre-feet)
Flood Storage	475.0 – 480.0	140,000
Conservation Storage	470.0 – 475.0	126,800
Top of Inactive Storage	470.0	899,400

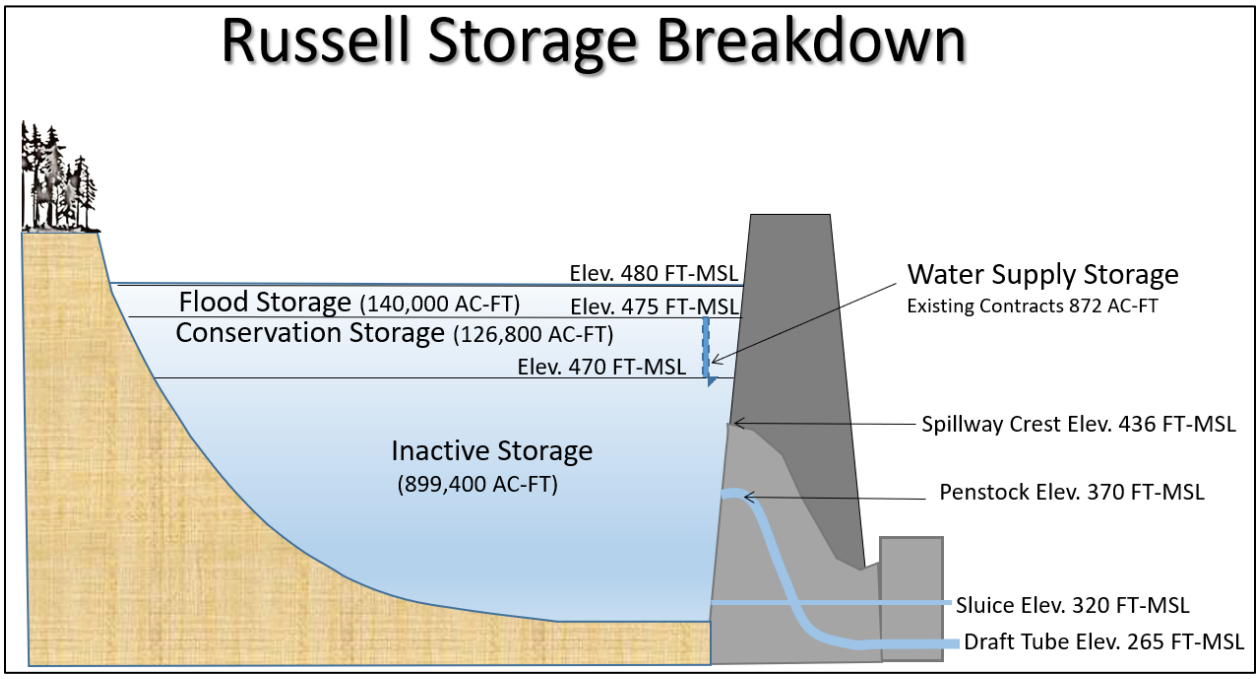

Figure 5: RBR Lake Storage Area Breakdown

2.5.3 Hartwell Dam and Lake

Table 5 and Figure 6 describe the elevation ranges and capacity of the three storage areas in Hartwell Lake.

Table 5: Hartwell Lake Storage

Feature	Elevation (feet, NGVD)	Capacity (Acre-feet)
Flood Storage	660.0 - 665.0	293,000
Conservation Storage	625.0 – 660.0	1,416,000
Top of Inactive Storage	625.0	1,134,100

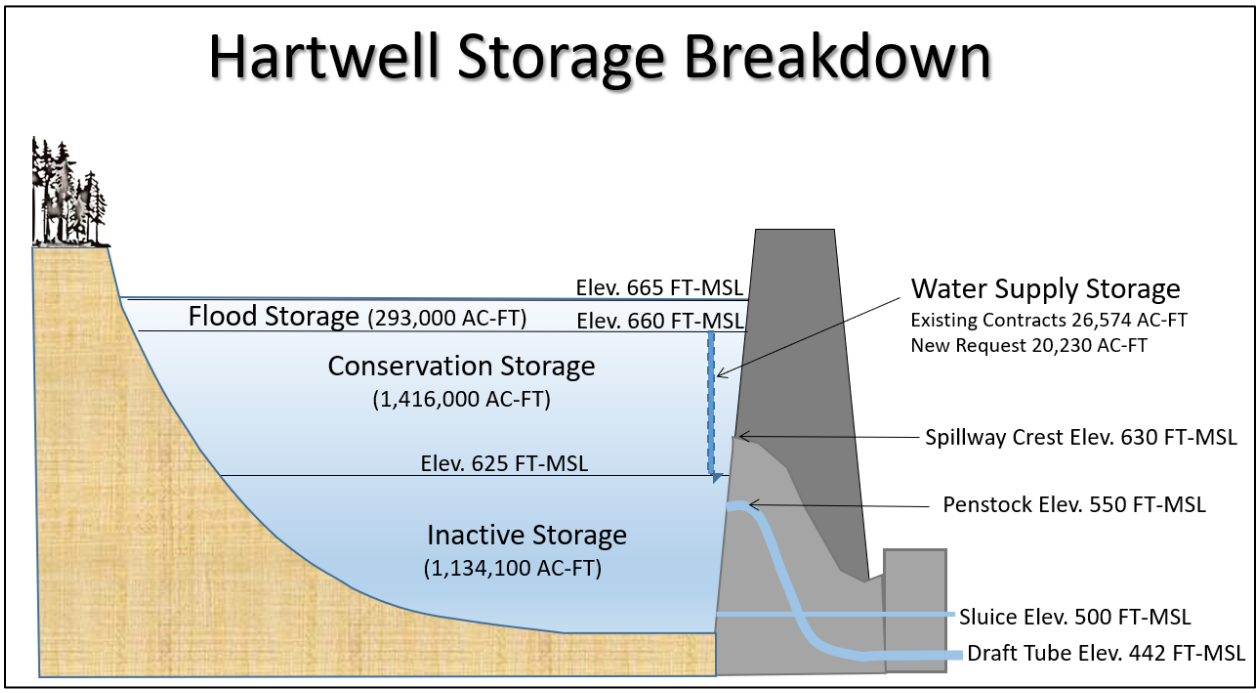

Figure 6: Hartwell Lake Storage Area Breakdown*

*Note: New Request with RFC is 10,410SC-FT

2.6 Previous Water Supply Storage Reallocations

The 1998 water supply reallocation for Hart County, Georgia, was the most recent reallocation for Hartwell Lake. Table 6 outlines all water supply storage reallocation agreements at the three Corps multi-purpose Lake and Dam projects on the Savannah River.

Table 6: Current Water Reallocation Contracts

Project	Recipient	Acre Feet of Water	Reallocated From	Date of Approval
Hartwell, GA & SC	ARJWS (modified 2002)	24,620	Conservation	1967
	City of Lavonia	127	Conservation	1990
	Hart County	1,827	Conservation	1998
	Subtotal	***26,574***		
J. Strom Thurmond, GA & SC	City of Lincolnton	92	Conservation	1964
	City of Washington	632	Conservation	1975
	Savannah Valley Auth.	92	Conservation	1989
	Columbia County	1,056	Conservation	1989
	Town of McCormick	506	Conservation	1999
	City of Lincolnton	83	Conservation	1990
	City of Thompson	1,056	Conservation	1990
	Town of McCormick	316	Conservation	2001
	Subtotal	***3,833***		
Richard B. Russell, GA & SC	SC Public Service Auth.	491	Flood	2001
	City of Elberton	381	Conservation	1990
	Subtotal	***872***		
	Total	**31,279**		

2.7 New Water Supply Storage Reallocation Requests

Four separate entities requested Municipal and Industrial (M&I) water supply storage reallocation from Hartwell Lake: ARJWS; Pioneer RWD; the City of Lavonia; and the Currahee Club.

ARJWS, Pioneer RWD, and the City of Lavonia all supply M&I water to end users. The Currahee Club would be considered a commercial end user which is considered municipal water supply. The City of Lavonia and ARJWS currently have agreements with the Corps to withdraw water from Hartwell Lake. Their current requests would increase water supply storage beyond their existing contract agreements.

Using the critical period of analysis over the past century (Appendix A, Sec. 3.2), Table 7 outlines requestor water supply needs through 2072. In all, granting RFC allows

Anderson, Pioneer, and Lavonia to meet future demand with smaller accounts, 4,571 ac-ft, 3,123 ac-ft, and 2,308 ac-ft, respectively. Currahee would require 412 ac-ft to meet the same level of demand during the critical period.

Table 7: Hartwell Lake Water Supply Reallocation Requests

Requestor	New Request (MGD)	New Request (Acre-Feet)	Existing (MGD)	Existing (Acre-Feet)
ARJWS	46	4,568	30	24,620
City of Lavonia	3.16	2,308	0.2	127
Pioneer RWD	5.0	3,122	0	0
Currahee Club	0.5	412	0	0
Total	54.56	10,410	30.2	24,747

2.8 Study Summary

In the following pages, the IWSSRR/EA assesses the feasibility of reallocating water supply storage in Hartwell Lake to water supply. The study evaluates the potential effects on the environment, recreation, hydropower, flood risks, water quality, aquatic communities, threatened, endangered, and protected species, socioeconomics, environmental justice, climate change, Hazardous Toxic Radioactive Waste (HTRW). It demonstrates the immediate and future need for water demands and the alternative sources of water supply for each requestor, and then calculates the acre-feet for the new yield requests. Afterwards, the Corps evaluates and compares the effects of using existing flood, conservation, and inactive storage areas. Using the three Corps methods of valuing reallocated storage, the study calculates the price per acre-feet for the new water supply storage requests. By comparing user costs for water supply storage from Hartwell Lake with the requestors' least cost alternative source of water supply, the Corps determined the most cost-effective way for the requestor to receive water supply to meet demands in 2072.

3.0 PLAN FORMULATION AND EVALUATION OF ALTERNATIVES

Plan formulation and evaluation of alternatives for this study were conducted in accordance with *USACE's Planning Guidance Notebook (ER 1105-2-100) and USACE's Water Supply Handbook*, both originating from the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Planning Act* (P.L. 89-80) and Executive Order (EO) 11747, which was approved by the U.S. Water Resources Council in 1982 and by the president in 1983. In addition, this study applies SMART planning principals codified in Section 1001 of WRDA 2014.

3.1 Planning Framework

The Corps planning process follows the six-step process defined in the 1983 U.S. Water Resources Council's Economic and Environmental Principles & Guidelines (P&G) for Water and Related Land Resources Implementation Studies. This process is a structured approach to problem solving which provides a rational framework for sound decision making. The six-step process shall be used for all planning studies conducted by the Corps of Engineers. The six steps are:

- Identifying problems and opportunities
- Inventorying and forecasting conditions
- Formulating alternative plans
- Evaluating alternative plans
- Comparing alternative plans
- Selecting a plan

The Corps' decision making is generally based on the accomplishment and documentation of all these steps. It is important to stress the iterative nature of this process. As more information is acquired and developed, it may be necessary to reiterate some of the previous steps. The six steps, though presented and discussed in a sequential manner for ease of understanding, occur iteratively, and sometimes concurrently. Iterations of steps are conducted as necessary to formulate efficient, effective, complete, and acceptable plans. Those steps culminate in the description of the TSP. The report includes an integrated Environmental Assessment (EA) with National Environmental Policy Act (NEPA) information interwoven in the integrated report to accomplish respective requirements.

With regards to IWSSRR/EA, the basic theme of the planning process is to evaluate the feasibility of reallocating water storage in Hartwell Lake to water supply storage for four requestors in order to meet increased user demand due to population growth.

The period of analysis for this study is a 50-year timeframe, assuming the report will be approved in Fiscal Year (FY) 2025 and the water supply agreement will be executed in FY25.

3.2 Planning for Future Water Demand

In order to identify potential actions to meet future water demands for the project area, the Corps first needed to accurately inventory current water supply and demands, and also project future water demand based on population increases through 2072. Conservative population growth numbers were used when projections were beyond current state analyses. Based on modeling, 2035 is the year when the requestors will no longer meet monthly demand

3.2.1 Population Growth

Total county populations in the study area were just under 486,000 in 2021. Projected population development from 2015 through 2060 for Georgia was provided by the Governor's Office of Planning and Budget (OPB). As the period of analysis for the proposed action extends beyond that of the OPB analysis, 2060 population estimates were maintained extrapolated upon for the remaining duration of this report to accommodate the water demand requestors' anticipated demand increase in tune with a 1% annual population increase and constitutes a conservative approach to population projection.

Population projections from 2015 through 2035 for South Carolina was provided by the South Carolina Revenue and Fiscal Affairs Office. As the period of analysis for the proposed action extends beyond that of the SC Revenue and Fiscal Affairs Office analysis, 2035 population estimates were extrapolated upon using the water demand requestors projected 1% population growth per year for the remainder of the period of analysis and maintained for the remaining duration of this report. This constitutes a conservative approach to population projection.

Detailed analysis of the socioeconomics conditions and demographics data and information can be found in Appendix E.

3.2.2 Inventory of Existing Water Demand and Supply

As seen in Table 8, ARJWS currently serves customers in three South Carolina counties: Anderson (174,000) serving all residents except those served by Piedmont/Pelzer and Pioneer RWD; Pickens (25,000) serving Clemson, Central, and Dacusville, and Northern Abbeville (<1,000). Their gallons per capita per day equals 116.5. The City of Lavonia, Georgia, currently serves 8,190 customers in Franklin County. Their gallons per capita per day equals 56. Pioneer RWD serves a population service area of 18,500 in two South Carolina counties: Anderson and Oconee. Their gallons per capita per day equals 108. Currahee Club does not have a gallon per capita per day estimate because it provides commercial services for irrigating a golf course and property owner association grounds.

Table 8: 2020 Populations Served by Requestor

Requestor	Population County Service Areas	Population Served	Residential Gallons per Capita per Day (gpcd)
ARJWS	Anderson, Pickens, Abbeville, City of Clemson, and Clemson University	251,159	60
City of Lavonia	Franklin and Hart	8,190	56
Pioneer RWD	Anderson, Oconee	18,500	92
Currahee Club	Currahee Club	N/A	N/A
Total		**277,849**	

3.2.3 Inventory of Future Water Demand

Table 9 displays the projected water demands by requestor from 2020 to 2072. AJWRS's projected demands increase from 21.3 MGD in 2020 to 47.3 MGD in 2072. City of Lavonia's projected demands increase from 1.4 MGD in 2020 to 3.2 MGD in 2072. Pioneer RWD's projected demands increase from 1.7 MGD to 6.0 MGD in 2072. Currahee Club's projected demands remain the same from 2020 to 2072.

Table 9: 2020-2072 Projected Water Demands by Requestor

Projected Demands	2020	2030	2040	2050	2060	2072
AJWRS						
Residential	16.66	18.78	20.95	23.1	25.15	27.3
Clemson University	3.2	3.6	4.02	4.43	4.83	5.35
Industrial	8.35	8.54	9.45	10.49	12.02	14.01
Total	**28.21**	**31.16**	**34.42**	**38.0**	**42.00**	**47.3**
City of Lavonia						
Residential	0.69	0.78	0.86	0.92	0.99	1.08
Commercial	0.17	0.19	0.21	0.23	0.25	0.29
Industrial	0.14	1.04	1.04	1.05	1.06	1.07
Water Lost to Production & Distribution	0.4	0.79	0.79	0.8	0.8	0.76
Total	**1.4**	**2.8**	**2.9**	**3.0**	**3.1**	**3.2**
Pioneer RWD						
Residential (91.55%)	1.5563	2.0141	2.5634	3.2958	4.2113	5.493

Commercial (8.35%)	0.1420	0.1837	0.2338	0.2988	0.3841	0.501
Agricultural (.10%)	0.0017	0.0022	0.0028	0.0036	0.0046	0.006
Total	**1.7**	**2.2**	**2.8**	**3.6**	**4.6**	**6.0**
Currahee Club						
Residential	0.0	0.0	0.0	0.0	0.0	0.0
Commercial	0.5	0.5	0.5	0.5	0.5	0.5
Industrial	0.0	0.0	0.0	0.0	0.0	0.0
Total	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**

3.3 Water Supply Needs Analysis

Water Demand Analyses were completed by each requestor and reviewed and approved by the Water Management and Reallocation Studies (WMRS) Planning Center of Expertise (PCX). Requestors completed their water demand projections based on actual 2020 water usage in October 2021. Detailed analysis of requestors' water demand through 2072 is available in Appendix G.

3.4 Plan Formulation

A plan is formulated using structural and nonstructural management measures to meet, fully or partially, identified study planning objectives subject to planning constraints. A management measure is a feature or an activity that can be implemented at a specific site to address one or more planning objectives. Management measures are the building blocks of alternative plans and can be structural and/or nonstructural. An alternative plan is one or more management measures functioning together to address one or more objectives.

3.4.1 No Action Alternative (NAA)

NEPA requires agencies to always describe and analyze a "no action" alternative in an as part of the alternative analysis in NEPA documents. In simple terms, a No Action alternative for an existing or ongoing federal project considers what would happen if the federal agency continued to operate and maintain the authorized project with no changes. The NAA analysis provides a benchmark to allow decision makers and the public to compare the levels of environmental effects of the alternatives.

Under the NAA, the Corps would continue current management for water supply in Hartwell in accordance with the current plan of regulation. No reallocation would occur to meet water supply needs of the four requestors. Under the NAA, most of the requestors would not have sufficient water supply to meet 2035 water demands. Current water supply amounts would not support projected future growth throughout the region. Current water conservation efforts would continue, but alone do not sufficiently decrease the gap in water supply needs. Requestors would need to find alternatives sources of water supply.

3.5 Problems and Opportunities

Due to local and regional population growth in NE Georgia and NW South Carolina, water demand is swiftly outpacing water supply. As such, four Hartwell Lake water requestors requested that the Corps complete a water supply reallocation study to identify supply shortcomings and potential measures to address the shortfall. The problems and opportunities for the study to address water supply through 2072 are identified below.

3.5.1 Problems

1. Insufficient water supply due to increased demand
2. Limited cost-efficient water sources
3. Limited existing and potential drought resilient water sources

A feasible opportunity exists with the Corps' water resource, Hartwell Lake, to meet the water needs of these water utilities, which corresponds with the Federal objective of water resources planning to contribute to national economic development in a manner consistent with protecting the Nation's environment.

3.6 Objectives and Constraints

The objective of this water supply storage reallocation study is to identify the most effective and efficient water supply source to meet water demands of requestors over a 50-year period of analysis from 2023-2072.

Flood control storage cannot be considered as an alternative source of water supply storage (ER 1110-2-1156, 24.4.1.2). The Clemson Upper Diversion Dam, Clemson Lower Diversion Dam, and Clemson Lower Diversion Dam Saddle Dike (CLDDSD) are classified as High Risk from a Dam Safety Action Classification (DSAC). The request for an exception to study reallocation alternatives at a Dam Safety Action Classification (DSAC) 1, 2, or 3 dam was approved for Clemson Dams. The exception permits the study of reallocating existing storage to water supply storage that does not sacrifice flood storage capacity. As such, flood control storage is not a viable alternative source of water supply storage.

Planning constraints include:

1. Avoid serious effects on authorized project purposes
2. Avoid substantial changes to the structure or operations
3. Avoid significant environmental effects
4. Avoid over-allocation of storage reallocation

No other specific planning constraints have been identified that would further limit the planning process. Although there are many factors that may ultimately affect the implementability of a particular alternative and be used throughout the screening process, these do not necessarily qualify as planning constraints.

3.7 Assumptions

Varying degrees of uncertainty are associated with the assumptions. The following key assumptions were included in the analyses.

1. Water demand projections reflect amount of water supply requested
2. A reservoir systems model approach results in the most accurate decisions for impacts on existing project purposes because the watershed is managed and operated as an inter-related system.
3. Any encroachment into the flood storage would contradict the Corps' flood risk management mission by increasing flood risks downstream.
4. A significant amount of inactive storage exists because there has been very little sedimentation over the life of the project (based on Russell and Thurmond results).

