PRE-APPLICATION DOCUMENT (PAD)

STEVENS CREEK HYDROELECTRIC PROJECT

FERC PROJECT NO. 2535

Dominion Energy South Carolina, Inc.
Cayce, South Carolina

Prepared by:

Kleinschmidt Associates
Lexington, South Carolina

KleinschmidtGroup.com

August 2019

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DEFINITIONS OF TERMS, ACRONYMS, AND ABBREVIATIONS

ACHP	Advisory Council on Historic Properties
Af	Acre-foot, the amount of water needed to cover one acre to a depth of one foot
APE	Area of potential effect as pertains to Section 106 of the National Historic Preservation Act
Applicant	Dominion Energy South Carolina, Inc.
BMP	Best Management Practice
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DC	Direct current
DESC	Dominion Energy South Carolina, Inc.
DLA	Draft License Application
DO	Dissolved oxygen, generally expressed in units of parts per million or milligrams per liter (mg/L)
DOC	dissolved organic carbon
EFH	essential fish habitat
EL	Elevation
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FATS	Forks Area Trail System
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FWS	U.S. Fish and Wildlife Service
GADNR	Georgia Department of Natural Resources
GA SCORP	Georgia's State Comprehensive Outdoor Recreation Plan 2017-2021
Hp	Horsepower
HPMP	Historic Properties Management Plan
installed capacity	The nameplate megawatt rating of a generator or group of generators
ILP	Integrated Licensing Process
interested parties	Individuals and entities that have an interest in a proceeding
IPaC	Information for Planning and Consultation
JAM	Joint Agency Meeting
kW	Kilowatt
kV	Kilovolts
kVA	kilovolt-ampere
Licensee	Dominion Energy South Carolina, Inc.
Licensing	The process of acquiring a FERC license for the operation of a hydropower project
licensing participants	Individuals and entities that are actively participating in the licensing proceeding
mg/L	milligrams per liter
MOA	Memorandum of Agreement

msl	mean sea level
MW	megawatt
MWh	megawatt-hour
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NH3	ammonia
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Services, also known as NOAA Fisheries
NOx	nitrate/nitrite
NOI	Notice of Intent to file an application for license
NRHP	National Register of Historic Places
NSBLD	New Savannah Bluff Lock and Dam
NWI	National Wetlands Inventory
PA	Programmatic Agreement
PAD	Pre-Application Document
PCB	Polychlorinated Biphenyl
PCWS	Phinizy Center for Water Sciences
Project	Stevens Creek Hydroelectric Project (FERC No. 2535)
Project Area	Zone of potential, reasonably direct project effects within the FERC Project Boundary
Project Boundary	The boundary line defined in the license issued by FERC that surrounds areas needed for Project purposes
Project Vicinity	The general geographic area in which the Project is located for the purposes of describing the existing environment around a Project or proposed Project
RM	river mile
RMP	Recreation Management Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCEPPC	South Carolina Exotic Pest Plant Council
SCPRT	South Carolina Department of Parks, Recreation and Tourism
SC SCORP	South Carolina's 2014 State Comprehensive Outdoor Recreation Plan
SHEP	Savannah Harbor Expansion Project
SHPO	State Historic Preservation Officer
SNSA	Southeastern Natural Sciences Academy
Tailrace	Channel through which water is discharged from the turbines
TMDL	total maximum daily load
TLP	traditional licensing process
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
V	volt

1.0 INTRODUCTION

Dominion Energy South Carolina, Inc.[1] (DESC) is filing a Notice of Intent (NOI) and a Pre-Application Document (PAD) with the Federal Energy Regulatory Commission (FERC) to relicense the Stevens Creek Hydroelectric Project (Project), FERC No. 2535. The Project is located in Edgefield and McCormick counties, South Carolina and Columbia County, Georgia, at the confluence of Stevens Creek and the Savannah River and has an installed capacity of 17.28 megawatts (MW). The Project occupies approximately 104 acres of federal lands within the Sumter National Forest with pre-existing easements and 0.21 acres of federal lands within the Sumter National Forest without pre-existing easements. On November 22, 1995, FERC issued a 30-year license which is scheduled to expire on October 31, 2025. SCE&G intends to file an application for a new license with FERC on or before October 31, 2023.

This PAD was prepared in accordance with §5.6 and §16.8 of FERC's regulations set forth in Title 18 of the Code of Federal Regulations (CFR). As required by the regulations, DESC exercised due diligence in preparing this PAD by contacting appropriate governmental agencies, non-governmental organizations (NGOs), Native American tribes, and others that might have relevant information. Due diligence was achieved by holding public and agency outreach meetings to identify existing and reasonably available information relevant to the Project. Public meetings were conducted at the Savannah Rapids Pavilion on November 29, 2018 at 2:00 pm and 6:00 pm. Agency meetings were held at the Misty Lake Clubhouse on January 10, 2019 at 9:30 am and via conference call on March 27, 2019 at 9:00 am. Meeting notes from the agency outreach meetings are included in Appendix A.

[1] On April 30, 2019, South Carolina Electric & Gas Company (SCE&G) filed a letter notifying FERC that SCE&G had changed its name to Dominion Energy South Carolina, Inc., effective April 29, 2019.