3.7.1 Management Measures

Table 10 identifies the management measures initially proposed to provide adequate water supply to the requesting water entities for a projected fifty years (2022 through 2072). Those measures that have the capacity to meet the projected demand will also be assessed for their cost-effectiveness, technical viability, environmental acceptability, and impacts on other project purposes to determine if they should be carried forward for further review.

The management measures considered for the Federal action include reallocation of storage for water supply from either the conservation storage, inactive storage, or flood storage from Hartwell Lake. These management measures represent future water supply from the Corps' Hartwell Lake project storage. For existing storage to be reallocated to water supply storage, it must be taken from some other existing use. Those management measures are referred to as the Future With-Project (FWP) Condition or Federal action. The Future With-Project Condition is the most likely condition expected to exist in the future with the Federal water supply plan. The NAA management measure represents future water supplies resulting from not reallocating the Corps' Hartwell Lake storage for water supply.

To determine whether the proposed management measures would be screened out or carried forward for further analysis in the initial array of alternatives, evaluation criteria were identified. To be carried forward for further analysis in the initial array of alternatives, the management measure would need to meet the planning objective of providing water supply or storage for water supply to meet near-term water demands and be a viable, reliable, drought resistant, long-term solution to meet future water demands. Hence, the first level of screening is meant to eliminate management measures that do not sufficiently increase water supply to meet water demand or would not likely provide a consistent and reliable source of water supply, in quality or quantity, during periods of drought.

Table 10: Initial Array of Management Measures

Management Measure	Type	*Screened Out* or Carried Forward
Water Conservation	Metering, Leak detection and repair, rate structure changes, modifying recycling and reuse, upstream watershed management, etc.	Screened Out Does not generate required water volumes to meet demand
Wholesale purchases requiring construction of a pump station and transmission mains *(ARJWS and City of Lavonia)*	NAA Non-Federal Action Structural Management Measure	Carried forward
Wholesale Purchases with Construction In-Place *(Pioneer RWD and Currahee Club)*	NAA Non-Federal Action Non-Structural Management Measure	Carried forward
Construction of Raw Water Line to River *(City of Lavonia)*	NAA Non-Federal Action Structural Management Measure	Carried forward
Installation of Additional Groundwater Wells *(Currahee Club)*	NAA Structural Management Measure	***Screened Out*** (Not a reliable source of water supply. Does not meet planning objective.)
Hartwell Lake Reallocation from Conservation Storage *(All requestors)*	FWP Federal Action Non-Structural Management Measure	Carried forward
Hartwell Lake Reallocation from Inactive Storage *(All requestors)*	FWP Federal Action Non-Structural Management Measure	Carried forward
Hartwell Lake Reallocation from Flood Storage *(All requestors)*	FWP Federal Action Non-Structural Management Measure	Carried forward

3.7.2 Water Conservation

Water conservation measures include: (1) reducing the level and/or altering the time pattern of demand by metering, leak detection and repair, rate structure changes, regulations on use (plumbing codes), education programs, and drought contingency planning; (2) modifying management of existing water development and supplies by recycling, reuse, and pressure reduction; and (3) increasing upstream watershed management and conjunctive use of ground and surface water.

While aggressive conservation measures could reduce water demands, such measures would not generate the required volumes of water supply needed to offset future demands.

Therefore, because water conservation would most likely only reduce demand slightly and would not be considered as a source of supply, it was screened out and not considered for further analysis.

The requestors would continue using and improving conservation measures; however, those conservation measures would not meet the study objective. Since this measure does not meet the study objective, it is eliminated from further analysis.

3.7.3 Wholesale Purchases Requiring Construction of a Pump Station and Transmission Mains

Without Federal action, ARJWS's most likely alternative would be to purchase treated wholesale water from the Greenville, South Carolina water system. This system has adequate capacity to supply ARJWS's future water needs. The Greenville Water System withdraws water from Lake Keowee at the Adkins Water Treatment Plant (WTP), which is located near Six Mile, a tributary of the Savannah River. For ARJWS to connect into the Greenville Water System, ARJWS would need to construct and operate a pump station at or near the Adkins WTP and a 27-mile transmission pipeline with a 60-inch diameter.

The City of Lavonia's most likely alternative, without Federal action, would require purchasing treated wholesale water from the City of Toccoa. This system has adequate capacity to supply the City of Lavonia's future water needs but would involve building 6.5 miles of waterline to the nearest adequate water main in the City of Toccoa's water system.

3.7.4 Wholesale Purchases with Construction In-Place

Without Federal action, Pioneer RWD's most likely alternative would be to increase their wholesale water supply deliveries from ARJWS until raw water withdrawals exceed 3.2 MGD. Then, Pioneer RWD would withdrawal treated water from Seneca Light and Water that derives its water from Lake Keowee. Those systems have adequate capacity to supply Pioneer RWD's future water needs. The estimated annual cost to purchase finished water from Seneca Light and Water is expected to exceed $8 million.

Without Federal action, Currahee Club's most likely alternative would be to purchase treated potable wholesale water from the City of Toccoa water system and transmit it to the Club for irrigation purposes. This system has adequate capacity to supply Currahee Club's future water needs.

3.7.5 Construction of Raw Water Line to River

Without Federal action, the City of Lavonia could construct a raw water line from the Broad River. This system has adequate capacity to supply the City of Lavonia's future water needs. It would necessitate the construction of a new intake structure, pump

station, and 20 miles of 16-foot waterline from the river 4.8 miles southwest of Royston, Georgia to the Crawford Creek Reservoir.

3.7.6 Installation of Groundwater Wells

For ARJWS, groundwater is not a viable option based on size and fractured bedrock geology. Currahee Club could install additional groundwater wells. Currahee currently has five wells, two of which are operational and produce useable flow. If all five were operational, they would produce a combined 0.3 MGD, which represents 64 percent of the projected need of 0.5 MGD for golf and common area irrigation. Since obtaining consistent and reliable adequate flow from additional wells is unlikely because of droughts, and such withdrawal could have a negative long-term effect to the groundwater aquifer, that alternative is not considered viable and would not meet the study objective. Therefore, it was eliminated from further analysis.

3.7.7 Hartwell Lake Reallocation from Conservation Storage

The conservation storage in Hartwell Lake accounts for 1,416,000 acre-feet of the Hartwell Lake pool. The conservation storage provides water storage for project purposes such as hydropower, recreation, fish and wildlife management, water quality, and water supply. A total of 26,574 acre-feet has been reallocated from the conservation storage for water supply. There is a sufficient volume of storage in Hartwell Lake's conservation storage to reallocate to water supply for the requestors to meet their future demand with a consistent and reliable source of water supply during periods of drought.

3.7.8 Hartwell Lake Reallocation from Inactive Storage

The inactive storage in Hartwell Lake accounts for 1,134,100 acre-feet of the Hartwell Lake pool. Inactive storage is designed to hold the sediment that would accumulate over the life of each project, provide hydropower head, and serve other project purposes on an as needed basis. There is a sufficient volume of storage in Hartwell Lake's inactive storage to reallocate to water supply for the requestors to meet their demand with a consistent and reliable source of water supply during periods of drought.

3.7.9 Hartwell Lake Reallocation from Flood Storage

The flood storage in Hartwell Lake accounts for 293,000 acre-feet of the Hartwell Lake pool. The Corps uses the flood storage to manage and reduce the risk of flooding people, places, and interests downstream. However, there is a sufficient volume of storage in Hartwell Lake's flood storage to reallocate it to water supply for the requestors to meet their future demand as a consistent and reliable source of water supply during periods of drought.

3.8 Initial Array of Alternatives: Screening and Evaluation of Alternatives

The screening of management measures eliminated water conservation measures and installation of groundwater wells because they would not increase water supply to meet water demand and would not provide a reliable, long-term, drought resistant water supply source.

The formulation strategy used to assemble management measures into the initial array of alternatives included combining the non-Federal alternatives into the NAA (Table 11). Federal action alternatives resulting in the reallocation of storage from Hartwell Lake for water supply include the independent alternatives of the conservation, inactive, and flood storages.

For National Environmental Policy Act (NEPA) alternative comparison purposes in the integrated EA, the NAA is the existing Plan of Regulation of Hartwell Lake. By comparing the existing Plan of Regulation to proposed water reallocation alternatives in Hartwell Lake, the effects of the water reallocation can be assessed for potential impacts to the human and natural environment. The annual cost of the most likely non-Federal alternative for each requestor is compared to the annual costs of the most likely Federal alternative of reallocation of Hartwell Lake storage for water supply to determine financial feasibility and the benefits of using Hartwell Lake storage for water supply.

Table 11: Initial Array of Alternatives

Alternative #	Type	Description
1	NAA Condition	No water supply storage reallocation from Hartwell Lake would result in existing Plan of Regulation and requestors identifying other water supply sources.
2	FWP Condition Federal Action	Hartwell Lake Reallocation from Conservation Storage
3	FWP Condition Federal Action	Hartwell Lake Reallocation from Inactive Storage
4	FWP Condition Federal Action	Hartwell Lake Reallocation from Flood Storage

3.8.1 Return Flow Credit

While new alternatives can be identified at any point in the planning process, the initial array of alternatives is typically refined into the final array. However, in April 2022 when South Carolina approved legislation to require the allowance of RFC, the Corps decided to hold the existing draft report and develop a RFC alternative prior to the draft report's release to the public. As such, a new alternative (Alternative 5) was developed that was absent from the initial array. This alternative is the same as Alternative 2 but includes RFC for aforementioned requestors. See Section 6.3 of Appendix A for detailed RFC information.

Return Flow Credit Accounting relies on the premise that the entity who owns the storage account also owns the water within, withdrawn from, and added to that account. Under RFC accounting, any returns that the contract holder makes back to the source pool are accounted as 100% return to their storage account rather than simply part of the total inflow to the source pool. The storage account gets 100% of the returned

quantity, rather than only part of the returned flow, based on the percentage of the conservation pool that the contract holder owns. This change in the accounting method could significantly help keep the storage account full if the contract holder returns a large portion of their withdrawal back to the source pool. It would likely also reduce the amount of storage required to meet a specific yield. However, RFC accounting at Hartwell also reduces the total inflow available to the other contract holders in Hartwell. A reduction in inflow will result in lower yields for those accounts, which will require mitigation by the requestors switching to RFC. This mitigation will ensure existing contracts continue to yield the same as prior to this reallocation. Dependable Yield Mitigation (DYM) is a calculation made to determine if additional storage is required to keep the existing contract holders whole at their current yield levels.

The modeling for RFC could not be done with the ResSim Yield model, because ResSim's inherent water accounting feature does not provide for the calculation of RFC. So, the three model runs described below were all computed using a different ResSim model ("Scripted Accounting Model") that used a script to calculate water accounting, including RFC.

3.8.2 Model Run "AFut0" Alternative 2 Water Accounting Run: Future with Requested New Accounts

The "AFut0" model run is representative Alternative 2 in the initial array which also includes Dependable Yield Mitigation (DYM) for any downstream water account holders who are adversely affected by the new accounts. For the scripted water accounting ResSim model, no adjustments needed to be made to represent the downstream DYMs. ResSim Yield Model tracks Russell and Thurmond accounts.

This model run sizes the water storage accounts needed to meet the 2035 demands during the critical period. Similar modeling was done with the ResSim Yield model, but to compare across the alternatives with and without RFC scenarios, the modeling needed to also be done with the scripted water storage accounting model.

3.8.3 Model Run "AFut1" Water Accounting Run: Future with Requested New Accounts and Return Flow Credit

The "AFut1" model run sized the water storage accounts needed to meet the 2035 demands during the critical period under the conditions of full RFC. As with AFut0, this model run also includes Dependable Yield Mitigation (DYM) for downstream water account holders who are adversely affected by the new accounts.

The Corps compared the AFut1 model run data with the AFut0 to see the difference in account size needed with and without the RFC. It was found that Anderson, Pioneer, and Lavonia needed smaller accounts, but the other account holders at Hartwell needed larger accounts, thus a new model run "AFut1d" was needed to apply mitigation at Hartwell accounts.

3.8.4 Model Run "AFut1d" Alternative 5 Water Accounting Run: Future with Requested New Accounts and Return Flow Credit and DYM for Hartwell Accounts

The "AFut1d" model run represents Alternative 5 (the new alternative developed after the initial array). This model run is the same as AFut1, including Dependable Yield Mitigation (DYM) for downstream account holders, but it also includes yield mitigation for the Hartwell account holders who were negatively impacted by the RFC granted to the other Hartwell account holders.

The purpose of the AFut1d model run is to size the water storage accounts needed to meet the 2035 demands during the critical period under the conditions of full return storage credit with full mitigation to downstream account holders and Hartwell account holders. The Corps compared the AFut1d results with the AFut0 to identify the difference in account size needed with and without the RFC.

3.8.5 Summary of RFC Results

Figure 7 summarizes the demand and account size information for the Phase 2 modeling scenarios. The ACur0 model run uses the current storage accounts sizes and the maximum demand that could be satisfied for those accounts during the critical period (i.e., critical yield). The AFWOP model run (NAA) also uses the current account sizes but uses the 2035 demand timeseries. The Anderson and Lavonia demands were shorted in this model run. The AFut0 model run increases the storage account sizes for Anderson and Lavonia to the size needed to fully meet the 2035 demands during the critical period. AFut1 included RFC for Anderson, Pioneer, and Lavonia, which enabled them to hold smaller water accounts and still meet their 2035 demand during the critical period. However, granting RFC to those account holders reduced the portion of total inflow received by the other account holders, causing them to require larger accounts, as reflected in AFut1d, which is the same as AFut1, except it includes larger accounts for Currahee and Hart County. In all, granting RFC allows Anderson, Pioneer, and Lavonia to need smaller accounts, by 4,568 ac-ft, 3,122 ac-ft, and 2,308 ac-ft, respectively. Currahee needed 412 ac-ft more to continue meeting the same level of demand during the critical period.

			Accounts				
Model Alt			**Anderson**	**Pioneer**	**Lavonia**	**Currahee**	**Hart Co.**
Demand = Current Yield		MGD	29.89	-	0.16	-	2.21
		cfs	46.25	-	0.24	-	3.42
ACur0	*Current Storage (ac-ft)*		***24620***	***0***	***127***	***0***	***1827***
Demand = 2035 Demands		MGD	45.94	5.00	3.16	0.50	2.21
		cfs	71.08	7.74	4.88	0.77	3.42
AFWOP	*Current Storage (ac-ft)*		***24620***	***0***	***127***	***0***	***1827***
AFut0	*Account size needed (ac-ft)*		***37760***	***3985***	***2564***	***411***	***1827***
AFut1	*Account size needed (ac-ft)*		***29142***	***3111***	***2429***	***411***	***1827***
AFut1d	*Account size needed (ac-ft)*		***29142***	***3111***	***2429***	***415***	***1842***
Difference btw AFut0 and AFut1d (ac-ft)			8618	874	135	-4	-15

Figure 7: Comparison of account sizes needed for different model alternatives

3.8.6 Planning and Guidance Criteria

As discussed in Section 3.1, when screening the initial array of alternatives, according to ER 1105-2-100, the planning process shall formulate alternatives in consideration of four criteria described in the P&G: completeness, acceptability, effectiveness, and efficiency. This screening process eliminates alternatives based on those four criteria by comparing all future with-project alternatives (storage reallocation to water supply) to each future without-project alternative (Existing Plan of Regulation and requestors new water supply source).

Completeness is the extent that an alternative provides and accounts for all investments and actions required to ensure the planned output is achieved. It includes environmental impacts, dam safety impacts, recreation impacts, flood risk management impacts, and hydropower impacts. These criteria may require that an alternative consider the relationship of the plan to other public and private plans if those plans affect the outcome of the project. Completeness also includes consideration of real estate issues, operations and maintenance, monitoring, and sponsorship factors. Adaptive management plans formulated to address project uncertainties also have to be considered. It does not necessarily mean that alternative actions need to be large in scope or scale.

A plan must be acceptable to Federal, state, and local government in terms of applicable laws, regulation, and public policy. It is the viability and appropriateness of an alternative from the perspective of the Nation's general public and consistency with existing Federal laws, authorities, and public policies. It does not include local or regional preferences for particular solutions or political expediency.

Effectiveness is defined as the degree to which the plan will achieve the planning objective. A plan must make a significant contribution to the problem or opportunity being addressed. It is the extent to which an alternative alleviates the specified

problems and achieves the specified opportunities. All initial array of alternatives would provide each individual requestor with the same amount and quality of water.

A project must be a cost-effective or efficient means of addressing a problem or opportunity, and plan outputs cannot be produced more cost-effectively by another institution or agency. It is the extent to which an alternative alleviates the specified problems and realizes the specified opportunities at the least cost.

3.9 Focused Array of Alternatives

In addition to those aforementioned criteria, the Corps compared the plans to each other with an emphasis on the outputs and effects that have the most influence on the decision-making process. This focused array of alternatives was later updated to a final array once RFCs became an issue. For this study, the Corps further screened the alternatives based on impacts to dam safety, recreation, flood risk management, and hydropower. Alternative 2 was initially identified as the alternative to carry forward for detailed analysis. However, Alternative 2 was eliminated from final array once RFC became a requirement for completeness. Those results are shown below in Table 12.

Detailed analysis of alternative analysis plan formulation is located in Appendix D.

Table 12: Focused Array of Alternatives Screening

	Complete					Acceptable	Effective	Efficient	Screening
Alternative	**Environmental Impacts****	**Dam Safety Impact**	**Recreation Impacts**	**FRM Impacts**	**Hydro Impacts**	**Probability of violating Laws, regulations and /or public policy**	**Probability of Insufficient MGD to Meet Future Water Demand**	**Cost and Time**	**Screened Out or Carried Forward to Final Array of Alternatives**
Alternative 1 – NAA a. Existing Plan of Regulation b. Non-Federal Action	a. No Change b. ***Unknown****	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. ***High*** b. Near *Zero*	a. No Change b. ***High***	***Carried forward for evaluation purposes***
Alternative 2 Hartwell Lake Conservation Storage Reallocation	***Not Evaluated***	No Change from NAA	No Change from NAA	***Minor Positive***	***Minor Adverse***	No Change from NAA	Near Zero	***Low***	***Screened Out***
Alternative 3 Hartwell Lake Inactive Storage Reallocation	***Not Evaluated***	No Change from NAA	No Change from NAA	***Minor Adverse***	***Minor Adverse***	No Change from NAA	Near Zero	***Low***	***Screened Out***
Alternative 4 Hartwell Lake Flood Storage Reallocation	***Not Evaluated***	No Change from NAA	No Change from NAA	***Minor Adverse***	***Minor Adverse***	***High***	Near Zero	***High***	***Screened Out***

Note: Environmental impacts from the non-Federal alternatives are unknown because the information is not available. However, the non-Federal NAA environmental impacts would be greater than reallocation from Hartwell Lake primarily because of the impact of constructing new transmission lines and pump stations and other updates to the distribution systems.

****** Environmental impacts were not evaluated for alternatives that were not carried forward for detailed analysis.***

3.9.1 Alternative 1: No Action Alternative

Under the NAA, the Corps would continue current management for water supply in Hartwell in accordance with the current plan of regulation. No reallocation would occur to meet water supply needs of the four requestors. Under the NAA, most of the requestors would not have sufficient water supply to meet 2035 water demands. Current water supply amounts would not support projected future growth throughout the region. Current water conservation efforts would continue, but alone do not sufficiently decrease the gap in water supply needs.

To meet future water demands, the requestors would take predictable actions as a consequence of the NAA. Each of the requestors would acquire it from some other non-federal source at a higher cost than the reallocation from Hartwell Lake and at a greater environmental cost due to construction impacts.

3.9.2 Alternative 2: Hartwell Lake Reallocation of Conservation Storage to Water Supply

Alternative 2 would reallocate conservation storage for water supply from Hartwell Lake. The Corps anticipates that reallocating storage from conservation storage to water supply would produce relatively minor positive impacts from the Federal NAA to hydropower production with low cost and time to obtain power. There is an estimate decrease of 0.02 feet or 0.24 inches in the average annual pool elevation at Hartwell and no change in elevation at Russell or Thurmond. Slight changes in Savannah River flows were detected at Augusta, GA with an average annual decrease of 12 cubic feet per second (cfs) from an average annual flow of 8,956 cfs to 8,944 cfs. As this alternative. While initially carried forward in the focused array, this alternative was dropped from the final array as it did not include RFC, and therefore was not considered a complete alternative.

3.9.3 Alternative 3: Hartwell Lake Reallocation of Inactive Storage to Water Supply

Alternative 3 would reallocate inactive storage for water supply from Hartwell Lake. The Corps anticipates that reallocating storage from inactive storage to water supply would produce relatively minor negative impacts and hydropower production with low cost and time to obtain power. Hydrology impacts resulting from reallocation from the Inactive Storage had minor positive changes in elevations at Hartwell and JST Lakes increasing Hartwell Lake’s annual average elevation 0.23 feet and JST Lake’s 0.16 feet. The positive change in elevation is a result of the reallocation of storage from the Inactive Storage to the Conservation Storage, slightly increasing the size of the Conservation Storage. The annual average flows at Augusta, GA would decrease by 10 cfs when compared to the NAA resulting in a minor negative impact to hydrology in the Savannah River flows at Augusta, GA. This alternative was not carried forward as minor adverse impacts to flood risk management may occur and it underperformed when compared to Alternative 2.

3.9.4 Alternative 4: Hartwell Lake Reallocation of Flood Storage to Water Supply

Alternative 4 would reallocate flood storage for water supply from Hartwell Lake. Although there would be no impacts to recreation and only minor impacts to hydropower, there would be high impacts expected to dam safety and flood risk management requiring high costs in money and time. Therefore, Alternative 4 was not carried forward to the final array.

3.9.5 Alternative 5: Hartwell Lake Reallocation of Conservation Storage to Water Supply and Return Flow Credit

Alternative 5 was added to the alternatives in 2023 after modeling completed in February. This alternative would reallocate conservation storage for water supply from Hartwell Lake and includes RFC. This alternative has the same pool elevations and flows as Alternative 2 (see section 3.9.2) but adds RFC for the water account holders. As with Alternative 2, the TSP produces minor positive FRM impacts, but unlike Alternative 2 also creates minor positive impacts from the NAA to the hydropower production. The provision of RFC removes some of the total Hartwell inflow from being distributed proportionally across all account holders, and instead credits it directly to the account of the returner. This shift allows those returning account holders to hold smaller storage accounts while still meeting their demands during the critical period. At the same time, other account holders receive less total inflow, and is reflected in their current account sizes no longer being able to provide the same level of withdrawals over the critical period. Thus, the other account holders (those who do not return flows directly to Hartwell Lake) would require slightly larger accounts (Table 13). The Corps anticipates that reallocation from conservation storage to water supply would produce relatively minor positive to hydropower production with low cost and time to obtain it. The purpose of this model run was to properly size the water storage accounts needed to meet the 2035 demands during the critical period under the conditions of full return storage credit.

Table 13: Requestor Account Size Comparison between NAA and Alt 5

Model Alt	Demands	Anderson	Pioneer	Lavonia	Currahee
NAA	Current Storage (ac-ft)	24620	0	127	0
Alt 5	Future Storage (ac-ft)	29142	3111	2429	415
Difference between Current Account Storage Size and Size needed to meet Future Demands under Alt 5 (ac-ft)		8618	874	135	-4

3.10 Final Array of Alternatives

Once the RFC alternative was added to the study, the array dwindled down to two final alternatives after analyzing outputs and effects that have the most influence on the decision-making process and accounting for completeness (Table 14).

Modeling showed small decreases to the average elevation at Hartwell Lake (0.02 feet or 0.24 inches), Russell Lake (0.01 feet or 0.12 inches, and JST (0.01 feet or 0.12 inches), which are insignificant with respect to the level of uncertainty in the results. Slight changes in Savannah River Flow were detected at Augusta, GA with a decrease of 10 cubic feet per second (cfs) from an average flow of 8955 cfs to 8945 cfs, an approximate -0.1% difference. No significant adverse environmental impacts are expected. In all, granting RFC allows Anderson, Pioneer, and Lavonia to need smaller accounts, by 8,618 ac-ft, 874 ac-ft, and 135 ac-ft, respectively.

Alternative 5 also includes Dependable Yield Mitigation (DYM) for any water account holders who are adversely affected by the new accounts. For the scripted water accounting ResSim model, no adjustments were necessary to represent the downstream DYMs. The model does not explicitly track Russell and Thurmond accounts but is represented in the ResSim Yield Model.

No new infrastructure would be required for three of the requestors; ARJWS, Pioneer RWD, and the City of Lavonia. Infrastructure currently in place for these requestors can sufficiently convey the additional water supply. All return flows are from facilities with existing National Pollutant Discharge System (NPDES) permits, summarized in Table 14. Currahee Club would be required to construct an intake pipe as described in Section 2.7.

Table 14: Return Flow Facility Permit Summary

Wastewater Treatment Plant (WWTP)	Receiving Body	NPDES Permit #
Michelin	Lower Three And Twenty Creek	SC0026701
Mount Vernon Mills	Lower Three And Twenty Creek	SC0000485
Pendleton/Clemson WWTP	Lower Eighteenmile Creek	SC0035700
City of Clemson WWTP	Lower Twelvemile Creek-Keowee River	SC0020010
Milliken (Pendleton Plant)	Lower Eighteenmile Creek	SC0000477
Anderson County WWTP (6 & 20)	Upper Six And Twenty Creek	SC0040193
Clemson University WWTP	Upper Seneca River (Hartwell Lake)	SC0034843
Harbor Gate	Upper Big Generostee Creek (Hartwell Lake)	SC0021849
Pioneer Rural Water Treatment Plant	Lower Tugaloo River (Cleveland Creek)	SCG646068

Table 15: Final Array of Alternatives Screening

	Complete					Acceptable	Effective	Efficient	Screening
Alternative	**Environmental Impacts**	**Dam Safety Impact**	**Recreation Impacts**	**FRM Impacts**	**Hydro Impacts**	**Probability of violating Laws, regulations and /or public policy**	**Probability of Insufficient MGD to Meet Future Water Demand**	**Cost and Time**	**Screened Out or Carried Forward to Final Array of Alternatives**
Alternative 1 – NAA a. Existing Plan of Regulation b. Non-Federal Action	a. No Change b. ***Unknown****	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. No Change b. No Change	a. ***High*** b. Near *Zero*	a. No Change b. ***High***	***Carried forward for evaluation purposes***
Alternative 5 Reallocation from Conservation Storage RFC	**Minor**	No Change from NAA	No Change from NAA	**Minor Positive**	**Minor Positive**	No Change from NAA	Near Zero	**Low**	**Carried Forward** *(Added 3/23)*

Note: Environmental impacts from the non-Federal alternatives are unknown because the information is not available. However, the non-Federal NAA condition's environmental impacts would be greater than reallocation from Hartwell Lake primarily because of the impact of constructing new transmission lines and pump stations and other updates to the distribution systems.

4.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Environmental evaluation is a process that integrates environmental considerations, resource impacts, and resource opportunities throughout the planning process. This section follows guidance on applying the environmental evaluation procedures to planning water resources projects while at the same time fulfilling the requirements of compliance with all applicable Federal environmental laws, including but not limited to, National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Clean Water Act (CWA), and other statutory requirements. Evaluating the environmental consequences that are expected to result from the implementation of the proposed action is accomplished by comparing the "future without project conditions" (the No-Action Alternative) to the "future with project conditions" (the Proposed Action Alternative).

The Corps does not anticipate any effects to air quality, essential fish habitat (EFH), water quality, noise, geology, wetlands, soils, floodplains, or flood risk management, from either the No Action Alternative or the Proposed Action. These resources have been dismissed from detailed analysis (Table 15). Resources that may be affected are analyzed in more detail in this section.
n
The final alternatives considered for assessing environmental impacts are: Alternative 1: No-Action Alternative and Alternative 5: Reallocation from the Conservation Storage with RFC, which is the proposed action.

Table 16: Resources Dismissed from Detailed Analysis

Resources Dismissed	Reasoning
Air Quality	Negligible greenhouse gas emissions may occur from the Currahee Club's construction of the small intake pipe. Given the size of the pipe, construction would not be expected to last more than a few days using small duty construction equipment, such as a backhoe. No other greenhouse emissions will result from the proposed action. Negligible impacts to air quality may occur with the NAA due to the construction of additional infrastructure to meet the requestors' supply needs. For the construction of additional infrastructure under the NAA, it is difficult to determine what machinery would be used for the construction or the duration of the construction. Therefore, the assessment of greenhouse emissions or other emissions is undeterminable and incalculable without knowing the type and extent of construction and machinery used.
Aquatic Resources of the Lower Savannah River	The NAA would have no impacts on the aquatic resources of the lower Savannah River. There would be no impacts as a result of the proposed action as there will be no changes to the operations of the dams. Compared with the NAA/FWOP, the proposed action would only have a 10 cfs reduction in the average annual flow at Augusta,

	Georgia, which is approximately - 0.1% difference in flow. This difference would not measurably impact aquatic resources or their habitat in the lower Savannah River. Minimum flows during drought periods would continue to be maintained consistent with the 2012 Drought Management Plan.
Essential Fish Habitat (EFH)	The NAA would have no impacts on EFH due to no change in reservoir operations. Hydrology modeling results indicate that the proposed action would have a 10 cfs reduction (a - 0.1% difference) in the average annual flow at Augusta, Georgia compared to the NAA which would not measurably impact water velocity or water quality in the lower portion of the Savannah River. In addition, minimum flows during drought periods will continue to be maintained consistent with the 2012 Drought Contingency Plan and there would be no change to minimum flows. Therefore, no impacts to EFH are anticipated with implementation of Alternative 5.
Noise	Construction activities related to the NAA due to the requestors seeking alternative sources would create minor to moderate increases in noise levels, depending on location, type of construction, and proximity to populated areas. Given the extent of some of the infrastructure that may be required moderate impacts may occur near populated area and would end once construction is complete. The proposed action would not affect noise levels around the lakes or downstream. Negligible short-term noise impacts may occur from the construction of the Currahee Club intake, given the size and anticipated type of equipment, noise levels would be similar to other maintenance activities at the Currahee Club.
Geology	None of the alternatives would have any impact to topography or geology in the project area.
Water Quality	Under the NAA, there may be effects to water quality due to the construction of the new infrastructure that would be required; however, as of now, those effects are undeterminable due to the extent and location of construction being unknown. Alternative 5 is not expected to affect water quality as only negligible changes to stream discharge is anticipated, a less than -0.1% difference in average annual flow. Reservoir operations and flow releases would not change, and the Corps would continue to follow the 2012 Drought Management Plan. Therefore, there will be no effect to the Savannah River water quality, including dissolved oxygen (DO) levels, as a result of the reallocation from the conservation storage.

	At Hartwell Dam the Corps has installed modifications, referred to as “turbine vents”, that allow air to be diffused into the water as it flows past the turbines during generation. The result is an increase of 2 to 3 mg/l in DO levels in the Hartwell tailwater. At RBR Dam, the Corps uses a deep-water layer DO injection system in RBR Lake to maintain DO discharges through the dam at or above 5 mg/l throughout the year. The DO system at RBR generally operates during the period from July–October each year. In addition to improving the DO of water released through RBR Dam, the DO system also improves water quality in the lower portion of RBR Lake, particularly the area downstream of the Highway 72 bridge. Turbine vents at Hartwell and JST Dams and DO injection systems at RBR and JST Lakes will continue to be operated during periods of DO depletion. Therefore, there will be no effect on lake water quality as a result of reallocation from the conservation storage. All return flows are from facilities with existing National Pollutant Discharge Elimination System (NPDES) permits in accordance with Clean Water Section 402. As the source of the water (Hartwell Lake) would not change, no changes to water quality from return flows are anticipated.
Wetlands	As only negligible changes to stream discharge and reservoir elevations are anticipated, the water table in surrounding wetlands is not expected to change in the project area. Therefore, there are no direct or indirect impacts expected to wetlands as a result of the proposed action.
Soils	It is not expected that soils in the lakes or the surrounding watershed will be impacted by the proposed action. No additional inundation to soils in the action area is expected to occur, as only imperceptible changes to pool elevations and Savannah River hydrology have been predicted.
Floodplains	The proposed action will have no impacts on floodplains in and around the project area. The natural hydrologic processes of surrounding floodplains will not be affected by the proposed action.
Flood Risk Management	The NAA and proposed action would have no impact to flood risk management. None of the alternatives would impact the flood storage capacity or impact Corps’ reservoir operations during a flood event.

4.1 Environmental Setting/Description of the Watershed

The Savannah River Watershed includes portions of 27 counties in Georgia, 13 counties in South Carolina, and four counties in North Carolina. Although the basin is predominantly rural, metropolitan areas are experiencing growth and development pressures. Primarily, growth is occurring in the areas of Augusta and Savannah, Georgia, although many smaller cities and towns are also developing. There are several functions the river serves including providing water for drinking, energy,

municipal/industrial use, agriculture, and aquatic habitat. According to the Georgia River Network website, forestry and agricultural practices represents a large percentage of land use within the Savannah River Watershed followed by smaller percentages of wetlands and urban development.
a
The Savannah River watershed encompasses 10,579 square miles. It is long and relatively narrow, with the long axis lying in a northwest-southeast direction. The Savannah River, together with its tributaries, forms the border between the states of Georgia and South Carolina. The confluence of the Seneca and Tugaloo Rivers, formerly known as "The Forks," but now inundated by Hartwell Lake, marks the upstream end of the Savannah River. The headwaters are on the southern slopes of the Blue Ridge Mountains in North Carolina, just north of the Georgia-South Carolina border. The length of the Savannah River from The Forks to the mouth is about 312 miles. The lower 50 miles, to just upstream of the confluence with Ebenezer Creek, is tidally influenced. The river's entire length of 312 miles is regulated by three adjoining Corps of Engineers multipurpose projects, each with appreciable storage. The three lakes, Hartwell, Richard B. Russell, and J. Strom Thurmond, form a chain along the Georgia-South Carolina border 120 miles long. Of the 6,144 square mile drainage basin upstream of J. Strom Thurmond Dam, 3,254 square miles (53%) are between J. Strom Thurmond and Richard B. Russell Dams, 802 square miles (13%) are between Richard B. Russell and Hartwell Dams, and 2,088 square miles (34%) are upstream of the Hartwell Dam. The basin is divided between three states: North Carolina consists of 2 percent of total area (179 square miles); South Carolina consists of 42 percent of the total area (4,530 square miles); and Georgia consists of 56 percent of the total area (5,870 square miles).

The Savannah River Basin embraces three distinct areas: the Blue Ridge Mountains, the Piedmont Province, and the Coastal Plain. The mountains and Piedmont are part of the Appalachian Mountain Range. The division between the mountains and Piedmont is an irregular line extending from northeast to southwest, crossing the Tallulah River at Tallulah Falls. The Fall Line, or division between the Piedmont Province and the Coastal Plain, also crosses the basin in a generally northeast to southwest direction, near Augusta, Georgia. Elevations within the mountain area of the basin vary from 1,500 feet NGVD on the Tallulah River to 5,030 feet NGVD at the highest peak, Little Bald, in North Carolina along the watershed divide. The Piedmont Province, due to its great width of over a hundred miles, is truly piedmont only in the upper parts, and gives away to a midland area before reaching the Coastal Plain. Exclusive of river valleys, its elevation generally varies from 500 feet NGVD at the Fall Line to about 1,800 feet NGVD at its upper extremity. Elevations within the Coastal Plain vary from 500 feet NGVD at the fall line to sea level at the Atlantic Ocean.

4.2 Hydrology

4.2.1 Existing Conditions

The Corps' Savannah River reservoirs are operated as a system, maintaining a balance between the Corps projects, and targeting system objectives, which include meeting all

authorized purposes of the reservoir projects. A 2014 storage balance agreement with Duke Energy also serves to balance usable storage in the Corps projects with the Duke Energy projects located upstream of Hartwell Lake.

During normal hydrological conditions, reservoir operational rules drive hydropower production to meet weekly power generation requirements marketed by the Southeastern Power Administration (SEPA). Drought conditions are managed by the 2012 Drought Management Plan. When operating during drought, drought operational rules are progressively applied as reservoir elevations decline. Minimum flow requirements in the Savannah River below JST Dam dictate discharges from the reservoir system based on reservoir elevation drought trigger levels. Flow restrictions on JST's release are initiated when either Hartwell or JST decline through a drought trigger level. As pools recover, the JST Dam flow restriction will not reset to the next higher level of restriction until both the Hartwell and JST pools have risen 2 feet above the trigger level that set the restriction. Hartwell releases only what is necessary to stay in balance with JST. There are no drought triggers in the RBR pool. Hydrology in the Savannah River below Augusta, GA is largely driven by releases from the upstream reservoirs with smaller tributaries contributing additional flow downstream of JST Dam. Approximately 60% of the Savannah River watershed is upstream of JST Dam. During flood events the primary purpose of the Corps projects becomes Flood Risk Reduction.

USACE HEC (Hydrologic Engineering Center)-ResSim (Reservoir System Simulation) software was used to assess any changes in reservoir elevations, discharges, and Savannah River flows below JST Dam as a result of the requested water supply withdrawals at Hartwell Lake. ResSim was developed to simulate reservoir operations for flood risk management, low flow augmentation, water supply planning studies, detailed reservoir regulation plan investigations, and real-time decision support. ResSim was used to mimic the operations of the USACE and Duke Energy Savannah River reservoirs. An unimpaired inflow dataset (UIF) developed by GADNR-EPD covering the period January 1929 to December 2013 was used for input to define basin hydrology to assess potential water supply withdrawal alternatives.

Operational rules for the reservoir system were incorporated into ResSim to define the current operations of the reservoir system. These rules included flood control rules, drought management triggers and minimum flows as defined in the 2012 Drought Management Plan, hydropower capacity and efficiency data, and contractual hydropower demands. In addition, all existing water supply withdrawals and water treatment returns were included in the ResSim configuration.

All alternatives, including No Action, were separate ResSim model "runs" to measure the incremental reservoir and downstream impacts of reallocating water supply storage from Hartwell Lake. With existing reservoir operational rules incorporated, the ResSim results provided a cumulative assessment of the potential impacts of additional water supply use by incorporating existing and proposed future water supply storage use into the model. ResSim also fully used the proposed reallocated and current user's water supply storage to represent a worst-case scenario. Changes in reservoir elevations at

Hartwell Lake and changes in flows in the Savannah River below JST Dam were the primary ResSim results (Table 16) used to assess many other relevant resource impacts.

Table 17: ResSim Results – Annual Average Hartwell, Russell, JST Lake Elevations and Savannah River Flows at Augusta, GA using Period of Record Analysis Comparing NAA to Conservation Storage with RFC.

	No Action Alternative (NAA) Alternative 1			Conservation Storage with RFC- DYM Alternative 5		
	Hartwell	Russell	JST	Hartwell	Russell	JST
Avg Annual Average Elevation (ft)	657	475	327	657	475	327
Avg Annual Average Outflow Augusta, GA (cfs)	8955			8945		

4.2.2 Environmental Consequences to Hydrology for Alternative 1 (NAA)

No changes to hydrology are expected to occur as there would be no reallocation from Hartwell Lake under the NAA. The requestors are expected to seek other water sources to meet their future water demands. The most likely alternative for each requestor involves withdrawals of water from non-federal reservoirs or tributaries of the Savannah River upstream of Hartwell Lake and the construction of additional infrastructure to convey the water to drinking water treatment facilities. The quantity of this future water demand is expected to equal that which is requested from Hartwell Lake.. There will be no additional direct withdrawals from Hartwell Lake, but the inflows to Hartwell Lake could be reduced as a result of the consumptive use of future upstream withdrawals. When compared to modeled existing conditions, which indicates an average annual flow of 8958 cfs at Augusta, GA, compared to the 8955 cfs under the NAA, this decrease of 3 cfs would be imperceptible. Additionally, when comparing modeled existing conditions for Hartwell pool elevations in comparison to the NAA, average annual elevations for the period of record decreased by 0.02 ft, an imperceptible change in elevation.