DESC worked closely with organizations and agencies to identify existing relevant studies conducted in the Project vicinity. A PAD Information Questionnaire was distributed to stakeholders on February 6, 2019 in an effort to identify existing information that should be included in the PAD. By exercising due diligence and involving the stakeholders early and thoroughly, DESC has ensured that this PAD provides existing, relevant and reasonably available information to FERC and other interested stakeholders. Appendix A is a record of the pre-PAD consultation process DESC initiated with agencies, tribes, and other organizations to obtain data and information about Project resources. The resulting comprehensive information assembled with this PAD will enable FERC and other entities to review study plans developed in consultation with resource agencies and other stakeholders, prepare documents analyzing any license application that may be filed with FERC and develop additional information requests and study plans to the extent they are necessary and related to direct effects of the Project.

2.0 PROCESS PLAN AND SCHEDULE [§ 5.6 (d)(1)]

2.1 TIME FRAMES FOR PRE-APPLICATION CONSULTATION, INFORMATION GATHERING, AND STUDIES

In accordance with FERC's regulations (18 CFR §5.3), DESC is requesting to use the Traditional Licensing Process (TLP). This request, along with the reasons why DESC believes the TLP is the most appropriate licensing process for the Project, is outlined in the cover letter which accompanies this PAD. Typically, the TLP includes three stages, as described at 18 CFR §4.38. The first stage involves coordination among DESC, resource agencies, affected Native American tribes, and the public. This stage includes sharing Project information, notifying interested parties, and planning studies using the PAD as a guide. The second stage includes implementing studies (to the extent that pre-filing studies are necessary) to gather additional data, developing a draft license application (DLA), and submitting the DLA for review by resource agencies and FERC. The third stage begins with the filing of the final license application (FLA). During this stage, FERC conducts a review of the FLA and the public comment process, completes an environmental analysis under National Environmental Policy Act (NEPA), and makes a final decision regarding issuing a license for the Project.

Throughout the relicensing, DESC will provide adequate opportunities for all interested parties to be meaningfully involved in the process. As discussed above, and outlined in the NOI, DESC is requesting to use the TLP. The process plan and schedule, provided in Table 2-1, provides anticipated timeframes for accomplishing the pre-filing consultation, information gathering, and studies required by regulations governing the use of the TLP. Should FERC require the use of the Integrated Licensing Process[2] (ILP), the process plan and schedule will be adjusted accordingly. Please note that comments on DESC's request to use the TLP are due within 30 days of filing the NOI.

As required by TLP regulations, DESC will maintain a consultation record relating to the pre-filing process. Appendix A includes records of the licensing proceedings to date, including information received from the stakeholders and appropriate communication records. DESC will

[2] The Integrated Licensing Process is the default process for filing an application for an original, new or subsequent license.

maintain records of licensing and other relevant information on DESC's relicensing website at www.stevenscreekrelicense.com. The PAD will be made available to the public at the Edgefield County Library in Edgefield, South Carolina, the McCormick County Library in McCormick, South Carolina, and the Columbia County Library in Evans, Georgia. DESC will maintain a copy of the PAD on the relicensing website at www.stevenscreekrelicense.com.

TABLE 2-1 STEVENS CREEK PROJECT RELICENSING PROCESS PLAN AND SCHEDULE

ACTIVITY[1]	RESPONSIBLE PARTY	TIMEFRAME	REGULATION	DATES[2,3]
Prepare NOI and PAD and draft study plans	DESC	Recommended 9 to 12 months prior to filing deadline		5/1/2019
File NOI and PAD	DESC	At least 5 years but no more than 5.5 years prior to license expiration	18 CFR § 5.5	May 2020
Issue Notice of NOI/PAD and Request Comments on TLP	FERC	Concurrent with NOI	18 CFR § 5.3	May 2020
Comments on use of TLP	FERC/ Stakeholders	Within 30 days of Notice	18 CFR § 5.3	June 2020
FERC Notice of Commencement and TLP Approval	FERC	Within 60 days of Notice	18 CFR § 5.8	August 2020
Joint Agency Meeting (JAM) Notification and Agenda to FERC and Stakeholders	DESC	At least 15 days prior to the JAM	18 CFR §16.8	September 2020
Publish Public Notice of JAM in Newspaper	DESC	At least 14 days prior to the JAM	18 CFR § 16.8	September 2020
Conduct JAM and Site Visit	DESC	30 to 60 days after FERC Notice of Commencement and TLP Approval	18 CFR § 16.8	September 2020
File Comments on PAD, and Study Requests	Stakeholders	Within 60 days of JAM	18 CFR § 16.8	November 2020
Conduct First Season of Studies	DESC		18 CFR § 16.8	TBD 2021
Conduct Second Season of Studies (if necessary)	DESC		18 CFR § 16.8	TBD 2022
Issue Study Reports to Stakeholders	DESC/ Stakeholders	Upon study completion		2021 through 2022
Prepare DLA	DESC	Recommended 6-9 months prior to filing deadline		January 2022 through November 2022

ACTIVITY[1]	RESPONSIBLE PARTY	TIMEFRAME	REGULATION	DATES[2,3]
File DLA with Stakeholders and FERC	DESC	No later than 150 days prior to deadline for filing FLA	18 CFR § 16.8	11/30/2022
File Comments on Applicant's DLA	Stakeholders	Within 90 days of filing DLA	18 CFR § 16.8	2/28/2023
File FLA	DESC	No later than 24 months before existing license expires	18 CFR § 5.17	10/31/2023

[1] Activities in shaded in blue are internal activities, with flexible schedules.
[2] If the due date falls on a weekend or holiday, the deadline is the following business day.
[3] The schedule is subject to change throughout the relicensing proceeding.