As the Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged, the no action alternative would have no short-term or long-term adverse impacts to the existing hydrology.

4.2.3 Environmental Consequences to Hydrology for Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

If storage is reallocated from the conservation storage, ResSim predicted a change of -0.08 feet (0.96 inches) in the average annual elevation at Hartwell Lake and -0.05 feet (0.60 inches) at JST with no change in elevation at Russell Lake.

Slight changes in Savannah River flows were also detected at Augusta, GA with an average annual decrease of 10 cubic feet per second (cfs) from an average annual flow of 8,955 cfs to 8,945 cfs., or less than - 0.1% difference. The receiving reservoir for returns from Hartwell Lake water supply users include Hartwell, Russell and JST Lakes.

When comparing modeled flows below the 50th percentile, meaning that flows would be at or below these flows approximately 50 percent of the time, differences in flow ranges from -10 cfs to 6 cfs, and with percent difference between -0.2% and 0.1%, representing imperceptible differences in flow at the lower flow ranges (Table 17).

Table 18. Comparison of Streamflow at Augusta, GA.

Streamflow at Augusta, GA (CFS)				
Percent Times Flows are at or below	NAA	Alternative 5	Difference	% Difference
0%	3600	3600	0	0.0%
5%	3764	3762	-2	-0.1%
10%	3968	3969	1	0.0%
15%	4124	4130	6	0.1%
20%	4262	4267	5	0.1%
25%	4412	4413	1	0.0%
30%	4612	4612	0	0.0%
35%	4856	4856	0	0.0%
40%	5176	5166	-10	-0.2%
45%	5570	5566	-4	-0.1%
50%	6005	5996	-9	-0.1%

In the context of a large river system, the proposed water supply withdrawals represent an imperceptible change to long-term hydrology. During drought periods, when flows are restricted and downstream resources are most susceptible to potential change, minimum flows as described in the 2012 Drought Management Plan will continue to be maintained.

As the reallocation of storage for water supply at Hartwell does not change any of the regulating rules associated with operation of the three-project system, and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged, it is anticipated that the proposed action would have negligible to no impact to hydrology in the Savannah River Basin, when compared to the NAA.

4.3 Recreation

4.3.1 Existing Conditions

The lakes of the Savannah River Watershed provide excellent opportunities for water resource-based recreation. During normal operating levels, the reservoirs of the Savannah River Watershed provide many opportunities for water-based recreational activities, including boating and swimming. The following subsections provide details on public boat ramps and swimming areas.

4.3.1.1 Public Boat-Launching Ramps and Private Docks

Public boat-launching ramps and private docks provide recreational access to the lakes of the Savannah River Basin. The following paragraphs discuss the facilities that exist on the three Corps reservoirs.

Hartwell Lake

There are 90 operational public boat-launching ramps and five marinas located on Hartwell Lake. From lake elevation 660 to 658.01 feet NGVD all ramps are usable. At and below lake level 654 feet NGVD, 17 boat-launching ramps become unusable, and between lake levels 658 and 652, 30 ramps become unusable. When lake levels drop to 646 feet NGVD, approximately one-half of the boat-launching ramps become unusable. If lake levels were to ever drop to 638 feet NGVD, all the ramps become unusable.

In addition to the public boat launching facilities, there are approximately 11,000 private boat dock permits issued on Hartwell Lake.

Richard B. Russell Lake

There are approximately 30 operational public boat-launching ramps on RBR Lake. All ramps are usable until lake levels reach 466 feet NGVD. Lake levels at RBR Lake do not routinely drop more than five feet below full pool, and public boat-launching ramps and public access to RBR Lake are not affected by changes in pool elevation.

J. Strom Thurmond Lake

There are 78 operational public boat-launching ramps and six marinas located on JST Lake. Above lake elevation 326 feet NGVD to 330 feet NGVD all ramps are usable and allow for the launching of boats with up to three feet of draft. There are 31 unusable ramps when lake levels are between 326 to 317 feet NGVD. At and below lake level 323 feet NGVD, 20 percent of boat-launching ramps become unusable. At and below lake level 315 feet NGVD 55 percent of boat-launching ramps become unusable. All boat-launching ramps would become unusable at 306 feet NGVD.

In addition, there are approximately 2,000 private boat docks on the JST Lake which provide additional access to JST Lake.

4.3.1.2 Swimming

Swimming areas on the Corps reservoirs are mainly used from May through September. The following paragraphs discuss the facilities that exist on the three Corps reservoirs.

Hartwell Lake
At Hartwell Lake, there are 11 Corps operated swimming beach areas located in seven recreation areas. When lake levels reach 654 feet NGVD, all designated swimming areas are dry. However, when the lake level drops below 657 feet NGVD, swimming areas become less desirable due to the reduced water area available for swimming.

Richard B. Russell Lake
There are no Corps operated designated swimming areas at RBR.

JST Lake
At JST Lake, there are 35 operated swimming beach areas located in eight recreation areas. When lake levels reach 324 feet NGVD, the designated swimming areas are dry. However, when the lake level drops below 327 feet NGVD, swimming areas beaches become less desirable due to the reduced water area available for swimming.

4.3.2 Environmental Consequences to Recreation for Alternative 1 (NAA)

As the Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged, the no action alternative would have no short-term or long-term adverse impacts to recreation.

4.3.3 Environmental Consequences to Recreation for Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

If storage is reallocated from the conservation storage with RFC, recreational changes will be negligible. Boat ramp and swim beach use would not be measurably impacted at any of the Corps' reservoirs or along the Savannah River downstream of JST Dam. ResSim predicted that compared with the NAA, reallocation from the conservation storage would cause a 0.3% increase in the number of beach days closed at Hartwell Lake and Thurmond Lake over the historical period of record analysis. There would be no impacts to the days of beach closed at Russell Lake. Similarly, there would not be measurable impacts to recreation facilities at RBR and JST Lakes. Therefore, no short-term or long-term adverse impacts are expected to occur to recreation as a result of this alternative. Appendix A, Sections 7.2 and 7.3 provide more detailed analysis of these findings.

4.4 Water Supply

Corps lake projects are operated based on the Reservoir Regulation Manual and the 2012 Drought Management Plan, and the prescribed minimum flows downstream of JST will continue to be met during drought periods. ResSim predicted an additional 8 days at Hartwell below elevation 646 over the entire period of record when compared to the NAA, but the modeling did not predict any days below elevation 635 for either the NAA or the Proposed Action. Hartwell's conservation storage extends down to elevation 625. If or when the Conservation Storage is emptied (Level 4 Drought conditions), the Corps would continue to release flows from JST as described in the 2012 Drought Management Plan, so the downriver flows would not be lower than those specified in that plan. Thus, there are no substantial changes in level of impacts expected to water quality, but the duration of the impact would be minimally longer in the Savannah River downstream of JST Dam.

4.4.1 Existing Conditions

Hartwell Lake

There are eight water supply users on Hartwell Lake. As seen in Table 18, three of these users have water storage agreements. The other five users have riparian rights to water. The total amount of storage that has been reallocated to water supply at Hartwell Lake is 26,574 acre-feet. The highest intake elevation is 653 feet NGVD and the lowest intake elevation is 611 feet NGVD.

Table 19: Hartwell Lake Existing Water Supply Storage Reallocation Agreements

User	Date of Agreement	Storage Space (acre-feet)	Agreement Cost ($)	Method Used to Determine Cost of Storage	Reallocation Source
Anderson Regional Joint Water System	1967	24,620	$3,477,700	Benefits Foregone	Conservation
City of Lavonia	1990	127	$21,447	Updated Cost of Storage	Conservation
Hart County	1998	1,827	$356,867	Updated Cost of Storage	Conservation

RBR Lake

There are six water supply users on RBR. As seen in Table 19two of those users have water storage agreements. The other four users have riparian rights to water. The total amount of storage that has been reallocated to water supply at RBR Lake is 872 acre-feet. The highest intake elevation is 468.8 feet NGVD and the lowest intake elevation is 454.75 feet NGVD.

Table 20: RBR Lake Existing Water Supply Storage Reallocation Agreements

User	Date of Agreement	Storage Space (acre-feet)	Agreement Cost ($)	Method Used to Determine Cost of Storage	Reallocation Source
City of Elberton, GA	1990	381	$419,658	Updated Cost of Storage	Conservation
South Carolina Public Service Authority	1990	491	$1,615,243	Benefits Foregone	Flood

JST Lake

As seen in Table 20, there are seven water supply users on JST Lake. Six of the users have water storage agreements and the other has riparian rights. The total amount of storage that has been reallocated to water supply at JST Lake is 3,833 acre-feet. The highest intake elevation is 321 feet NGVD. The lowest intake elevation is 300 feet NGVD.

Table 21: JST Lake Existing Water Supply Storage Reallocation Agreements

User	Date of Agreement	Storage Space (acre-feet)	Agreement Cost ($)	Method Used to Determine Cost of Storage	Reallocation Source
City of Lincolnton (2 agreements)	1964 1990	92 83	$15,000 $24,608	Updated Cost of Storage	Conservation Conservation
City of Washington	1975	632	$72,800	Benefits Foregone	Conservation
Savannah Valley Auth.	1989	92	$27,395	Updated Cost of Storage	Conservation
Columbia County	1989	1,056	$313,048	Updated Cost of Storage	Conservation
Town of McCormick (2 agreements)	1999 2001	506 316	$17,357 $66,499	Benefits Foregone	Conservation
City of Thomson	1990	1,056	$334,714	Updated Cost of Storage	Conservation

A water storage agreement is similar to a bank account of water that is debited by the user and credited based on a pro-rated apportionment of inflow coming into the reservoir. Using a storage accounting tool, the Corps tracks the amount of storage available to each water storage agreement holder. Debits and credits are determined on

the first day of each month for the prior month. The amount of inflow coming into the reservoir is based on the net change in reservoir storage during the previous month plus the amount withdrawn by all users during the previous month (users must submit a monthly report to the Corps documenting their withdrawals). Debits for the prior month only occur if the reservoir the withdrawal is being made from is below guide curve on the first day of the current month. The bank account of water is reset to the full storage purchased when the reservoir returns to guide curve and is determined on the first day of each month.

A water storage agreement provides the user rights to withdraw water from their storage within the reservoir but does not guarantee either a specific quantity or the quality of the water. The storage agreement holders are often required to obtain a separate Surface Water Withdrawal Permit from either the State of Georgia or the State of South Carolina depending on the quantity of water they are expecting to withdraw from their storage each month.

Downstream of JST Dam

There are 16 major water supply users downstream of JST Dam. Those users are not required to have water storage agreements with the Corps, and their water use is regulated by State water withdrawal permits. Downstream users have designed their infrastructure based on having the ability to withdraw from the river when the streamflow of the Savannah River at Augusta declines to 3600 cfs measured at the New Savannah Bluff Lock and Dam (NSBL&D). The major municipal users are located at Augusta and near the coast. The City of Augusta operates and withdraws water from the Augusta Canal. The City of North Augusta withdraws water from the pool upstream of the New Savannah Bluff Lock and Dam (roughly river mile 187.5). The Beaufort-Jasper County Water Supply Authority withdraws water at river mile 39.3, while the City of Savannah's M&I Plant is located on Abercorn Creek, approximately at river mile 29. The other municipal users consist of Columbia County and Edgefield County.

Industrial users with intakes in the NSBL&D pool include North Augusta, Mason's Sod, Kimberly Clark, Urquhart Station, PCS Nitrogen, DSM Chemical and General Chemical, and South Carolina Electric and Gas. Users below NSBL&D include International Paper, Savannah River Site, Plant Vogtle, Savannah Electric–Plant McIntosh, Georgia-Pacific, and the Savannah National Wildlife Refuge.

4.4.2 Environmental Consequences to Water Supply from Alternative 1 (NAA)

The water supply storage requestors would have to locate or construct other sources for municipal and industrial water supply. The most likely alternative for each requestor involves withdrawals of water from non-federal reservoirs or tributaries of the Savannah River upstream of Hartwell Lake and the construction of additional infrastructure to convey the water to drinking water treatment facilities. Some environmental impacts may occur from that construction. The quantity of this future water demand is expected to equal that which is requested from Hartwell Lake. There will be no additional direct withdrawals from Hartwell Lake, but the inflows to Hartwell Lake could be reduced as a result of the consumptive use of future upstream withdrawals. When compared to

modeled existing conditions, which indicates an average annual flow of 8958 cfs at Augusta, GA, compared to the 8955 cfs under the NAA, this decrease of 3 cfs would be imperceptible. Additionally, when comparing modeled existing conditions for Hartwell pool elevations in comparison to the NAA, average annual elevations for the period of record decreased by 0.02 ft, an imperceptible change in elevation.

The 26,574 acre-feet of storage currently allocated to water supply would remain available to the current water storage agreement holders, but no additional storage from Hartwell Lake would be available for use, which may have a long term moderate adverse impact dependable water supply to meet future demands of the four requestors.

4.4.3 Environmental Consequences to Water Supply from Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

Compared to the NAA, the reallocation of 10,410acre-feet (ac-ft) from the conservation storage with RFC would result in a minor long-term positive impact to water supply by the project being able to meet additional water supply needs in the area. An additional estimated dependable yield of 24.55 MGD would be available for water storage agreements with the four requestors. Minor changes in lake elevations would not impact existing water supply storage capacity or intakes at any of the lakes. Likewise, users downstream of JST Dam would not be impacted by the reallocation. Minimum flows in the Savannah River downstream of Thurmond would continue to be maintained by meeting the minimum flow requirement of 3600 cfs at Augusta.

4.5 Hydropower

4.5.1 Existing Conditions

The SEPA markets hydropower generated at Hartwell, RBR and JST Dams (Table 21). SEPA markets the energy through contracts negotiated between SEPA and certain preference customers. In addition to the three Corps hydropower projects on the Savannah River, there are seven other USACE hydropower facilities included in the Georgia-Alabama system that provide the energy and capacity requirements of the SEPA contracts. Those projects are located in the Alabama-Coosa, and Apalachicola-Chattahoochee-Flint Basins. Under normal conditions, if a certain basin or portion of a basin is unable to meet the demands expected, then that shortage can usually be transferred to, or “made up” in, another basin. In the event of drought or any other situation that may prevent the ability to generate power, SEPA may purchase replacement energy for the system generation to meet the requirements of SEPA’s contract.

Table 22: Pertinent Hydropower Parameters

Power	Hartwell	Richard B. Russell	J. Strom Thurmond
Overload Capacity (MW)	428.0	656.0	402.5

Power-on-Line (POL)	1962	1985	1952
Marketable Capacity (MW)	396.0	605.0	288

The RBR Dam includes a pumped storage feature which began commercial operation in July 2002. Current operation of the four pumped storage units includes several operational restrictions to minimize fish entrainment and fishery habitat impacts.

Hydropower benefits are based on the cost of the most likely alternative source of power. When storage is reallocated for water supply and an impact occurs to hydropower, the power benefits foregone are equivalent to the cost of replacing the lost power with the most likely alternative source of power.

The power benefits foregone can be divided into two components: (1) The lost energy benefits and (2) lost capacity benefits. In the case of water supply withdrawals, there is usually a loss of energy benefits, and lost energy benefits are based on the loss in generation (both at-site (Hartwell) and in downstream reservoirs (RBR and JST)) as a result of water being diverted from the reservoir for water supply rather than passing through the hydropower plant.

The second power-related cost is the revenue foregone. This is the value of the lost hydropower based on the power marketing agency's current energy rates. As defined in the Planning Guidance Notebook (PGN):

> *"The Corps does not market the power it produces; marketing is done by the Federal power marketing agencies (Southeastern Power Administration, Southwestern Power Administration, Western Area Power Administration, Bonneville Power Administration, Alaska Power Administration) through the Secretary of Energy." ER 1105-2-100, Planning Guidance Notebook (22 April 2000), Appendix E, paragraph E-42, b(2).*

Average annual combined energy and capacity benefits foregone due to the proposed reallocation of water storage in Hartwell Lake are presented in Table 22.

Table 23: Average Annual Combined (Energy and Capacity) Power Benefits Foregone due to Reallocation of Storage in Hartwell Lake

Alternative	Hydropower Benefits Foregone
Conservation Storage	**($5,354)**
Conservation Storage w/RFC	**($5,354)**

The Hydropower Analysis in Appendix B contains a more detailed discussion on hydropower and the revenues foregone.

4.5.2 Environmental Consequences to Hydropower from Alternative 1 (NAA)

The NAA represents the most likely anticipated future condition without reallocation of storage for water supply from Hartwell Lake. The populations in the upper river basin have been slowly rising and they are expected to continue to rise, increasing the demand for water supply over time. The NAA would not reallocate any additional storage of Hartwell Lake for water supply. Therefore, existing users with previous water supply storage reallocation agreements would continue withdrawing only up to their contracted amounts. If additional or new water supply is needed, the requestor would need to obtain water from another source. There would be no change in the Plan of Regulation or impacts to hydropower benefits foregone, therefore no impacts to hydropower are anticipated.

4.5.3 Environmental Consequences to Hydropower from Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

When compared to the NAA, reallocation of storage from the conservation storage with RFC for the M&I water needs would reduce the amount of storage available in the reservoirs for hydropower generation resulting in a minor adverse impact to hydropower benefits (Table 23). Total hydropower benefits foregone represent a 0.05 percent loss due to the proposed storage reallocation from the conservation storage in Hartwell Lake. Therefore, there will be minor adverse impacts to hydropower benefits in the short-term and long-term as a result of Alternative 5.

Table 24: Hydropower Benefits Foregone (RFC)

Alternative	Hydropower Benefits Foregone
Conservation Storage w/ RFC	**($5,354)**

4.6 Aquatic Resources at the Lakes

4.6.1 Existing Conditions

Hartwell Lake and its tailrace provide a vast habitat for both warm water and cold water fisheries. The lake area supports a large warmwater fishery including such species as striped bass, hybrid bass, largemouth bass, spotted bass, bluegill, pumpkinseed, redear sunfish, yellow perch, sauger, walleye, and catfish. Nongame species found within the lake include blueback herring, carp, longnose gar, redhorse, and spotted sucker. The GADNR and the SCDNR both annually stock, on average, a combined 500,000 to 1,000,000 striped bass and hybrid bass in Hartwell Lake.

The Hartwell tailrace supports a cold water put and take trout fishery that is supported by stocking from both States. Georgia DNR-EPD classifies the Savannah River in Hart County (which includes the Hartwell tailrace) as Secondary Trout Waters. These waters are described as those waters in which there is no evidence of natural trout reproduction, but they are capable of supporting trout throughout the year. Striped bass from RBR Lake are also found in this cold-water fishery.

Study findings indicate that blueback herring habitat becomes quite restricted during lake stratification due to the DO and temperature requirements of the fish. Congregation of herring in the penstock area and occasional fish kills from entrainment are the impacts from the stratification conditions (Alexander, et.al., 1991). Operational procedures are followed by Savannah District to minimize this entrainment.

RBR Lake supports a wide variety of fish species. The more common species include largemouth bass, spotted bass, threadfin shad, gizzard shad, blueback herring, bluegill, redear sunfish, channel catfish, brown bullhead, black crappie, yellow perch, white perch, spotted sucker, and common carp. Small numbers of hybrid bass (striped bass x white bass) and striped bass are caught each year in RBR Lake. GADNR and SCDNR initiated a striped bass stocking program in 2011 to support a well-established “trophy” striped bass fishery in RBR Lake.

The RBR tailrace supports a substantial cool-water fishery for striped bass, hybrid bass, and white perch. A commercial fishery for blueback herring exists in the RBR tailrace. Blueback herring are used by fishermen as bait in both Georgia and South Carolina. The more common fish species in JST Lake include largemouth bass, spotted bass, bluegill, redear sunfish, hybrid bass, striped bass, black crappie, brown bullhead, channel catfish, flathead catfish, white perch, yellow perch, threadfin shad, gizzard shad, and blueback herring. SCDNR and GADNR both actively stock hybrid bass and striped bass in JST Lake. On average, 750,000 to 1,000,000 striped and hybrid bass combined have been stocked annually in JST Lake.

State natural resource agencies have identified the largemouth bass spawning period at the three Corps Savannah River lakes as being a priority in water management decisions. The spawning period is defined as beginning when water temperatures reach 65 degrees Fahrenheit and lasts until three weeks after water temperatures reach 70 degrees. The water temperatures are taken each day throughout this period in a sunny cove between 1000 and 1630 hours by submersing a thermometer six inches where the water is approximately three to five feet deep. The spawning period usually starts around the first of April and lasts 4 to 6 weeks (Lake Regulation and Coordination for Fish Management Purposes, South Atlantic Division, US Army Corps of Engineers, May 31, 2010).

Stable lake levels are provided during this peak spawning period to prevent the stranding of eggs and abandonment of nests. Throughout the spawning season, water levels are not lowered more than six inches below the highest lake elevation recorded during the operational spawning window. If inflows during the spawning season cause lake levels to rise to flood levels, managers have the authority to lower lake levels more than 6 inches, since flood control takes precedence over fish spawn. Maintaining these stable lake levels is not always possible during drought.

4.6.2 Environmental Consequences to Lake Aquatic Habitat for Alternative 1 (NAA):

There will be no additional direct withdrawals from Hartwell Lake, but the inflows to Hartwell Lake could be reduced as a result of the consumptive use of future upstream withdrawals. When compared to modeled existing conditions, which indicates an average annual flow of 8958 cfs at Augusta, GA, compared to the 8955 cfs under the NAA, this decrease of 3 cfs would be imperceptible. Additionally, when comparing modeled existing conditions for Hartwell pool elevations in comparison to the NAA, average annual elevations for the period of record decreased by 0.02 ft, an imperceptible change in elevation. Minimum pool elevation under the NAA increased by 0.19 ft, an imperceptible change. Therefore, no impacts are expected to aquatic resources under the NAA, the Corps would continue to manage lake levels, to the extent practicable to provide habitat for largemouth spawning.

4.6.3 Environmental Consequences to Lake Aquatic Habitat for Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

When compared to the NAA, this alternative would have no measurable short-term or long-term effects on aquatic resources at the Corps lakes. The difference in the minimum pool elevation between Alternative 5 and the NAA was 0.13 ft for Hartwell and 0.11 ft for JST, about 0.5% of the depth of the conservation pool depth at each project.

The slight change in the annual average lake elevation at Hartwell and JST Lakes would not measurably impact the availability of aquatic habitat. Water level management during the spawning period will continue to be implemented. Therefore, negligible to no impacts are expected to aquatic habitat in the lakes.

4.7 Threatened, Endangered, and Protected Species

4.7.1 Existing Conditions

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1543) regulates activities affecting plants and animals classified as endangered or threatened, as well as the designated critical habitat of such species. The study area was defined as Hartwell Lake and 500 feet width of Savannah River from Hartwell Lake downstream to New Savannah Bluff Lock and Dam in Augusta, GA. The study area was defined to capture indirect effects from potential changes in hydrology in the Savannah River and changes in Hartwell Lake elevations.

Research on the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) website (http://ecos.fws.gov/ipac/) indicated numerous federally listed species from Hartwell Lake to Augusta, GA (IPaC 2023). Within this area, there are a total of 4 federally listed endangered species, 2 federally listed threatened species, 1 federally listed candidate species, 1 federally proposed endangered species, and 1 federally proposed threatened species, as well as 23 species of birds that are protected by the Migratory Bird Treaty Act. American Bald

Eagle, which are within the project area, are not only protected by the Migratory Bird Treaty Act, but also by the Bald and Golden Eagle Protection Act and are considered birds of conservation concern. The USFWS IPaC website also identified critical habitat for one of the endangered and threatened species within the project area.

Table 25. USFWS IPaC ESA-Listed Species in Project Area (Hartwell Lake to Augusta, GA).

Federally Listed Species	Status
Mammals	
Tricolored Bat	PE[1]
Birds	
Eastern Black Rail	T[2]
Red-cockaded Woodpecker	E[3]
Insects	
Monarch Butterfly	C[4]
Flowering Plants	
Harpella	E
Michaux's Sumac	E
Ocmulgee Skullcap	PT[5]
Relict Trillium	E
Smooth Coneflower	T

[1]PE=Proposed Endangered
[2]T=Threatened
[3]E=Endangered
[4]C=Candidate
[5]PT=Proposed Threatened

Listed species under the National Marine Fisheries Service jurisdiction include the shortnose sturgeon and the Altantic sturgeon. The shortnose sturgeon was listed as endangered in 1967 (32 FR 4001; March 11, 1967), there is no designated critical habitat for shortnose sturgeon. The Atlantic sturgeon was listed as Endangered - South Atlantic and Carolina Distinct Population Segment in 2012 (77 FR 5914; February 6, 2012). In August 2017, NOAA finalized a rule that designated the Savannah River as critical habitat for Atlantic sturgeon. The range for critical habitat for Atlantic sturgeon is from the mouth of the river to the base of the New Savannah Bluff Lock and Dam.

4.7.2 Environmental Consequences of Alternative 1 (NAA)

Adverse impact to threatened, endangered, or protected species or their habitat may occur under the NAA, related to the construction of infrastructure that may be required. The most likely alternative for each requestor involves withdrawals of water from non-federal reservoirs or tributaries of the Savannah River upstream of Hartwell Lake and the construction of additional infrastructure to convey the water to drinking water treatment facilities. Additional construction of infrastructure may impact ESA-listed species due to disturbances to habitat from construction; however, without knowing the

exact location of additional construction of infrastructure, species and impacts cannot be determined.

The quantity of this future water demand is expected to equal that which is requested from Hartwell Lake. There will be no additional direct withdrawals from Hartwell Lake, but the inflows to Hartwell Lake would be reduced as a result of the consumptive use of future upstream withdrawals. Flows in the Savannah River downstream JST Dam would likewise be reduced in proportion to the consumptive use of water withdrawals upstream of Hartwell Lake which may have adverse impacts to ESA-listed species depending on amount of flow reduction. There will be no additional direct withdrawals from Hartwell Lake, but the inflows to Hartwell Lake could be reduced as a result of the consumptive use of future upstream withdrawals. When compared to modeled existing conditions, which indicates an average annual flow of 8958 cfs at Augusta, GA, compared to the 8955 cfs under the NAA, this decrease of 3 cfs would be imperceptible. Additionally, when comparing modeled existing conditions for Hartwell pool elevations in comparison to the NAA, average annual elevations for the period of record decreased by 0.02 ft, an imperceptible change in elevation.

Therefore, short-term and long-term minor adverse impacts to ESA-listed species are expected under the NAA related to the construction of new infrastructure, but no effects are anticipated related to reservoir operations.

4.7.3 Environmental Consequences of Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

The proposed action would have no effect to listed species, or their designated critical habitats. The Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects would remain unchanged under the proposed action.

For species under USFWS jurisdiction, as any changes to Hartwell Lake elevations and Savannah River hydrology would be imperceptible, no changes to upland habitat, including wetland habitat is anticipated, therefore the Corps finds that there would be no effect to ESA-listed species under USFWS jurisdiction. With the exception of the minor infrastructure required for Curahee Club intake, the proposed action does not include any new construction and direct impacts to ESA-listed species would not occur. Currahee Club would be required to obtain any permits for the construction of the intake pipe, including federal permits under the Clean Water Act. Obtaining these permits would require review under ESA, including any avoidance measures for effects to ESA-listed species. Additionally, as the majority of the intake pipe construction would be within the footprint of the Curahee Club golf course, effects to ESA-listed species under USFWS jurisdiction are highly unlikely. Therefore, the Corps has determined no effect to ESA-listed species under USFWS jurisdiction.

For species under NMFS jurisdiction, the Corps evaluated potential routes of effect to shortnose sturgeon, Atlantic sturgeon, and Atlantic sturgeon critical habitat. The primary route of effect is indirect impacts to habitat through changes in hydrology in the lower Savannah River below the New Savannah Bluff Lock and Dam at Augusta, GA. As indicated in section 4.2: Hydrology, the proposed action would have imperceptible impacts to hydrology at Augusta, GA and no impacts are anticipated to water quality. Minimum flows in the Savannah River downstream of JST Dam during drought periods, would remain unchanged as a result of the proposed reallocation. Drought conditions are managed by the 2012 Drought Management Plan. When operating during drought, drought operational rules are progressively applied as reservoir elevations decline. Minimum flow requirements in the Savannah River below JST Dam dictate discharges from the reservoir system based on reservoir elevation drought trigger levels, these minimum flow requirements account for aquatic habitat requirements specifically for ESA-listed species such as the Atlantic sturgeon and shortnose sturgeon. As the proposed action would not result in changes to operating rules in the 2012 Drought Management Plan, would have imperceptible impacts to hydrology in the lower Savannah River and no impacts to water quality, the Corps finds that there would be no effect to shortnose sturgeon and Atlantic sturgeon. Furthermore, the Corps finds that there would be no modifications to critical habitat as a result of the proposed action.

4.8 Socioeconomics

4.8.1 Existing Conditions

The Strom Thurmond Institute of Public and Government Affairs (STI) at Clemson University conducted three analyses of the economic effects of reservoir levels on the surrounding communities. The analyses consisted of separate studies of the three reservoirs with the most potential for impacts associated with potentially large reservoir fluctuations: Lake Keowee, Hartwell Lake, and JST Lake.

The Institute in partnership with the Corps conducted an economic impact analysis of the counties surrounding Hartwell Lake (Allen et al., 2010). The study objective was to determine the incremental economic changes within the six counties from incremental changes in Hartwell Lake's elevations. The counties all share a border with Hartwell Lake. Information and data gathered and used included: county-level sales tax revenue according to industry classifications; 2007 estimates of total property value of lakefront real estate (segmented by county); residential and commercial development in relation to reservoir elevations (value and number of exchanges segmented by county); an estimation of economic impacts due to ancillary fees or loss of income related to real estate exchanges; and an assessment of the major roadways and potential development spots for increasing tourism and residential and commercial growth. In addition, information from Standard Industrial Classification (SIC) codes (including businesses and commercial concessionaires such as marinas, etc.) was incorporated into the Hartwell Lake economic assessment. The goal of the analysis was to identify a relationship between incremental reservoir levels and economic changes. The Institute used results from the Corp's HEC-ResSim model simulations for Hartwell Lake in their analysis.

From April 2007 through December 2008, widespread regional drought conditions caused persistent low water levels in Hartwell Lake. During this period the lake remained well below full pool, making some private docks, public boat ramps, and marinas unusable and reducing traffic at lake-oriented businesses. The estimated economic impact of low lake levels over this 21-month period on the value of goods and services produced in the region is well below one percent of the value of total output in each of the six counties bordering Hartwell Lake.

For the entire region, this extended period of low water levels in Hartwell Lake reduced output by only approximately one-tenth of one percent. This study demonstrates that Hartwell Lake is not a primary economic driver in the region and provides evidence that the six counties surrounding Hartwell Lake have sufficient economic breadth and depth to weather prolonged low lake levels without realizing substantial declines in their economic well-being.

4.8.2 Environmental Consequences to Socioeconomic Resources from Alternative 1 (NAA)

The NAA could have a minor negative impact on socioeconomics by increasing the cost of obtaining water from a source other than Hartwell Lake. This may discourage new residents, industries, and visitors from coming to the area. As a result, future development of the area and jobs that may be created as a result, may be curtailed.

4.8.3 Environmental Consequences to Socioeconomic Resources from Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

There is a generally accepted relationship of water supply, population growth, and economic development. With the implementation of this alternative, residents, industries, and visitors to the Hartwell Lake area will continue to be provided with an adequate supply of water. Hartwell Lake is the largest body of surface water within the area of potential water supply sources for the four water storage requestors. When compared to the NAA, the reallocation from the conservation storage would have a minor positive impact on the socioeconomics of the area by obtaining relatively low-cost water supply from Hartwell Lake. This would encourage new residents, industries, and visitors to come into the area. As a result, future development of the area and jobs may be created as a result. The addition of RFC would also have a minor beneficial effect on socioeconomics of the area because the proposed action would be more beneficial to all end users than the NAA since direct costs of this utility would be expected to substantially increase if more costly alternative water sources other than Hartwell Lake are required to meet future water demands.

4.9 Environmental Justice

The concept of environmental justice is based on the premise that no segment of the population should bear a disproportionate share of adverse human health or environmental effects due to any federal action. The Corps is required to use the

Environmental Quality Climate and Economic Justice Screening Tool (CEJST) to identify disadvantaged communities in the project area. These communities are classified as disadvantaged based on their percentile related to burden indicators, such as: Low Income, Low Life Expectancy, Transportation Barriers, etc.

4.9.1 Existing Conditions

The Corps used the CEJST to identify disadvantaged and underserved communities (Figure 8) and then considered how these communities may be impacted by the proposed action. The CEJST tool uses burden indicators to identify underserved communities such as: low income, unemployment rate, limited English speaking, less than high school education, individuals under age 5, and individuals over age 64. These indicators are reported in percentiles. Percentiles are used to show how the residents in the project area compare to the rest of the state and nation. The purpose of identifying these disadvantaged communities is to ensure that the federal action will not have a disproportionate impact on these communities when compared to other communities. Census tracts within the four counties that surround Lake Hartwell that are classified as disadvantaged are listed in Table 25, as well as the most common burden indicators for these tracts within each county.

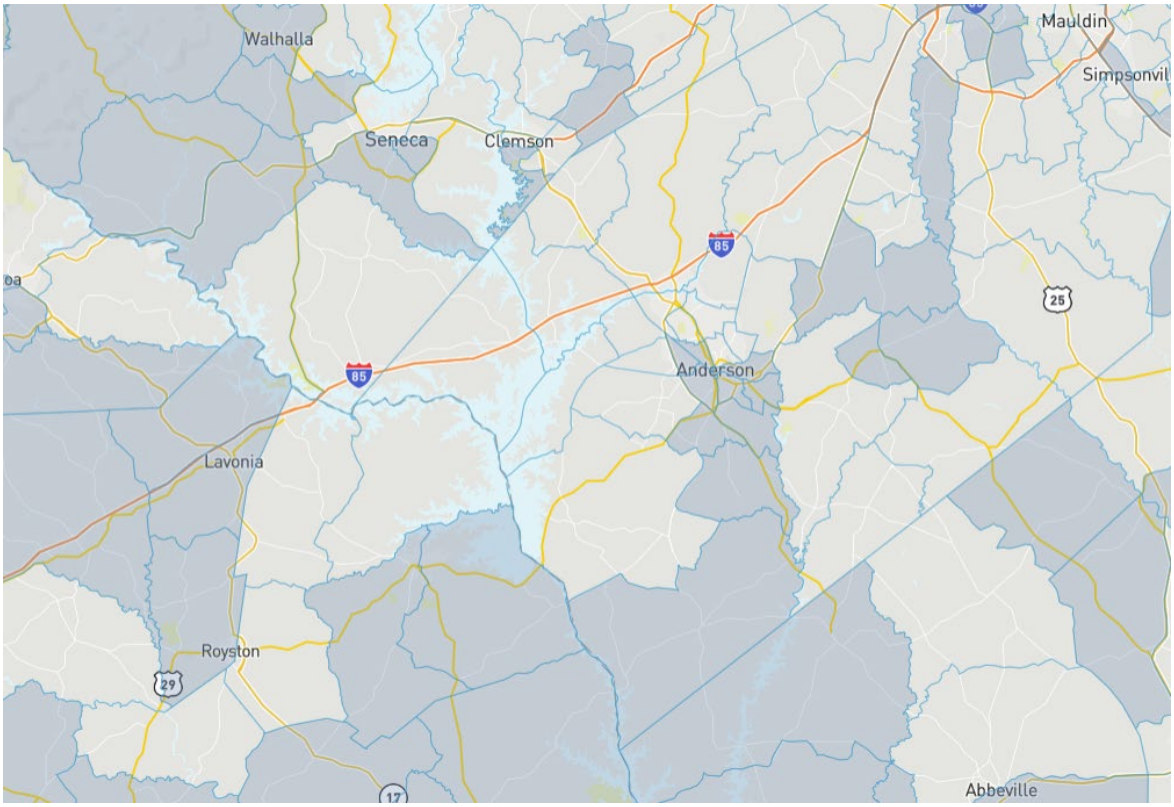

Figure 8: Disadvantaged communities in the Lake Hartwell area identified by the CJEST. The disadvantaged communities are designated by the grey shading.

Table 26: Census tracts identified as disadvantaged

County	Census Tracts	Most common Indicators above burden threshold within the county
Hart, GA	13147960400	Lack of Indoor Plumbing, Low Income, Heart Disease, and Diabetes
Hart, GA	13147960500	
Franklin, GA	13119890101	Transportation Barriers, Low Income, and Heart Disease
Franklin, GA	13119890102	
Franklin, GA	13119890200	
Franklin, GA	13119890400	
Stephens, GA	13257970301	Low Income and Heart Disease
Stephens, GA	13257970302	
Stephens, GA	13257970400	
Anderson, SC	47007011401	Transportation Barriers, Low Income, Low Life Expectancy, Asthma, Heart Disease, and Diabetes
Anderson, SC	47007011402	
Anderson, SC	47007011700	
Anderson, SC	45007011800	
Anderson, SC	45007011902	
Anderson, SC	45007000600	
Anderson, SC	45007000700	
Anderson, SC	45007000800	
Anderson, SC	45007000900	
Anderson, SC	45007012300	
Oconee, SC	45073030100	Transportation Barriers, Lack of Indoor Plumbing, and Low Income
Oconee, SC	45073030401	
Oconee, SC	45073030500	
Oconee, SC	45073030701	
Oconee, SC	45073030800	
Oconee, SC	45073031000	

Oconee, SC	45073031100	
Pickens, SC	45077010401	Lack of Indoor Plumbing, Low Income, and Low Life Expectancy
Pickens, SC	45077010402	
Pickens, SC	45077010501	
Pickens, SC	45077010502	
Pickens, SC	45077010700	
Pickens, SC	45077010801	
Pickens, SC	45077010803	
Pickens, SC	45077011102	
Pickens, SC	45077011103	
Pickens, SC	45077011202	

4.9.2 Environmental Consequences for Alternative 1 (NAA)

Under the NAA, the three requestors that provide water for M&I purposes (ARJWS, Pioneer RWD, and the City of Lavonia) would need to develop alternative water sources at a much higher cost. It is likely that the increased cost for water supply development, may increase overall water costs to end users. Increased water costs would result in a minor negative impact to disadvantaged communities.

4.9.3 Environmental Consequences for Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

Any potential changes in water use rates resulting from new water storage contracts would apply across all water system users and therefore, would not have a disproportionate impact on any end user. When compared to the NAA, this alternative would be more beneficial to all end users than the NAA since the proposed action is a less costly alternative than those that have been identified under the NAA for meeting future water demands.

4.10 Protection of Children

4.10.1 Existing Conditions

The concept of protecting children arises out of a growing body of scientific knowledge, which demonstrates that children may suffer disproportionately from environmental health and safety risks. To address these concerns, Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks* was issued. It requires each federal agency to identify and assess environmental health and safety risks that may disproportionately affect children; and ensures that policies, programs, activities, and standards address disproportionate risk to children that results from environmental health or safety risks.

4.10.2 Environmental Consequences of Alterative 1 (NAA)

No health and safety risks for children are expected to occur under the NAA. The Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood

management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged, the no action alternative would have no short-term or long-term adverse impacts related to the protection of children.