2.2 PROPOSED LOCATION AND DATE FOR JOINT AGENCY MEETING AND SITE VISIT [§ 16.8 (B)(3)(II)]

DESC will host a Joint Agency Meeting (JAM) and site viewing no earlier than 30 days, and no later than 60 days after TLP approval, if FERC approves this request. DESC invites FERC to the JAM to secure for itself and all other attendees and participants, FERC's perspective on the initial scoping of issues. The purpose of the JAM will be to provide stakeholders the opportunity to view the Project, to discuss the information presented in the PAD, and to identify issues related to the Project. For this Project, site visits and issue identification workshops have already occurred and have included many interested stakeholders. The JAM will provide another, formal opportunity for stakeholders and FERC to become involved. Currently, DESC proposes to hold the JAM at the Misty Lake Clubhouse in third quarter of 2020. The date and location of the meeting may be altered after consultation with jurisdictional agencies and other licensing participants and pending FERC's decision regarding DESC's request to use the TLP. If FERC requires that DESC use the ILP, then FERC will hold a scoping meeting in accordance with the regulations at CFR § 5.8.

3.0 PROJECT LOCATION, FACILITIES, AND OPERATIONS [§ 5.6 (d)(2)]

3.1 CONTACT INFORMATION FOR EACH PERSON AUTHORIZED TO ACT AS AN AGENT FOR APPLICANT (EXACT NAME, BUSINESS ADDRESS, AND PHONE NUMBER)

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3.2 MAPS OF LAND USE WITHIN PROJECT BOUNDARIES (TOWNSHIP, RANGE AND SECTION, STATE, COUNTY, RIVER, RIVER MILE, AND CLOSEST TOWN) AND, IF APPLICABLE, FEDERAL AND TRIBAL LANDS, AND LOCATION OF EXISTING FACILITIES

The Project is located at river mile (RM) 209.1 of the Savannah River, at its confluence with Stevens Creek, in Columbia County, Georgia and Edgefield County, South Carolina (Figure 3-1). The Project's dam is located approximately one mile upstream of the Augusta Diversion Dam, and approximately 13 miles downstream of the J. Strom Thurmond Dam (here after referred to in this document as Thurmond Dam). Exhibit G Project Boundary maps are included in Appendix B of this PAD. Detailed information on land use within the Project boundary is included in Section 4.7.

Stevens Creek Project structures include: 1) non-overflow portions, located at the abutments with top EL of 198.54 feet (1929 NGVD, 184.0 Plant Datum); 2) 2,000-foot spillway composed of a (a) cyclopean concrete gravity section, ogee crest, with a top elevation (EL) of 183.54 (1929 National Geodetic Vertical Datum [NGVD], 169.0 Plant Datum), (b) 1,000 feet of 5-foot-high flashboards from the lock to the center of the spillway, (c) 1,000 feet of 4-foot-high flashboards from the center of the spillway to the South Carolina abutment; 3) a concrete gravity lock 85-feet-

wide by 165.5-feet-long located between the powerhouse and spillway section; 4) a 388-foot-long powerhouse, integral with the dam, consisting of a reinforced concrete substructure and a steel-framed brick superstructure, and containing eight turbine-generators; 5) a reservoir with a surface area of approximately 2,400 acres (gross capacity is 23,600 acre-feet and usable storage is approximately 7,800 acre-feet); 6) transmission interconnecting electrical equipment including (a) for unit pairs 1-2 and 3-4, there are two 5600/6272/7000/7840 kVA, 2,300 V/46,000 V step-up transformers, (b) for unit pairs 5-6 and 7-8, there are two 5600/7000 kVA, 2,300 V/46,000 V step-up transformers, and (c) two 46 kV ties to a 46 kV/115 kV substation; and 7) appurtenant facilities.