4.10.3 Environmental Consequences of Alternative 5 (Proposed Action, Reallocation from the Conservation Storage with RFC)

No additional health and safety risks for children are expected occur from implementation of Alternative 5 if water is reallocated from Hartwell Lake for additional water supply storage. The Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged, the no action alternative would have no short-term or long-term adverse impacts.

4.11 Climate

4.11.1 Existing Conditions

The climate in the upper basin is relatively temperate, consisting of mild winters and long summers. The mean temperature for the basin is 60 degrees Fahrenheit. January, usually the coldest month of the year, frequently has night temperatures of 20 degrees Fahrenheit or lower. July and August are the hottest months of the year with many days having temperatures over 90 degrees Fahrenheit. Evaporation accounts for approximately 480,000 acre-feet of annual water losses at the three projects.

There are generally two periods of maximum rainfall in the upper basin: February and March, and July and August. The minimum rainfall in the basin usually occurs in October and November. The mean annual precipitation decreases from 83.5 inches in Highlands, North Carolina, to 49.2 inches at Savannah, Georgia. The greatest annual precipitation, 131.8 inches, occurred at Jocassee, South Carolina, in 1948. This same station recorded a low of 62.4 inches in 1994.

Prevailing winds throughout the Savannah River Basin are from the southeast and southwest during most of the year, but are from the northwest during October, November, and December. Winds of high velocity are rare and are usually associated with hurricanes or tropical disturbances.

4.11.2 Climate Change Assessment

With regard to climate change, the Corps' screening level climate change vulnerability assessment (VA) tool was used to assess the potential impacts and likelihood of climate change impacts to this region as a result of all alternatives being evaluated, including the no action alterative. Based on results of the VA tool, the Ogeechee-Savannah watershed is considered relatively more vulnerable to the impacts of climate change on water supply relative to other watersheds in the South Atlantic Division but does not fall within the top 20% of vulnerability scores relative to the other similar watersheds in the continental United States. The VA tool indicated that none of the Corps Business Lines,

including water supply, exceeded the default 20 percent threshold in 2050 or in 2085. For more information on the climate change analysis see Appendix C.

4.11.3 Environmental Consequences of Alternative 1 (NAA)

The NAA will have potential minor, short-term adverse impacts to climate change. Due to the prediction that the requestors would have to build additional infrastructure to provide their water supply needs, there would be minor adverse impacts to climate change from greenhouse gas (GHG) emissions from construction activities. Without knowing the exact construction measures and extent of additional infrastructure, GHG emissions estimations are undeterminable. Potential use of other water supply sources may impact the water levels of those sources, especially during periods of drought which are predicted to increase over time due to climate change (Binita et al., 2015).

4.11.4 Environmental Consequences of Alternative 5 (Proposed Action, Reallocation from the Conservation Storage with RFC)

Alternative 5 will have no impact to climate change. Reallocation from the conservation storage will not have a precipitable affect to the water levels of the lakes and discharge in the Savannah River. Potential impacts from climate change in the future may affect water levels of the lakes from extreme weather events, such as increasingly intense flooding or drought. However, as indicated above the VA tool indicated that none of the Corps Business Lines, including water supply, exceeded the default 20 percent threshold in 2050 or in 2085. It is anticipated; therefore, that the proposed action will not have any significant impacts with regards to climate change. For more information on the climate change analysis see Appendix C.

4.12 Hazardous Toxic Radioactive Waste (HTRW)

4.12.1 Existing Conditions

The documented accounts of HTRW in the Savannah River Basin are limited. The presence of polychlorinated biphenyls (PCBs) in Twelve Mile Creek/Hartwell Lake was discovered when surface water, sediment, and fish from the area were sampled in the mid-1970s. The source of this contamination was determined to be the Sangamo-Weston, Inc. capacitor manufacturing plant in Pickens, South Carolina. Sangamo-Weston, Inc. operated the plant from 1955 to 1987. The liabilities associated with that operation were subsequently assumed by Schlumberger Technology Corporation (STC). Dielectric fluids, used in the manufacture of capacitors until 1977, contained PCBs, and materials containing these fluids were disposed via land burial. In addition, PCBs were present in discharges from the plant to Town Creek (a tributary of Twelve Mile Creek). Surface water and sediment contaminated by the discharged PCBs eventually migrated downstream to Twelve Mile Creek and Hartwell Lake.

In 1994, the United States EPA issued a Record of Decision (ROD) for the Twelve Mile Creek/Hartwell Lake area that included natural recovery of PCB contaminated sediments. This alternative was supported by studies showing that PCB contaminated sediments are expected to be continually buried by sediment entering Twelve Mile

Creek and Hartwell Lake. In addition, the ROD called for ongoing monitoring of biota, adoption of risk-based guidelines for human consumption of Hartwell Lake fish, and a public education program designed to increase public awareness of the fish consumption advisory. The EPA mandated natural recovery and monitoring are ongoing.

4.12.2 Environmental Consequences of Alternative 1 (NAA)

No changes to any sites related to hazardous, toxic, or radioactive wastes (HTRW) are expected under this alternative. However, construction of any additional infrastructure to convey water to the drinking water treatment facilities may require the identification and removal of hazardous, toxic, or radioactive wastes prior to construction; however, without knowing the exact location of this infrastructure, impacts cannot be determined.

4.12.3 Environmental Consequences of Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

No adverse effects from any hazardous, toxic, or radioactive waste or known sites are expected under this alternative. The Corps would not change any of the regulating rules associated with operation of the three-project system and the operating rules associated with the Drought, Flood Management, and standard operations including hydropower generation and minimum flow requirements from the projects remain unchanged. Additionally, as indicated in Section 4.2: Hydrology, the proposed action is not expected to have a precipitable impact to pool levels. Therefore, no impacts to the natural recovery of PCB contaminated sediments are expected from the proposed action.

4.13 Cultural Resources

In accordance with 36 CFR §800, the Corps has found the proposed modifications pose no adverse effect to historic properties under the conditions of limiting the installation of water supply requestors to existing intakes and other disturbed areas. The Corps coordinated this determination under Section 106 of the National Historic Preservation Act (NHPA) with the South Carolina and Georgia State Historic Preservation Offices in May 2023 and received concurrence on the no adverse effect determination (SHPO Project No. 23-RL0131; HP-230505-003).

All water supply requestors, except for Currahee Club, have an existing intake already in service at Hartwell Lake. The Currahee Club intends to install a 10-inch PVC or HDPE pipe that will be installed along the centerline of a cove adjacent to the club's golf course. The intake pipe will terminate in a culvert which connects the sub-impoundment to the main lake.

4.14 Cumulative Impacts

Cumulative impacts are defined in 40 CFR 1508.1(g)(3), as those effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative

effects can result from individually minor but collectively significant actions taking place over a period of time.

For this project, as the environmental effects from this project are those that may result from either construction of infrastructure to support the water withdrawal (Currahee Club) and those actions that may affect reservoir operations. The actions listed in this section were accounted for in the hydrology modeling efforts, as described in Section 4.2 and Appendix A.

4.14.1 Past Actions

The 1998 water supply reallocation for Hart County, Georgia, was the most recent reallocation for Hartwell Lake. The three existing water supply storage agreements for Hartwell Lake account for 26,574 acre-feet of the conservation storage (Section 2.6).

Drought conditions are managed by the 2012 Drought Management Plan. When operating during drought, drought operational rules are progressively applied as reservoir elevations decline. Minimum flow requirements in the Savannah River below JST Dam dictate discharges from the reservoir system based on reservoir elevation drought trigger levels, these minimum flow requirements account for aquatic habitat requirements specifically for ESA-listed species such as the Atlantic sturgeon and shortnose sturgeon.

Other past actions include the 2014 Duke Energy Agreement, which is a storage balance agreement with Duke Energy that also serves to balance usable storage in the Corps projects with the Duke Energy projects located upstream of Hartwell Lake.

4.14.2 Present Actions

Normal maintenance and operations activities would continue to occur at Hartwell but would not increase the intensity or duration of impacts discussed. A number of maintenance projects were funded through the Bipartisan Infrastructure Law, none of these projects are anticipated to affect reservoir operations and are primarily replacement in kind projects.

4.14.3 Reasonably Foreseeable Future Actions

The engineer hydrology modeling efforts incorporate existing reservoir operational rules, the results provide a cumulative assessment of the potential impacts of additional water supply use by incorporating existing and proposed future water supply storage use into the model. Therefore, reasonably foreseeable future actions are accounted for in the engineering model.

4.14.4 Cumulative Environmental Impacts: No Action Alternative

No Action Alternative: There could be cumulative impacts associated with the NAA (construction of a new infrastructure); however, without knowing the location and expanse of the new infrastructure, it is impossible to determine the degree of the cumulative impacts, or which future actions may cumulatively have impacts under the NAA. Cumulative impacts related to reservoir operations are reflected in the engineering models, as there are no or negligible impact to hydrology under the NAA, those resources that would be impacted by changes in hydrology, including water quality, recreation, aquatic resources, threatened and endangered aquatic species, HTRW, and climate change, any cumulative impacts to these resources would be negligible to minor.

4.14.1 Cumulative Environmental Impacts: Alternative 5 – Reallocation from the Conservation Storage with RFC (Proposed Action)

cumulative impacts, or which future actions may cumulatively have impacts under the NAA. Cumulative impacts related to reservoir operations are reflected in the engineering models, as there are no or negligible impact to hydrology under the proposed action, those resources that would be impacted by changes in hydrology, including water quality, recreation, aquatic resources, threatened and endangered aquatic species, HTRW, and climate change, any cumulative impacts to these resources would be negligible to minor.

4.15 Compliance with Environmental Laws, Statutes, and Executive Orders

This section provides a summary of proposed action's compliance with applicable Federal environmental laws, statutes, and executive orders. The draft FONSI would not be finalized and signed until the proposed action achieves environmental compliance with applicable laws and regulations.

4.15.1 Statutes

Abandoned Shipwreck Act of 1987 (43 U.S.C. §§2101-2106)
There are currently no known shipwrecks in the project area. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Anadromous Fish Conservation Act of 1965, as amended (16 U.S.C. § 757a *et. seq.)*
Any future planning for the use or development of water or land resources affecting anadromous fish will be coordinated with local, State and Federal resource agencies in accordance with NEPA regulations and submitted to Congress. The proposed action will not affect anadromous fish.

Archaeological and Historic Preservation Act, as amended (54 U.S.C §§ 312501-312508) and Archeological Resources Protection Act (16 U.S.C § 470 aa-mm)

Project was coordinated with the Georgia and South Carolina State Historic Preservation Offices. No adverse effects to cultural resources are anticipated. Undertaking is limited to previously disturbed areas.

Bald Eagle Act of 1972 (16 U.S.C. §§ 668-668d)
No impacts are expected to bald and golden eagles from the proposed action.

Clean Air Act of 1972, as amended (42 U.S.C. § 7401 *et. seq.)*
The "general conformity" requirements of Section 176(c)(4) of the Clean Air Act, are met as no impacts are anticipated.

Clean Water Act of 1971, as amended (33 U.S.C. § 1251 *et. seq.*)

Clean Water Act Section 404(b)1 Compliance
No discharge of dredged or fill material in waters of the U.S. are anticipated in the recommended plan. Therefore, a Section 404(b)(1) evaluation is not required. Currahee Club will be responsible for obtaining any required permits for the intake pipe.

Under the NAA, to meet future water demands, the requestors would take predictable actions as a consequence of the NAA. The requestors would acquire it from some other non-Federal source. These non-Federal sources of water would be obtained at a higher financial and economic cost and with greater environmental impacts due to construction of new transmission lines versus obtaining water from current connections to raw water in Hartwell Lake, new pump stations and paying higher rates at non-Federal water sources versus Hartwell Lake. As the NAA would require extensive new infrastructure to be built and impacts are unknown, whereas as under the proposed action existing infrastructure would be used resulting in fewer environmental impacts. Therefore, the Corps finds that the proposed action is the least environmentally damaging practical alternative (LEDPA).

Clean Water Act Section 401 Compliance
Section 401 Water Quality Certifications from the states of Georgia and South Carolina are not needed for the recommended plan as no discharge of effluent or materials into waters of the U.S. is anticipated for the recommended plan. Currahee Club will be responsible for obtaining any required permits for the intake pipe.

Clean Water Act Section 402 Compliance
All return flows included in the recommended plan are from facilities with existing permits in compliance with the National Pollutant Discharge Elimination System (NPDES). Any modifications, if necessary, to these permits will be the responsibility of the requestors.

Coastal Zone Management Act of 1972, as amended (16 U.S.C. § 1451 *et seq.*)
Pursuant to Section 307 of the Coastal Zone Management Act of 1972, as the project is outside of the Coastal Zone and has no indirect impacts to the Coastal Zone, it was determined that this Act is not applicable.

Endangered Species Act of 1973 (16 U.S.C. § 1531 *et. seq)*
No effects to ESA-listed species, under jurisdiction from both USFWS and NMFS, are expected as a result of the proposed action and section 7 consultation is not required.

The Currahee Club will have to install a 10-inch PVC or HDPE pipe that will be placed along the centerline of a cove adjacent to the club's golf course. The intake pipe will terminate in a culvert which connects the sub-impoundment to the main lake. The Currahee Club will have to consult with USFWS for any impacts to ESA-listed species for the installation of the pipe. However, given the location of the intake pipe effects are unlikely.

For these reasons, the Corps finds that the proposed action in in compliance with the ESA.

Estuary Protection Act of 1968 (16 U.S.C. §1221 et. seq.)
No estuaries will be impacted as a result of the proposed action.

Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. §§661-665; 665a; 666; 666a-666c)

The Corps has coordinated with USFWS that review of the draft EA and comments provided will meet the requirements of the Fish and Wildlife Coordination Act.

Flood Control Act of 1944, as amended, Section 4 (16 U.S.C. §460d)
State and Agency review, as required under this Act for proposed water resources projects, will occur prior to approval of the Chief's Report.

Marine Mammal Protection Act of 1972, as amended (16 U.S.C. §1361 *et. seq.)*
There are no marine mammals within the project area. Therefore, there will be no impacts to the marine mammals under the Marine Mammal Protection Act.

Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 *et. seq.)*
No impacts to essential fish habitat are expected to occur with the proposed action.

Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. §1401 *et. seq.)*

Not applicable. The project is not located near ocean waters and do not involve the transportation or placement of dredged material into ocean waters.

Migratory Bird Conservation Act of 1928, as amended (16 U.S.C. § 715)
No impacts to migratory birds are expected to occur with the proposed action.

Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712)
This Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. The Corps does not expect that migratory birds would be adversely (directly or indirectly) affected by the proposed action.

National Environmental Policy Act of 1969, as amended (42 U.S.C. § 4321 *et. seq.)*
Environmental information on the proposed action has been compiled and the draft IWSSRR/EA has been prepared and is being coordinated for public, state, and Federal agency review. The Proposed Action is in compliance with NEPA through the analysis of environmental impacts proposed by the Corps.

National Historic Preservation Act of 1966, as amended (54 U.S.C. § 300101 *et. seq)*
The Corps coordinated a determination of no adverse effect under Section 106 of the National Historic Preservation Act (NHPA) with the South Carolina and Georgia State Historic Preservation Offices (SHPO) in a letter dated May 1, 2023. SC SHPO responded in a letter dated May 15, 2023 (SHPO Project No. 23-RL0131). Concurrence was provided on the no adverse effect determination. GA SHPO provided a response in a letter dated May 30, 2023 (HP-230505-003). No concerns were expressed. Section 106 consultation will be required for any inadvertent discoveries or project scope changes. See Appendix H for more information.

Native American Graves and Repatriation Act (25 U.S.C. § 3001 *et. seq)*
Sixteen Tribes, including Alabama Quassarte Tribal Town, Absentee Shawnee Tribe of Indians of Oklahoma, Catawba Indian Nation, Cherokee Nation, Chickasaw Nation, Coushatta Tribe of Louisiana, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Muscogee (Creek) Nation, Poarch Band of Creek Indians, Seminole Nation of Oklahoma, Seminole Tribe of Florida, Shawnee Tribe, Thlopthlocco Tribal Town, and United Keetoowah Band of Cherokee Indians in Oklahoma, were consulted through a letter dated May 1, 2023. One tribal response was received. The Catawba Indian Nation responded in a letter dated June 14, 2023 (THPO #2023-46-7). There were no concerns regarding the undertaking, but the Catawba Indian Nation requested to be informed of any inadvertent discoveries. Federal or Tribal lands are not involved and there are no known cultural resources sites with NAGPRA association located in this area. Any inadvertent discoveries of human remains and/or associated funerary objects will be coordinated with tribes. See Appendix H for more information.

Sunken Military Craft Act of 2004 (10 U.S.C. §§113 et.seq.)
There are currently no known sunken military craft in the project area.

4.15.2 Executive Orders

Executive Order 11593, Protection and Enhancement of the Cultural Environment, 13 May 1971.

There are no known cultural resources that may be impacted by the proposed action. Any inadvertent discoveries would be handled according to all applicable cultural resources laws and regulations as they are discovered.

Executive Order 11988, Floodplain Management, 24 May 1977 amended by Executive Order 12148, 20 July 1979.

The Corps is in compliance with the EO 11988 and has determined that the 8-Step Decision Making Process is unnecessary as the purpose of the 8-step process is to evaluate alternatives to avoid adverse effects; this project will have no adverse effects on the floodplain. The project does not affect land use, does not encourage growth in a floodplain, and does not involve construction within a floodplain. Therefore, since this project would have no effects on floodplains, this action is in compliance with the EO, completion of the 8-step process is not necessary.

Executive Order 11990, Protection of Wetlands, 24 May 1977.

The Corps anticipates no impacts to wetlands from the proposed action.

Executive Order 12898, Environmental Justice, 11 February 1994.

In accordance with this EO, the Corps has determined that no group of people would bear a disproportionate share of adverse environmental consequences resulting from the proposed action. It is expected that there would be a minor beneficial effect to EJ communities under the proposed action compared with the NAA.

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, 21 April 1997.

The project would not create a disproportionate environmental health or safety risk for children.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, 6 November 2000.

Tribal lands are not involved. There are no known Indian Sacred Sites that may be impacted by the proposed action. Any inadvertent discoveries will be coordinated with tribes. Tribes will be kept apprised of project updates.

Executive Order 13751 Safeguarding the Nation from the Impacts of Invasive Species, 6 December 2016.

The project will not introduce, establish, or spread invasive species to the project area and is therefore compliant with the EO.

Executive Order 13186, Protection of Migratory Birds, 10 January 2001.

The proposed action is not expected to impact migratory birds.

5.0 FINAL ARRAY OF ALTERNATIVES

Once the PDT analyzed the results and screened each of the alternatives based on completeness, acceptability, effectiveness, and efficiency, then they carried the following two alternatives forward for detailed consideration and analysis into the final array. They include:

- Alternative 1: NAA – Existing Plan of Regulation
- Alternative 5: Hartwell Lake Conservation Storage with RFC

While not explicitly part of the selection and screening process, a Least Cost Alternative must be identified for evaluation purposes. The NAA does not meet the needs of water supply users, but it is the most likely scenario absent federal action. Future action would be required inevitably for the cities in the study area, and the totality of those actions are represented by the Least Cost Alternative. The purpose of the nonfederal alternative is to compute the next least costly/most likely alterative absent a reallocation from a USACE reservoir and to estimate the federal water supply benefit.

5.1 NAA (Alternative 1)

The NAA includes existing authorized water supply storage agreements and projected shortfalls through 2072, but it would not result in new water supply storage agreements. It would not meet the study objective of providing water supply storage for requests that are currently being evaluated. In short, the NAA assumes that no means are possible to alleviate the water supply shortfalls forecasted in this analysis, and the project requestors shortfall is approximately 24.55 MGD under 2072 basin conditions and demands, even with implementation of additional water conservation methods.

5.2 Conservation Storage Water Supply w/ RFC (Alternative 5)

Alternative 5 would reallocate conservation storage for water supply from Hartwell Lake the same as Alternative 2 but includes RFC for the requestors. The conservation storage alternative would result in new water supply storage agreements. The Corps would reallocate water storage from the existing conservation storage to water supply to meet the present and future needs of current requestors. All currently authorized water storage agreements would continue to receive their storage volumes at the same storage/yield ratio.