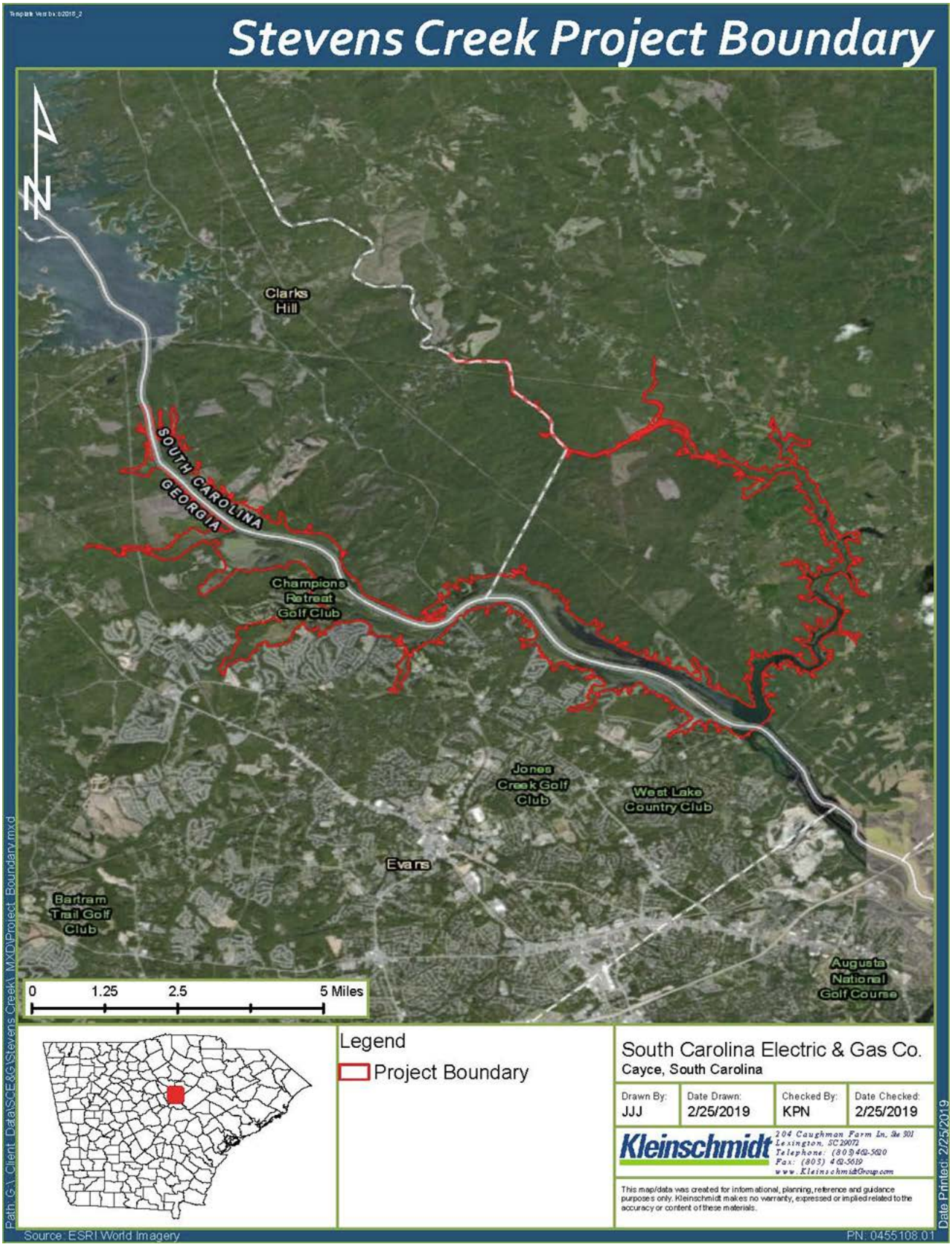


FIGURE 3-1 PROJECT LOCATION MAP

3.3 DETAILED DESCRIPTION OF EXISTING FACILITIES

3.3.1 COMPOSITION, DIMENSIONS, AND CONFIGURATION OF DAMS, SPILLWAYS, PENSTOCKS, POWERHOUSES, TAILRACES, INCLUDED AS PART OF THE PROJECT OR DIRECTLY CONNECTED

The Project is linearly configured from left to right (looking downstream) as a 97-foot-long concrete non-overflow section, a 2,000-foot-long concrete ogee spillway, an 85-foot-wide inoperative lock, a 388-foot-long powerhouse, and a 102.5-foot-long non-overflow section. The total length is 2,635 feet and height is approximately 30 feet. The spillway has approximately equal lengths of four-foot-high (left half) and 5-foot-high (right half) flashboards that trip when pool level is one-foot over the top of the flashboards. The rightmost 110 feet of the spillway contains five sluices that are no longer operated because the gates are covered by silt at the upstream face of the dam.

The Project powerhouse is a three-level structure with a concrete substructure and a steel-framed, brick-covered superstructure. It has a total length of 388 feet, a width (upstream-downstream) of approximately 87 feet, and a structural height of 102 feet from the draft tube-foundation interface to the top of the superstructure. The brick superstructure is shorter in length (328 feet) because it does not enclose two unused turbine bays on the left end; it is approximately 50-feet-wide and 57-feet-tall. The powerhouse contains eight turbine-generator units. As noted, the two leftmost bays are not used and do not have generators or turbines installed. There is an automated trash rake system installed at the powerhouse.

3.3.2 RESERVOIR NORMAL MAXIMUM WATER SURFACE AREA AND ELEVATION AND GROSS STORAGE CAPACITY

The Stevens Creek Reservoir extends upstream approximately 12 miles from the Stevens Creek Dam to a point approximately one-mile downstream of Thurmond Dam. The surface area of the reservoir is approximately 2,400 acres at full pool (EL 187.54 feet 1929 NGVD). Gross storage capacity in the reservoir is approximately 23,600 acre-feet, but usable storage in the top 4.5 feet below full pond is approximately 7,800 acre-feet. The reservoir normally fluctuates between EL 183.0 feet and 187.5 feet, using available storage capacity to re-regulate flow releases from Thurmond Dam.

3.3.3 NUMBER, TYPE AND CAPACITIES OF TURBINES AND GENERATORS, AND INSTALLED (RATED) CAPACITY OF EXISTING TURBINES OR GENERATORS

The powerhouse contains eight turbine-generator units, with a total maximum rated capacity of 17,280 kilowatts (kW). This includes five I.P. Morris Francis vertical shaft turbines, each rated at 3,125 horsepower (hp) and 75 revolutions per minute (RPM); three S. Morgan Smith Francis vertical shaft turbines, each rated at 3,125 hp and 75 rpm; and eight synchronous Westinghouse generators, each rated at 2,700 kVA, 2,300 V, 60 cycle, 3 phase and 75 rpm. There are four Rapid Power Technologies excitation transformers rated 125 kVA, 2,400 V/121V, each feeding two Rapid Power Technologies static DC Excitation Power Supplies with rated output of 250 ADC, 150 VDC to supply excitation power to each generator field. Governors on Units 1, 2, 4, 5, 6, and 7 are digital governors by American Governor Company and governors on Unit 3 and 8 are Woodward 700H digital governors. The estimated total hydraulic capacity of Stevens Creek is approximately 8,300 cubic feet per second (cfs) at a head EL of 28 feet.

3.3.4 NUMBER, LENGTH, VOLTAGE, AND INTERCONNECTIONS OF ANY PRIMARY TRANSMISSION LINES

Energy generated is conducted from the powerhouse step-up transformers through the main leads exiting the powerhouse, via 46 kV overhead lines to SF6 breakers approximately 100 feet west of the powerhouse, and then another 100 feet west to the Project switchyard interconnecting the Project to the local grid via the Georgia Power substation. There are no transmission lines included in the Project boundary. Single line drawings for the Project are included in Appendix C, which is filed as Critical Energy Infrastructure Information (CEII).

3.3.5 ENERGY PRODUCTION (ESTIMATE OF DEPENDABLE CAPACITY, AVERAGE ANNUAL, AND AVERAGE MONTHLY ENERGY PRODUCTION)

The Project's dependable capacity estimate is 10 MW during the winter and 8 MW during the summer, with November being the period of critical streamflow. Listed below is a summary of the monthly and annual average generation values for the Project from 2000-2018 (in megawatt hours [MWh]).

TABLE 3-1 MONTHLY AND ANNUAL AVERAGE GENERATION AT THE STEVENS CREEK PROJECT (2000 – 2018)

TIMEFRAME	AVERAGE GENERATION*
January	5,482
February	5,669
March	6,127
April	5,523
May	5,455
June	5,283
July	5,170
August	5,281
September	4,318
October	4,241
November	4,402
December	5,322
Annual	62,273

Source: Dominion Energy South Carolina, Inc. 2019
*measured in megawatt hours

3.4 CURRENT PROJECT OPERATION, INCLUDING DAILY OR SEASONAL RAMPING RATES, FLUSHING FLOWS, RESERVOIR OPERATIONS, AND FLOOD CONTROL OPERATIONS

The Project is manned five days a week, eight hours a day and is operated remotely from DESC's Urquhart Steam Station near Beech Island, South Carolina. The Project serves an important function to the Savannah River in that it operates as a re-regulating project. More specifically, Stevens Creek redistributes the varying discharges from the upstream Thurmond Dam Project to provide a more uniform flow in the Savannah River, downstream of the Project. The Thurmond Dam Project is the furthest downstream of three multiple purpose projects in the upper Savannah River Basin operated by the Savannah District of the US Army Corps of Engineers (USACE). Thurmond Dam and the other two projects, Hartwell and Richard B. Russell, are operated to maximize the public benefits of hydroelectric power, flood damage reduction, recreation, fish and wildlife, water supply, and water quality.

The Project is operated in accordance with an Operating Plan on file with FERC (Order issued June 22, 2018). This Operating Plan was developed in consultation with the USACE, U.S. Fish and Wildlife Service (FWS), Georgia Department of Natural Resources (GADNR), South Carolina Department of Natural Resources (SCDNR), and the City of Augusta and includes details regarding how the Project is to be operated. The normal operating target range for Stevens Creek is to provide an hourly discharge of +/- 15 percent of the scheduled daily average discharge from

Thurmond Dam, if the actual discharge from Thurmond Dam is within 500 cfs of the scheduled discharge. Excerpts from the Operating Plan, with minor edits, are provided in the following sections to describe Project operations under varying flow conditions.

When reviewing Project operations, it is important to note that the Project provides an important service to downstream resources in its function as a re-regulating facility. Maximum flow releases from Project facilities are only a fraction of the amount of flow normally released from the upstream Thurmond Dam Project. Moreover, the Project impoundment has very little storage capacity to accommodate incoming USACE releases. Therefore, normal operations require Project operators to lower the Project impoundment to accept incoming flows from USACE operations. Lowering the impoundment allows the Project to "soften" USACE flows released downstream and meet its function as a re-regulating facility.