Alternative 5 included RFC for Anderson, Pioneer, and Lavonia, which enabled them to hold smaller water accounts and still meet their 2035 demand during the critical period. However, granting RFC to those account holders reduced the portion of total inflow received by Currahee. Currahee would require an additional 412 ac-ft to continue meeting the same level of demand during the critical period.

5.3 National Economic Development (NED) Evaluation and Derivation of User Cost

USACE's Engineer Regulation (ER) 1105-2-100 specifies the four pricing methods used to calculate the value of storage considered for reallocation (i.e., the price to be charged for the capital investment for the reallocated storage). The four methods include: benefits foregone, revenues foregone, replacement cost, and updated cost of storage. The value placed on the storage is the highest of the four methods.

- Benefits Foregone are generally estimated using the standard National Economic Development (NED) evaluation criteria in compliance with ER-1105-2-100. The benefits foregone are evaluated over a 50-year period of analysis.

- Revenues Foregone are defined as the reduction in revenues accruing to the Treasury as a result of reallocating storage from hydropower to water supply. The revenues are based on the existing repayment agreement between the power marketing agency and the USACE. Revenues foregone from other project purposes are the reduction in revenues accruing to the U.S. Treasury based on existing repayment agreements.

- Replacement Cost are equal to benefits foregone, barring any unforeseen consequences. In the event that reallocated storage is being taken from the flood control pool, the USACE will estimate the replacement cost of equivalent protection if necessary.

- Updated Cost of Storage reallocated storage is estimated by updating the cost of the joint use features from the midpoint of construction to the fiscal year in which the reallocation of storage is approved. The updated cost of the joint use features is then multiplied by the proportion of useable storage that is to be reallocated to estimate the value of the reallocated storage.

Hydropower benefits foregone, hydropower revenue foregone, and the replacement costs of power are impacts to hydropower. Hydropower benefits are based on the cost of the most likely alternative source of power. The replacement cost of power is equal to hydropower benefits foregone. Therefore, it is not calculated separately. Hydropower revenues foregone are based on Southeastern Power Administration (SEPA) contract rates applicable to power generation. The updated cost of storage is not power related. It accounts for the joint-use construction cost of the project storage.

5.4 Hydropower Benefits Foregone

Hydropower benefits are based on the cost of the most likely alternative source of power.

5.4.1 NAA (Alternative 1)

The NAA represents the most likely anticipated future condition without reallocation of storage for water supply from Hartwell Lake. The populations in the upper river basin

have been slowly rising and they are expected to continue to rise, increasing the demand for water supply over time. The NAA would not reallocate any additional storage of Hartwell Lake for water supply. Therefore, existing users with previous water supply storage reallocation agreements would continue withdrawing only up to their contracted amounts. If additional or new water supply is needed, the requestor would need to obtain water from another source. There would be no change in the Plan of Regulation or impacts to hydropower benefits foregone for the project purposes.

5.4.2 Alternative 5 (Conservation Storage Water Supply w/ RFC Alternative)

Table 26 summarizes the hydropower benefits foregone for the impacts across the entire Savannah River system due to reallocating storage from the conservation storage. Losses in hydropower benefits foregone of $5,354 represents less than 0.01 percent of the total hydropower benefits. Note there is only a difference of accounting for storage between Alternative 2 and 5.

Table 27. Conservation Storage w/RFC Average Annual Combined Power Benefits Foregone.

Discount Rate at 2.5% - FY23 Price Level – 50 POA			
Alternative	**Energy**	**Capacity**	**Total**
	Benefits	**Benefits**	**Hydropower Benefits**
NAA	$46,698,012	$95,917,262	**$142,615,274**
Reallocation w/RFC	$46,611,392	95,998,528	**$142,609,920**
Hydropower Benefits Foregone	($86,620)	$81,266	($5,354)
Hydropower Benefits Impact	-0.19%	0.08%	0.00%

5.5 Hydropower Revenues Foregone

The hydropower revenues foregone method is the reduction in revenues accruing to the U.S. Treasury from reducing hydropower outputs, based on existing SEPA power sales contract rates. Annual hydropower revenues foregone are calculated by multiplying the SEPA power sales contract rate by the energy loss plus the capacity rate multiplied by the capacity gain.

The hydropower capacity revenue gained plus the hydropower energy revenues lost equal the total annual revenues foregone. The difference between the NAA and Alternative 5 is miniscule (See Appendix E). Total annual capacity gains for conservation storage equals $45,453 while conservation with storage equals $45,453. Annual energy revenue losses are $49,728 for both conservation alternatives. The totality of the annual energy revenues foregone equals losses of $4,275 for both

conservation alternatives. That means that Conservation and Conservation with RFC components included are identical. The only difference between the alternative is a difference in calculated cost of storage, not revenues. The cost of storage calculations is shown further in the document.

5.6 Credit to Power Marketing Agency

Project costs originally allocated to hydropower are repaid through power revenues based on rates designed by the Federal Power Marketing Agency (PMA) to recover allocated costs plus interest within 50 years of the date of commercial power operation. If a portion of a project's storage is reallocated from hydropower to water supply, the PMA's repayment obligation may be reduced in proportion to the lost energy and capacity through a system of financial credits.

For purposes of providing an estimate, the annual credit will be based on the revenue foregone with the rates adjusted periodically to cover the cost of O&M for providing hydropower from the Federal projects and to repay the Treasury for the hydropower portion of the Federal investment in the project. In either case the credit in each year will be based on revenue lost or costs actually incurred (and documented) by the PMA.

A letter will be sent to the PMA following execution of the water storage agreement at Hartwell Lake documenting the date of agreement execution and the average annual energy and capacity losses due to the reallocation action. The PMA may use this information to apply the hydropower revenues foregone credit annually, based on the in-effect PMA rates for energy and capacity. The credit will become effective per each water supply storage agreement enacted date.

5.7 Updated Cost of Storage

The cost allocated to the user under this procedure updates the joint-use construction cost of the reservoir to present day price levels. The updated cost of storage is the cost of reallocating existing conservation and inactive storage to water supply storage determined by computing the joint-use costs at the time of construction by subtracting the specific costs from the total cost at the time of construction. Joint-use costs of the multi-purpose project include Lands/Acquisitions; Relocations; Reservoir; Dams, Spillway, and Appurtenances; Roads, Rail Roads, and Bridges; Buildings, Grounds, and Utilities; and Permanent Operating Equipment. The joint-use cost is updated to present day price levels (FY23) by using the Engineering News Record (ENR) Construction Cost Index ("as-built" to 1967 prices) and Corps of Engineers Civil Works Construction Index System (CWCCIS) (1967-current prices). That index is maintained in Engineer Manual (EM) 1110-2-1304. Those costs are indexed from the midpoint of the physical construction period (July 1966) to the beginning of the fiscal year in which the contract for the reallocation storage is approved. Land values were updated using a weighted average index factor of the other cost accounts. The Hartwell Dam and Lake project's total updated joint-use cost indexed to FY23 price levels is $812,072,209.

The FY23 joint-use cost is then multiplied by the requested storage reallocation to water supply divided by the total usable storage (flood and conservation storage in Hartwell

Lake not including inactive storage). It is then amortized over 50 years with the FY23 2.5 percent discount rate to derive the average annual value.

The computation for Updated Cost of Storage follows:

$$\frac{(Joint\ costs) \times Storage\ reallocated}{Total\ usable\ storage\ space\ in\ AF}$$

The average annual value of the updated cost of storage of reallocating 19,973 acre-feet of existing conservation storage to water supply storage is estimated at $334,700. The average annual value of the updated cost of storage is calculated by amortizing the total updated cost of storage value, $9,492,870, at a 2.5 percent discount rate over a 50-year period of analysis.

5.7.1 Updated Cost of Storage Reallocated from the Conservation Storage (Alternative 5)

The update cost of storage value for reallocating existing inactive storage to water supply is calculated by multiplying the joint cost of $812,072,209 by the inactive storage reallocated to water supply (10,410) divided by the total usable storage in Hartwell Lake not including inactive storage (1,708,600 acre-feet of flood and conservation storage). The updated cost of storage value for reallocating existing inactive storage to water supply is $4,949,429.

$$\frac{\$812{,}072{,}209\ \times 10{,}410\ AF}{1{,}708{,}600\ AF} = \$4{,}947{,}528$$

The average annual value of the updated cost of storage of reallocating 10,410 acre-feet of existing conservation storage to water supply storage is estimated at $174,440. The average annual value of the updated cost of storage is calculated by amortizing the total updated cost of storage value, $4,947,528, at a 2.5 percent discount rate over a 50-year period of analysis. Alternative 5, conservation with RFC, needs less AF than Alternative 2 due to the return flows.

5.8 Annual Operations, Maintenance, Repair, Replacement, and Rehabilitation Costs Alternative Comparison

Annual Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) costs are developed by ARJWS, Pioneer, Lavonia, and Currahee for the reallocation study and discounted to the relevant year's rate. The cost of reallocated storage changes each government FY. This is due to the fact that the Federal discount rate changes on an annual basis as well as varying annual OMRR&R costs. Section 932 of the 1986 WRDA requires recalculation of the interest rate at 5-year intervals if the storage is paid annually over a 30-year period.

5.8.1 Alternative Comparison

OMR&RR is 5,275,390 total over 50 years for the NAA. Currahee would have no operations changes thus would have a cost of 0. ARJWS lumped the cost of operations into their capital cost thus those will be represented in the following section. The Corps would expect the OMR&RR to be higher for the NAA if those costs are fleshed out. OMR&RR is 17,385,171 total over 50 years under both the Conservation alternatives. Significant costs for supplies, maintenance, operations, power usage, labor, insurance, and other reallocation costs explain the difference between the NAA and conservation alternatives.

5.9 Recreation Evaluation

The overall effects of reallocating 10,410acre-feet of conservation storage from Hartwell Lake to water supply storage would decrease average water surface elevation in Hartwell Lake by 0.02 feet or 0.24 inches over the period of record. As a result, compared to the NAA, the effects on campsites, boat ramps, picnic areas, roads, and swimming beaches along the shoreline are not measurably different for the action alternative from the NAA.

5.10 System of Accounts: Analysis and Screening of Final Array of Alternatives

National Economic Development (NED) costs include both financial costs to implement, maintain, and operate each alternative, and foregone economic benefits of implementing each alternative. NED financial costs include project capital costs including real estate and OMRR&R costs. Foregone benefits, in this case, consist of hydropower. NED costs used in comparing the final array of alternatives are based on FY23 price levels and FY23 interest rate (2.5 percent).

The following sections and tables summarize criteria from the four main system of accounts, including National Economic Development (NED) Benefits, Regional Economic Development (RED) Benefits, Environmental Quality (EQ), and Other Social Effects (OSE). In accordance with ER 1105-2-100, Planning Guidance Notebook, the four general Principles, Requirements, and Guidelines (PR&G) criteria of completeness, efficiency, effectiveness, and acceptability, as seen below, assess the final array of alternatives with the system of accounts. Additionally, the tables will conclude that Alternative 5 scores higher based on having positive benefits to the NED and lacks the negative effects to EQ as shown in the NAA.

In addition to the accounts evaluation criteria, the project is also evaluated and selected using the Comprehensive Benefits Plan analysis, which is outlined in the ASA (CE) Memo on Comprehensive Documentation of Benefits in Decision, published on January 5, 2021. This analysis is included in the report due to efforts by the Corps to evaluate all water resources development project planning across the four accounts equally, and to ensure that one of the accounts is not being overprioritized. The evaluation includes a full display of the project benefits, both positive and negative, across all benefit types for each plan, as well as a comparison of costs and benefits among the different plans.

5.10.1 NED System of Accounts

Alternative 1, the NAA, alternative would maintain existing contracts, but there would only be a partial fulfillment of water demand under this alternative (Table 27). Alternative 5, the conservation storage with RFC, would reallocate 10,410 AC-FT from Hartwell Lake and maintain existing contracts. The least cost alternative would maintain existing contracts but would need to source water from elsewhere in order to meet future water demand. The full requested need for water demand is not met under the NAA alternative, but it would be met under all other evaluated alternatives. There is no significant change to the floodplain, and this meshes with the fact there is minimal expected change to recreation. Employment due to the need for increased water operations is likely to increase regardless of which plan is chosen, thus we expect to see slightly increased employment when this change occurs in the future. If the NAA were to be carried forward, there is a risk to the tax base because the tax base could potentially shrink if a city is without water. Other social effects were not a cause for concern in this study and are likely to be minimal to none. The NAA plan was deemed to be Not Complete because it did not meet the study purpose, Partially Effective because it partially meets future water demand, less efficient because it is more costly than other alternatives, not acceptable because it does not meet future requests. Alternative 5, the conservation storage with RFC, is deemed to be complete, effective, efficient, and acceptable, and it is the plan we carried forward. The least cost alternative would be complete, effective, acceptable, and the least efficient because it is the costliest. Additional coordination for the least cost alternative and NAA would largely need to come from the state, city, and county levels. For the conservation alternatives, the coordination responsibility would be shared by USACE and the state levels of government. These individual categories are further teased out in the following sections.

Table 28: NED Screening of the Final Array of Alternatives

Final Array	1	5	Least Cost
A1. Water Supply from Hartwell Lake	Continue existing water supply storage agreements.	Continue existing water supply storage agreements.	Continue existing water supply storage agreements.
		Reallocate 10,410ac-ft conservation storage w/ RFC	Next least cost water supply alternative implemented
A2. Reallocation from other Sources	Other Sources	Hartwell Only	Other Sources
B. IMPACT ASSESSMENT			
B1. National Economic Development			
Water Supply	Shortage likely without non-federal alternative	Full Request Met	Full Request Met
Flood Risk Management	No Change	No Change	No Change

Recreation Effect	N/a	Minimal Change	No Effect
B2. Environmental Quality – Refer to Section			
B3. Regional Economic Development			
Impacts to employment	Increased	Increased	Increased
Impacts to tax base	Some effect	No effect	No effect
Other Social Effects	None	None	None
C. PLAN EVALUATION			
C. P&G Criteria			
Complete	Not Complete	Complete	Complete
Effective	Partially Effective	Effective	Effective
Efficient	Less Efficient	Efficient	Least Efficient
Acceptable	Not Acceptable	Acceptable	Acceptable
D. COORDINATION	Additional State	USACE / State	Additional State

5.10.2 Regional Economic Development (RED) System of Accounts

The RED account describes and assesses changes in regional economic activity that would occur for the alternatives, including changes in jobs, income, economic output, and population (ER 1105-2-100, page 1-3). RED is used to evaluate changes in the distribution of regional economic activity that result from each alternative plan.

Both Alternative 5 would result in the least costs water supply source and lowest rates for water requestors. The additional water supply storage would alleviate water shortages during drought conditions and provide a reliable water supply for requestors, supporting current and continued population and economic growth in the region. No construction would be required for Alternative 5.

All final alternatives would continue to provide stable lake elevations and maintain all authorized purposes during drought conditions. Hence, visitor spending in lake communities and tourism-related jobs, income, and regional economic conditions would not change from the NAA to Alternative 5 (Table 28). Regional employment for operations would increase, however.

Table 29: RED System of Accounts Qualitative Assessment and Screening of the Final Array of Alternatives

Criteria	Future Without Project Condition (Alternative 1)	Reallocation from Conservation Storage w/ RFC (Alternative 5)
Regional Costs	Since communities and cities will still be susceptible to drought, there could be negative impacts	Lowest cost alternative to water users.

	on Municipal and Industrial (M&I) users. M&I users may need to search for new dependable, drought resistant sources.	
Regional Benefits	Communities will experience water shortages during drought. Continued recreational access consistent with current conditions would support economic benefits to regional economics in adjacent lake communities.	Regional benefits include adequate and reliable water supply storage to support population and economic growth. Lake levels would remain relatively the same as the NAA. There would be a 0.96-inch decrease in drought conditions. No potential for adverse effects to recreational access, visitation, and jobs and income in tourism businesses compared to the NAA.

5.10.3 Environmental Quality (EQ) System of Accounts

The EQ planning account describes the non-monetary effects on significant ecological, aesthetic, and cultural resources (Table 29). No significant impacts to cultural resources result from implementing Alternative 5. Impacts to cultural resources, water resources, terrestrial resources, threatened and endangered species, and aesthetics are described in Section 5, Environmental Consequences. The cultural and environmental resources are not anticipated to be significantly affected with Alternative 5.

Table 30: Environmental Quality System of Accounts Qualitative Assessment and Screening of the Final Array of Alternatives

Resource	Future Without Project Condition (Alternative 1)	Reallocation from Conservation Storage w/ RFC (Alternative 5)
Hydrology	No adverse impact	No Adverse impact
Recreation	No adverse impact	No adverse impact
Water Supply	Minor adverse impact	Minor positive impact
Hydropower	No adverse impact	Minor adverse impact
Flood Risk Management	No adverse impact	No adverse impact
Water Quality in the Lakes	No adverse impact	No adverse impact
Water Quality in the Savannah River below JST Dam	No adverse impact	No adverse impact
Aquatic Resources in the Lakes	No adverse impact	No adverse impact
Aquatic Resources in the Lower Savannah River	No adverse impact	No adverse impact
Essential Fish Habitat	No adverse impact	No adverse impact
Threatened and Endangered Species	No adverse impact	No adverse impact
Socioeconomics	Minor adverse impact	Minor positive impact
Environmental Justice	Minor adverse impact	Minor positive impact

Resource	Future Without Project Condition (Alternative 1)	Reallocation from Conservation Storage w/ RFC (Alternative 5)
Protection of Children	No adverse impact	No disproportionately high and adverse impacts.
HTRW	No adverse impact	No adverse impact
Cultural Resources	No adverse impact	No adverse impact

5.10.4 Other Social Effects (OSE) System of Accounts

The OSE account describes plan effects on social aspects such as community impacts, health and safety factors, displacement, energy conservation, and others (USACE ER 1005-2-100; IWR Report 2013-R-03, *Applying Other Social Effects in Alternatives Analysis)*. This OSE evaluation includes a description of the provision of reliable water source, risks of life loss, community well-being and social connectedness, and social benefits associated with recreational aspects associated with the alternatives. Both reallocation alternatives benefit the Hartwell Lake region by providing a reliable water source for communities, supporting community well-being, economic vitality, and public services to support health and safety in the broader community (Table 30).
An evaluation on the risks of life loss from flooding was not conducted for this evaluation because Alternative 5 would not result in changes to flood storage and is not changing the duration of flows above moderate flood stage or where channel capacity is exceeded. There are not any expected additional or induced flood damages due to Alternative 5, and the risk to loss of life associated with Alternative 5 compared to the NAA would be the same. Hence, implementation of Alternative 5 does not change the loss of life compared to the No Action Alternative. Therefore, there are no adverse social effects associated with risks to life and safety for Alternative 5.

In addition, the ability to support recreational access through stable lake levels, continued visitation, and regional economic benefits supported by visitor spending would provide social benefits for Alternative 5, such as individual and community economic vitality and growth. Recreational amenities in communities can promote individual and community health and well-being through the provision of outdoor activities and access to trails and areas to exercise. However, this would not be any different than the NAA.

Table 31: OSE System of Accounts Qualitative Assessment and Screening of the Final Array of Alternatives

Criteria	No Action Alternative/Future Without Project Condition (Alternative 1)	Reallocation from Conservation Storage w/ RFC (Alternative 5)
Recreation	Current level of recreational supports individual and community health and well-being and economic vitality in lake communities.	No change in impacts from the NAA to the recreational access during drought conditions. This results in no changes to social effects, such as to

		individual and community health and well-being and economic vitality compared to the NAA.
Flood Risk Management	No change in elevation or storage.	ResSim modeling results indicate that Hartwell Lake's average annual peak elevations would be 0.22 feet higher and average peak streamflow at Augusta, GA would be 166 cfs higher over the historical period of record analysis resulting in a minor negative impact to flood risk management and no change in life loss and safety from the NAA.
Environmental Justice	Increased cost for water could result from the NAA if requestors have to resort to developing alternative water sources at a higher cost. This increase could result in a minor negative impact to low-income communities. However, low-income communities may not be disproportionately affect based on the Price Reduction for Low Income Community analysis.	When compared to the NAA, the proposed action would be more beneficial to all end users than the NAA since direct costs of this utility would be expected to substantially increase if more costly alternative water sources other than Hartwell Lake are required to meet future water demands. The proposed action would result in a minor positive impact to low-income communities.
Transportation	Roads would remain accessible to project facilities, although during high-water years, roads may experience closure.	No change from NAA.