3.4.1 OPERATING CONDITIONS – FLOOD (INFLOW GREATER THAN 30,000 CFS)

During periods of sustained flows of greater than 30,000 cfs from the Savannah River and Stevens Creek, the Stevens Creek Plant will generate to its full capability (approximately 8,300 cfs), while spilling all additional flow over the 2,000-foot-long overflow section of the dam (flashboards will be tripped). In this situation, all water coming down the Savannah River passes directly through the Stevens Creek Reservoir. The reservoir elevation may exceed EL 187.5 feet, depending upon the volume of flow at any given time. If the reservoir and river elevation reach a level which threatens to flood the plant, operation will cease, and personnel will evacuate the plant. At this point, all river flow will be discharged over the spillway. When river flow returns to a level controllable by normal operation at Thurmond Dam, the Stevens Creek Reservoir will be drawn down to an approximate EL of 183.5 feet so that flashboards can be reset. The resetting may take three to five days or more, depending on the amount of debris on the spillway, and damage to the flashboards. Normal operation of the Project will resume when any damage to the plant has been repaired and flashboards have been reset.

3.4.2 OPERATION CONDITIONS – HIGH FLOWS (INFLOW OF 8,300 CFS TO 30,000 CFS)

During periods of sustained high discharge in the Savannah River, the Stevens Creek plant will generate to its full capability (approximately 8,300 cfs), while spilling all additional flow over the 2,000-foot-long overflow section of the dam (some flashboards will be tripped). In this situation,

all water coming down the Savannah River passes directly through the Stevens Creek Reservoir. The reservoir elevation may exceed EL 187.5 feet, depending on the volume and duration of the high flow. When river flow returns to a level controllable by normal operation at the Thurmond Dam, the Stevens Creek Reservoir will be drawn down to approximate EL 183.5 feet allowing the flashboards to be reset. The amount of time required to reset the flashboards will depend on the number of boards tripped and the amount of debris on the spillway. Normal operation of the Project will resume when the flashboards have been reset.

3.4.3 OPERATION CONDITIONS – NORMAL FLOWS (INFLOW OF 4,200 CFS TO 8,300 CFS)

During periods of normal flow in the Savannah River, the Stevens Creek plant will generate in accordance with the schedule in Table 3-2 to approximate the scheduled daily average discharge from Thurmond Dam on weekdays, with the Stevens Creek Reservoir elevation fluctuating within its normal operating range (EL 183.0 feet to 187.5 feet) daily, but gradually increasing to approximate EL 186.0 feet by midnight on Friday night, so that stored water will be available to supplement the typically low weekend discharges from Thurmond Dam.

TABLE 3-2 STEVENS CREEK GENERATION SCHEDULE

Scheduled Thurmond Discharge - CFS								
Stevens Creek Headwater Elevation (ft.-NGVD 1929*)	2500	2700	2900	3000	3200	3500	3800	4000
	MW	MW	MW	MW	MW	MW	MW	MW
183.0-184.0	3.5	3.8	4.1	4.2	4.5	5.0	5.4	5.7
184.0-186.0	3.9	4.2	4.5	4.7	5.0	5.5	6.0	6.3
186.0-187.0	4.5	4.9	5.2	5.4	5.7	6.2	6.8	7.1
187.0-187.5	4.9	5.2	5.6	5.7	6.1	6.6	7.1	7.4
Scheduled Thurmond Discharge - CFS								
Stevens Creek Headwater Elevation (ft.-NGVD 1929)	4300	4500	4700	5000	5800	6300	6600	7000
	MW	MW	MW	MW	MW	MW	MW	MW
183.0-184.0	6.2	6.5	6.8	7.2	8.4	9.2	9.6	10.2
184.0-186.0	6.8	7.1	7.4	7.9	9.2	10.0	10.5	11.1
186.0-187.0	7.6	7.9	8.3	8.8	10.2	11.0	11.5	12.2
187.0-187.5	7.9	8.3	8.6	9.1	10.5	11.3	11.8	12.5

Source: Stevens Creek Hydroelectric Project Operations Plan, rev. June 22, 2018
* ft, NGVD 1929 feet in National Geodetic Vertical Datum 1929

When daily average discharges from Thurmond Dam vary from those originally scheduled, Stevens Creek plant operation is adjusted as needed to accommodate the change. In the normal

flow range, the re-regulating operation at Stevens Creek requires using the full active storage (between EL 183.0 feet and 187.5 feet).

3.4.4 OPERATION CONDITIONS – LOW FLOWS (INFLOWS OF 4,000 CFS TO 4,200 CFS)

During periods of low flow in the Savannah River, when Thurmond Dam discharges are reduced to a daily average of 4,000 cfs to 4,200 cfs, the Stevens Creek plant will continue to generate in accordance with the schedule in Table 3-2 to approximate the scheduled daily average discharge from Thurmond Dam. The plant would generate 6 MW to 9 MW, depending on the reservoir elevation. The primary difference from normal conditions would be that the discharge from the Stevens Creek plant would not exceed approximately 4,200 cfs unless more water is discharged from Thurmond Dam. Stevens Creek reservoir fluctuation would be slightly less than under normal conditions, due to the reduced storage required to re-regulate the lower Thurmond Dam discharges.

3.4.5 OPERATION CONDITIONS – DROUGHT (INFLOW OF 3,800 CFS TO 4,000 CFS)

During periods of drought, when Thurmond Dam discharges are reduced to a daily average of 3,800 cfs to 4,000 cfs, the Stevens Creek plant will continue to generate in accordance with the schedule in Table 3-2 to approximate the scheduled daily average discharge from Thurmond Dam. The plant would generate 5 MW to 7 MW, depending on the reservoir elevation. The primary difference from normal conditions would be that the discharge from Stevens Creek plant would not exceed approximately 4,000 cfs unless more water is discharged from Thurmond Dam. Stevens Creek Reservoir fluctuation would be slightly less than under normal conditions, due to the reduced storage required to re-regulate the lower Thurmond Dam discharges.

3.4.6 OPERATION CONDITIONS – SEVERE DROUGHT (INFLOW OF LESS THAN 3,800 CFS)

During periods of severe drought, when Thurmond Dam discharges are less than 3,800 cfs, the Stevens Creek plant will continue to generate in accordance with the schedule in Table 3-2 to approximate the scheduled daily average discharge from Thurmond Dam. Daily average discharge from Thurmond Dam can fall as low as 3,100 cfs as noted in the Savannah River Basin Drought Management Plan.

3.5 CURRENT NET INVESTMENT

The current net investment for the Project as of December 31, 2019 is identified in Appendix D, which is filed as Privileged.

3.6 SUMMARY OF PROJECT GENERATION AND OUTFLOW RECORDS

For the past five years (2014 to 2018), total Project gross generation has averaged 61,288 MWh, ranging annually from approximately 44,000 to 80,500 MWH.

Discharges from the Project are measured at the U.S. Geological Survey (USGS) Streamflow Gauge No. 02197000 (Savannah River at Augusta, Georgia). This gaging station is also referred to as the Butler Creek gauge, and is located approximately 24 miles downstream of Thurmond Dam and 12 miles downstream of Stevens Creek Dam, 11 miles downstream of Augusta Diversion Dam and a short distance downstream of the New Savannah Bluff Lock and Dam operated by USACE. Flows released from the Stevens Creek Dam for the past five years have averaged 7,473 cfs. The minimum instantaneous flow was 2,850 cfs, occurring on October 29, 2013 and the maximum instantaneous flow was 54,700 cfs, occurring on January 2, 2016.

3.7 CURRENT LICENSE REQUIREMENTS

The current Project license contains several Project-specific requirements in addition to the general L-form license articles required of all FERC licensees. Project-specific requirements relating to operating the Project are summarized below. License articles are included in their entirety in the current Project license (Appendix E).

Article 402: Article 402 requires the Project to be operated to re-regulate releases from the up-stream Thurmond Dam. This article further details that the licensee shall contact the Thurmond Dam operators to obtain the predicted operating schedule for the Thurmond Dam and release all flow discharged to it from the Thurmond Dam on a weekly basis. The licensee is required operate the Project with the goal of attaining full pool by the end of the Thurmond Dam's production week to provide, to the extent practicable, a continuous weekend release. This article further requires that the Project is operated in order to minimize pool fluctuations to the extent practicable while discharging flow in response to daily and weekly projects from the Thurmond Dam. Additionally, the reservoir shall be maintained between EL 183.0 feet and 187.5 feet NGVD.

Article 403: Article 403 details the filing and updating of the Project operating plan. The operating plan is required to be updated every five years to accommodate changing operations at up-stream or down-stream dams. The operating plan shall address Project flows, placing particular emphasis on minimizing reservoir fluctuations from March through June, which encompasses the spawning periods of the majority of important game fish. The plan shall also address emergency plant shutdowns, procedures to follow when the flashboards trip, notification of down-stream users when the minimum flow cannot be provided, provisions to address potential future minimum release requirements at the Augusta Diversion Dam, and operating rules that correspond to the anticipated range of average daily flows from the J. Strom Thurmond Dam.

Article 404: Article 404 details the licensee's participation in a cooperative planning process for enhancing dissolved oxygen in the Stevens Creek reservoir and downstream of the Stevens Creek Dam. This article also requires the filing of annual water quality monitoring status reports.

Article 405: Article 405 requires the filing of a water quality monitoring plan for FERC approval. The licensee shall collect data on pH, temperature, dissolved oxygen, and conductivity on a monthly basis from seven monitoring locations. The monitoring results shall be included in the annual status reports required in Article 404. When dissolved oxygen enhancement measures are in place and the monitoring data show that state dissolved oxygen standards are consistently being met in the Stevens Creek reservoir and down-stream of the dam, the Licensee may petition FERC to reduce the frequency of water quality monitoring.

Article 406: Article 406 requires the licensee to annually fund resource-based activities in the Savannah River basin in the amount of $4,700 (1995 dollars), annually. These payments are adjusted to reflect changes in the Consumer Price Index.

Article 407: Within six months after license issuance, and every ten years thereafter, the licensee shall file a resource enhancement plan and implementation schedule for FERC approval using the funds described in Article 406. The plan shall describe specific enhancement activities to be undertaken and contain provisions to monitor the success of these measures. The licensee shall finance the enhancement measures annually, until or unless the FERC determines otherwise. Any enhancement activities may include, but are not limited to, fish stocking, habitat improvement projects, and dissolved oxygen improvement.