5.11 Corps Principles, Requirements, and Guidelines (PR&G) Criteria

As discussed in 3.7.3, four general criteria are considered during alternative screening. The PR&G criteria were considered in the screening of the Final Array of Alternatives. They are (1) completeness, (2) efficiency, (3) effectiveness, and (4) acceptability, and defined as:

1) *Completeness:* Completeness is the extent to which an alternative provides and accounts for all required investments and actions to ensure the realization of the planning objectives, including actions by other federal and nonfederal entities. Completeness also includes consideration of real estate issues, O&M, monitoring, and sponsorship factors.

2) *Efficiency:* The extent to which an alternative plan is the most cost-effective means of achieving the objectives.

3) *Effectiveness:* Effectiveness is defined as the degree to which the plan will achieve the planning objective. A plan must make a significant contribution to the problem or opportunity being addressed.

4) *Acceptability:* A plan must be acceptable to federal, state, and local government in terms of applicable laws, regulation, and public policy.

Table 31 reflects the results of each alternative in the final array as screened against the P&G criteria.

Table 32: Screening Against Corps P&G Criteria

Criteria	No Action Alternative/Future Without Project Condition (Alternative 1)	Reallocation from Conservation Storage w/ RFC (Alternative 5)
Completeness	Does not address the objective.	Provides a complete solution to the identified problem and project objectives.
Efficiency	No cost for existing Plan of regulation but does not address the project objective. However, the cost of non-Federal requestors implementing the use of alternative water supply source would be costly.	Provides the most efficient use of Federal and non-Federal resources, while providing a cost-effective solution to the identified problem.
Effectiveness	Does not make a significant contribution to the problem or opportunity being addressed unless non-Federal requestors implement the use of alternative water supply sources.	Fully effective at addressing the study objective.
Acceptability	Not acceptable to the users requesting water storage. SEPA prefers no reallocation. Existing Plan of Regulation acceptable to federal laws, regulations, and guidelines. Non-Federal implementation of the use of alternative water supply sources would not be acceptable to local public policy.	Acceptable to users and SEPA than Alternative 2. Acceptable to federal laws, regulations, and guidelines.

5.12 Tentatively Selected Plan

Based on the NED plan and the comprehensive benefits analysis addressing RED, EQ, and OSE benefits, Alternative 5, Reallocation of Conservation Storage for water supply with RFC, is the TSP. Alternative 5 consists of reallocating 10,410 acre-feet of conservation storage for water supply (Table 32). The resulting change in pool elevation would be 0.24 inches.

Table 33: Total User Cost of Hartwell Lake Water Supply Reallocation Storage

Requestor	Request for Storage (ac-ft)	Price per Ac-Ft	Total User Cost	Annual Cost
AJRWS	4,568	$475.29	$2,171,141	$76,550
Pioneer RWD	3,122	$475.29	$1,483,774	$52,315
City of Lavonia	2,308	$475.29	$1,096,841	$38,672
Currahee Club	412	$475.29	$195,772	$6,903
TOTAL	10,410	$475.29	$4,947,528	$174,440

Note: Federal Discount Rate = 2.5%; Annual cost estimated over 50-year POA

5.13 Key Risks, Uncertainties, and Assumptions

This study considers four key items of risks, uncertainties, and assumptions.

- Although reviewed and approved by the Corps' Water Management and Reallocation Studies Center of Expertise as reasonably accurate and logically consistent based on sound economic theory and sufficient and relevant data used in the calculations, uncertainty may exist in local requestor's projections of future water demand contingent upon the future rate of population growth and water usage. Storage reallocated to each local requestor may prove greater or less than actual future requestor estimated demand. Inefficient allocation of reallocated storage would result if demand projections higher than actual future demand. The inverse is also true should demand projections prove lower than actual future demand. This condition may induce negative impacts on the economic health of the requestors. Regardless, the TSP would decrease the risks of shortages.
- The critical drought on record is a unique event and future hydrometeorological conditions cannot be known. The Corps use the historical data as a representation of one set of conditions, through which different alternatives were compared and contrasted.
- A reservoir systems model approach results in the most accurate decisions for impacts on existing project purposes because the watershed is managed and operated as an inter-related system. The Corps operates the three multi-purpose reservoir projects on the Savannah River as a combined system. Not analyzing the water supply storage requests using a reservoir system model approach could result in inaccurate decisions since the Savannah River Watershed is managed and operated as an inter-related system. The planning decision uses a reservoir system model approach to analyze the impacts from reallocating existing storage to water supply to eliminate any risks and uncertainties from not reflecting the actual connectivity of the three multi-project reservoir system.
- Each model contains some uncertainty and error and are not perfect reflections of reality in the project area. The impacts are somewhat mitigated by comparing alternative scenarios run in the same model. For this study, the Corps used two different models, so cross comparisons were interpreted carefully, however, the analysis only used comparisons among alternatives run in the same model.
- Any encroachment into the flood storage would contradict the Corps' flood risk management mission by increasing flood risks downstream. Assumptions on cost and time estimates required to upgrade from a DSAC 2 to a DSAC 4 indicate that using flood storage as a source of water supply would increase the risk and uncertainty of water supply deficit in the future if the flood storage would be used.
- A significant amount of inactive storage exists because there has been very little sedimentation over the life of the project. That assumption is based on sedimentation studies prepared for Richard B. Russell and J. Strom Thurmond Lake and Dam projects. Since inactive storage is not the TSP, the risk and

uncertainty of using the other project's sedimentation analyses does not affect the outcome of this project.

5.14 Test of Financial Feasibility

To test the financial feasibility of the reallocation, the annual cost of the reallocated storage is compared to the annual cost of the most likely, least costly alternative water supply source that would provide an equivalent quality and quantity of water if storage reallocation at Hartwell Lake were not an option for the water supply customers. The following sections evaluate the alternative source and identify the most likely, least costly water supply source if storage reallocation at Hartwell Lake were not an option.

As a test of financial feasibility, the annual cost of the Federally reallocated storage is compared to the most likely, least cost alternative that would provide an equivalent quality and quantity of water which the non-Federal requestor would undertake in absence of using the Federal project. As seen in Table 33, the Federal water supply reallocation from the conservation storage of Hartwell Lake with RFC would be financially feasible if its cost is less than that most likely, least cost non-Federal alternative.

Table 34: Test of Financial Feasibility

	NAA (Alt 1)	Conservation Storage w/RFC (Alt 5)	Least Cost Alternative
Estimated Yield from Storage		24.55	0.00
Credited RFC	**0**	12.17	
Reallocated Storage (ac-ft)	**NO**	**10,410**	**0**
Meets Future Water Demand	**NO**	**YES**	**YES**
Adheres to State Law	-	**YES**	**YES**
Hydropower benefits foregone	-	$ (5,354)	-
Hydropower Revenues Foregone	-	$ (4,275)	-
Capital Costs –Cost of Storage		$ 174,440	-
Capital Costs – Pump Station, Transmission, and Treatment Plants*	$ 69,693,200	$ 28,025,428	$ 71,040,974
O&MRR&R Annual Costs	186,000	$ 10,418	$ 186,000
Average Annual Cost (2.5% FY23)	$ 69,879,200	$ 28,035,851	$ 71,226,974

**All Costs are annualized and at the 2.5% FY23 Discount Rate

When comparing the alternatives to the least costly alternative, the alternative that is the most acceptable, efficient, effective, and complete is Alternative 5, conservation storage with RFC. The least cost alternative has an Average Annual Cost of 71,226,974 compared to conservation with RFC cost of 28,035,851 at an FY2023 rate of 2.5% (Table 34). The least cost alternative differs from No Action because the least cost alternative factors in the need to meet future water demand. The least cost alternative derives water from other sources outside of Hartwell Lake in order to meet the demand, and Pioneer would need to construct a new pipeline not reflected in the NAA.As a result, the Corps has determined that purchasing water supply storage from the Hartwell Lake project is the most cost-effective alternative.

Table 35: Average Cost by Requestor

Average Annual Capital Costs to Achieve Storage by Requestor		
	Alternative 5 (RFC)	**Least Cost Alternative**
Pioneer	$ 274,343	$ 1,475,409
ARJWS	$ 27,703,079	$ 69,170,675
Currahee	$ 15,100	$ 42,310
Lavonia	$ 32,906	$ 352,581
Total	$ 28,025,428	$ 71,040,974

5.15 Price Reductions for Low-Income Community

The only requestors that may be able to qualify for a low-income price reduction are Pioneer RWD and Currahee because their populations are less than 20,000. According to the requirements in ER 1165-2-121, neither Pioneer RWD nor Currahee are eligible for the price reduction because they do not service counties in the lower two-thirds of personal income of all the counties in the United States.

Section 322 of WRDA 90 gives discretionary authority to the Secretary of the Army to approve a price reduction to a community for storage if certain criteria are met. The criteria include a population of less than 20,000 persons, not more than 2 MGD may be granted under this provision, and the per capita income per county must be in the lower two thirds of all the counties in the United States.

On the basis of population serviced, the reallocation requests of ARJWS and the City of Lavonia are excluded from this provision.

The eligibility of both Currahee and Pioneer Rural Water District for this price reduction is dependent on whether or not they serve counties with personal income in the lower two thirds of all counties in the United States. A formula for determining this is contained in Economics Guidance Memorandum 14-04: Current State and County Income Index Data, Current Eligibility Factor Formula (Ability to Pay). The method is further described

in ER 1165-2-121, dated 1 November 1989. The data that follows comes from the economic memorandum.

An eligibility factor (EF) greater than 1 would indicate that the community qualifies for the price reduction. The income test follows:

- EF = a – b1 x (state factor) – b2 x (area factor)

The state factor equals the income index number for the State in which the project is located. The area factor equals the income index number for the relevant counties. The parameters a, b1, and b2 are determined by the data and by the constraint that a certain fraction of the county/state combination index numbers have an Eligibility Factor greater than zero. The following values of parameters apply:

- a = 19.59; b1 = 0.082; b2 = 0.164

In the case of Pioneer Rural Water District, which serves Anderson and Oconee counties in South Carolina, the equation is as follows:

- EF(Pioneer RWD)=19.59 – 0.082(80.87) – 0.164[(74.84 + 77.81)/2]

- EF(Pioneer RWD)=0.44136 < 1

In the case of Currahee Club, which serves Stephens County in Georgia, the equation is as follows:

- EF(Currahee)=19.59 – 0.082(87.01) – 0.164(74.60)

- EF(Currahee)=0.22078 < 1

Therefore, both Pioneer Rural Water District and Currahee Club are ineligible for the Price Reduction for Low Income Community.

5.16 Federal and Non-Federal Costs and Responsibilities

In accordance with Section 103(c)(2) of the WRDA of 1986 (Pub. L. No. 99-662), the cost to reallocate storage in Hartwell Lake for M&I water supply is a non-Federal responsibility.

A water storage agreement for each requestor will document the Federal government and M&I water supply users' rights and responsibilities. It will include the cost of storage and other specific costs. The M&I water supply users could repay the cost of storage upfront or repay the cost over a 30-year period, beginning with the date of signing a new water storage agreement approved by the Assistant Secretary of the Army for Civil Works.

The cost of storage was derived using the use of facilities cost allocation procedure (Appendix E of ER 1105-2-100). This procedure selects the highest cost among benefits foregone, revenue foregone, updated cost of storage, or replacement costs for the cost of storage. The highest cost among those procedures is the updated cost of storage.

The annual OMRR&R costs of the project associated with the reallocated storage (joint-use cost of the project) is also a non-Federal responsibility. Those costs would be paid at the beginning of each fiscal year. At the end of the fiscal year, final adjustments and accounting will summarize all joint-use costs associated with OMRR&R for the project. The use of facilities cost allocation procedure would be applied to the joint-use OMRR&R cost to determine the final costs. Increased OMRR&R costs related to the reallocation of storage are a non-Federal responsibility.

5.17 Repayment Cost for the User

Costs allocated to storage are set to the highest of benefits foregone, revenues foregone, replacement costs, or updated cost of storage. Therefore, users incur updated cost of storage costs (Table 34). The total annual financial payment for the recommended reallocation is $655,799. The cost of storage is repaid at the FY2023 Water Supply interest rate of 2.5 percent amortized over 50 years. In accordance with Section 932 of the Water Resources Development Act of 1986, that interest rate will be adjusted at 5-year intervals throughout the repayment period. The yield rate is determined by the Secretary of the Treasury (1.875%) plus one-eighth percent (0.125%). This is documented in the annual HQUSACE Economic Guidance Memorandum 22-01. The estimated joint-use expenditures are based on actual FY2020 O&M expenses, and the RR&R is based on projected RR&R costs at the project. At this time, there are no significant RR&R costs that have ARJWS Repayment Cost.

See Appendix E for detailed analysis, and the parameters that were used to identify specific costs and calculate repayments costs for each requestor. Costs are in FY2023 and annualized using the FY2023 Federal Water Supply discount rate of 2.5% over a 50-year repayment period.

Table 36: Updated Cost of Storage for ARJWS Annual Repayment Cost

Requestor	Total Costs	Annual Repayment
ARJWS	$2,171,141	$108,988
Pioneer	$1,483,774	$74,483
Lavonia	$1,096,841	$55,060
Currahee Club	$195,772	$9,827

Note: Costs are in FY2023 and annualized using the FY2023 Federal Water Supply discount rate of 2.5% over a 30-year repayment period.

6.0 PUBLIC INVOLVEMENT

6.1 Coordination with Relevant Agencies

The following agencies were extended an invitation in December 2018 to become Cooperating Agencies in this study. Cooperating agency meetings were held on 8 April and 26 May 2020 to discuss study progress and potential issues. Participating agencies included: GADNR, SCDNR, EPA, USFWS, USGS, and SEPA. In response to sending letters to all cooperating agencies and SEPA, NOAA declined, and no response was received from USFWS. SEPA, SCDNR, and EPA participated in an interagency study meeting on 8 April 2019 and GADNR, SCDNR, EPA, USFWS, USGS, and SEPA participated in a draft findings study meeting on 26 May 2020.

Monthly meetings are held with the requestors. A revenues foregone procedures meeting was held on 4 May 2020 in collaboration with SEPA.

This Draft IWSSRR/EA and FONSI are being reviewed by Federal and state natural resource agencies and the public. The draft IWSSRR/EA will be made available for a 30-day public comment period. All future Public and Agency coordination and comments will be located in Appendix H.

7.0 SUMMARY OF EFFECTS ON PROJECT PURPOSES

Based on the NED plan and the comprehensive benefits analysis addressing RED, EQ, and OSE benefits, Alternative 5, Reallocation of Conservation Storage for water supply with RFC, is the recommended plan. Alternative 5 consists of reallocating 10,410 acre-feet of conservation storage for water supply. The resulting change in pool elevation would be 0.24 inches.

Table 35 summarizes the effects of reallocating conservation storage to water supply on the environment, flood risk management, hydropower, and recreation. There are no serious effects on the project purposes from reallocating conservation storage for water supply.

Table 37: Summary of Effects on Project Purposes

Alternative	Environmental	Flood Risk Management	Hydropower	Recreation
Alternative 1 No Action Alternative/Future Without Project Condition (NAA)	Lake elevations, discharges and reservoir management will continue in accordance with current management plans	Available flood storage, peak reservoir elevations, and flood releases will not be impacted	Hydropower Benefits and Revenues will not be impacted by water supply reallocation	Lake levels and recreation facility availability in the Savannah River lakes and in the river downstream of JST Dam will not change

Alternative	Environmental	Flood Risk Management	Hydropower	Recreation
Recommended Plan: Alternative 5 – Reallocation from the Conservation Storage	Lake elevations and reservoir releases downstream of JST Dam will not change significantly as a result of reallocation of storage from the conservation pool. Predicted change is an average annual decrease of 38 cubic feet per second (cfs) or 0.42 percent in the Savannah River below JST Dam	Hartwell Lake average annual peak elevations would be 0.06 feet lower and average annual streamflow at Augusta, GA would be 10 cfs lower over the historical period of record	Total hydropower average annual benefits foregone ($105,000) represent a 0.05 percent loss due to the storage reallocation from the Conservation Storage in Hartwell Lake.	Hartwell Lake would be 0.08 feet lower and JST Lake 0.05 feet lower, on average, over the historical period of record analysis (1929-2013) when compared to the NAA. An additional 8 days at Hartwell Lake below elevation 646 over the entire period of record (27,384 days) when compared to the NAA, but no predict days below elevation 635 for either the NAA or the Recommended Plan. No measurable impacts to recreation facilities at RBR and JST Lakes or in the Savannah River below JST Dam

8.0 IMPLEMENTATION

Upon approval of the Final Integrated Water Supply Storage Reallocation Report and EA, the Corps will enter into four separate Water Supply Storage Agreements with the requesting entities totaling 10,410 acre-feet, with ARJWS (4,568acre-feet), Pioneer RWD (3,122 acre-feet), City of Lavonia (2,308 acre-feet), Currahee Club (412 acre-feet). The requestor will be required to make the first payment within 30 days after entering into the Agreement.

9.0 DISTRICT ENGINEER'S RECOMMENDATION

Reallocation of storage from the Hartwell Lake conservation storage to water supply meets the study objective, is economically justified, would not significantly impact the other authorized purposes of the Corps' Savannah River Reservoir System, and would not require major structural or operational changes to the three-reservoir Corps system. Such a reallocation would enable the Corps' reservoirs to meet present and near future water supply storage requests in the project area.

Therefore, pursuant to the authority provided in the Water Supply Act of 1958, as amended, I recommend that 10,410 acre-feet of conservation storage in Hartwell Lake be reallocated to water supply.

Execution of the individual reallocation water supply storage agreements between the Corps and the individual requestor (ARJWS, Pioneer RWD, Currahee Club, and the City of Lavonia) would occur after ASA(CW) approves each individual request or delegates that responsibility to the Commanding General.

The recommendation contained herein reflects the information available at this time and current Departmental policies governing formulation of the project. They do not reflect a national Civil Works program perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Chief of Engineers.

Date_____

Ronald J Sturgeon, PE
Colonel, U.S. Army
Commanding

10.0 REFERENCES

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11.0 LIST OF ACRONYMS

ARJWS	Anderson Regional Joint Water System
cfs	Cubic Feet Per Second
EFH	Essential Fish Habitat
EJ	Environmental Justice
EO	Executive Order
ESA	Endangered Species Act
EQ	Environmental Quality
FONSI	Finding of No Significant Impact
FWOP	Future Without Project Condition
GA DNR	Georgia Department of Natural Resources
GA EPD	Georgia Environmental Protection Division
GPA	Georgia Ports Authority
HTRW	Hazardous Toxic Radioactive Waste
JST	J. Strom Thurmond
MGD	Million Gallons Per Day
M&I	Municipal and Industry
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NAA	No Action Alternative
NED	National Economic Development
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric Turbidity Units
NPS	National Park Service
O&M	Operation and Maintenance
OSE	Other Social Effects
PDT	Project Development Team
ppt	Parts per thousand
RBR	Richard B. Russell
RED	Regional Economic Development
SAS	Savannah District
SC DNR	South Carolina Department of Natural Resources
SC DHEC	South Carolina Department of Health and Environmental Controls
SHPO	State Historic Preservation Office
TSP	Tentatively Selected Plan
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fisheries and Wildlife Service
WRDA	Water Resources Development Act
WQ	Water Quality