Article 408: Article 408 requires the licensee to provide for the construction, maintenance, and operation of up-stream fish passage facilities at its own expense as prescribed by the Secretary of the Interior and Secretary of Commerce. Up-stream fish passage facilities shall consist of a refurbished navigation lock at the Stevens Creek Dam, which shall be operated using attraction flows or other fish attraction mechanisms to provide a minimum of 30 lockages during the American shad migration season. The licensee shall complete design of up-stream fish passage facilities at the Project if and when up-stream fish passage facilities are installed at the Augusta diversion dam down-stream of the Project. Actual construction and operation of the FWS-approved final design will be required within two years after fish passage facilities are in place at the Augusta diversion dam, unless the licensee can effectively document that up-stream fish passage facilities at the Augusta diversion dam are not successfully passing anadromous fish species upstream to the Stevens Creek Dam. In such case, the licensee shall provide up-stream fish passage facilities within two years after fish passage facilities are successfully operating at the Augusta diversion dam.

Article 409: Article 409 details the filing of an aquatic plant management plan for FERC approval.

Article 410: Article 410 requires the licensee to maintain a 50-foot shoreline buffer of trees on licensee-owned land on the Stevens Creek reservoir to minimize soil erosion and maintain aesthetic quality.

Article 413: Article 413 details the development and submittal of a Project recreation plan to include the following recreation enhancements:

1. Existing Stevens Creek recreation site – The licensee shall provide the following enhancements in addition to the existing facilities:
    a. One barrier-free picnic table
    b. One barrier-free restroom
    c. A paved access road, parking for 20 vehicles, and turn-around area
    d. One barrier-free parking space
2. Existing Fury's Ferry recreation site – The licensee shall provide the following enhancements in addition to the existing facilities:
    a. Three picnic tables, one of which is barrier-free
    b. Paved walkways and a shoreline trail
    c. One stationary barrier-free fishing pier with a floating boat dock

d. One barrier-free rest room

e. Gravel parking for 20 vehicles, including one barrier-free parking space

3. Proposed recreation site #1 – The licensee shall develop appropriate access to this site and provide:

    a. An unpaved boat launch

    b. Gravel parking area for six cars and four trailers

    c. One trash receptacle and safety sign

4. Proposed recreation site #2 – This licensee shall develop appropriate access to this site and provide:

    a. An unpaved boat launch

    b. Gravel parking area for seven cars and four trailers

    c. Four fishing stations connected by 520 feet of trails. The fishing stations shall consist of cleared areas on the bank of the creek. Three years after construction, the licensee shall evaluate the fishing stations to determine if benches are appropriate.

    d. One safety sign

5. Tailwater Fishing Platform – The licensee shall provide:

    a. A shore fishing platform below the dam on the Georgia side of the river

    b. Parking for 10 vehicles, including one barrier-free parking space

    c. A walkway from the parking area to the fishing platform

    d. One safety sign

In addition, the licensee shall restrict access to the area in the Sumter National Forest at the end of Forest Road 636B that was originally proposed as a recreation site by installing a gate across the access road to the site. The recreation plan shall comply with the Cultural Resources Management Plan for the project, include a schedule for implementing improvements, and a maintenance plan. The licensee shall provide funds to the Forest Service to maintain the existing Fury's Ferry recreation site and proposed recreation sites #1 and #2. The design and construction of all recreational facilities shall comply with the standards and provisions of the Americans with Disabilities Act (ADA).

Article 414: Article 414 states that a recreation plan update must be filed with the Commission every six years following license issuance, in conjunction with the Form 80 filing. The six-year recreation plan updates must include:

1. Annual recreation use figures for the reservoir and recreation sites,

2. A discussion of the adequacy of the licensee's recreation facilities to meet recreation demand.
3. An assessment of the need for new or expanded facilities
4. A description of the methodology used to collect all study data.
5. Consideration of the following project-specific issues:
    a. Safety, security and vandalism
    b. Navigational problems such as shallow water, heavy boat traffic, and aquatic weed growth
    c. The viability of providing a recreation site, including a year-round accessible boat launch ramp, on the Georgia side of the reservoir.

If the Commission determines that recreation facilities in the Project area are inadequate to meet demand, the Commission may require the Licensee to provide recreation facilities adequate to meet recreation needs in the Project area.

3.8 COMPLIANCE SUMMARY

Compliance with the Project-specific license requirements are described below.

Articles 402 and 403: DESC currently operates the Project according to requirements in Article 402 and maintains the reservoir level within the required fluctuation range of 183.0 feet to 187.5 feet NGVD29. DESC developed their original operating plan according to Article 403 and FERC approved this plan on September 13, 1996. As required by Article 403, DESC updates the operating plan every five years, with the most recent revised operating plan approved by FERC on June 22, 2018. The article also requires DESC to file annual operation reports with FERC. DESC filed the most recent operation report on January 25, 2019.

Articles 404 and 405: DESC prepares an annual Dissolved Oxygen (DO) report according to the requirements listed in Articles 404 and 405. The most recent DO report was filed with FERC on January 29, 2019.

Articles 406 and 407: According to Article 407, DESC must file a resource enhancement plan and implementation schedule every 10 years during the license term using the funds described in

Article 406. DESC filed the Fisheries Resource Enhancement Plan and Implementation Schedule for the period 2006-2015 on November 7, 2005 and FERC approved the plan on October 20, 2006. DESC filed the Fisheries Resource Enhancement Plan and Implementation Schedule for the period 2016-2025 on November 4, 2015 and FERC approved this plan on February 25, 2016. DESC is due to submit the next revised plan in 2025.

Article 408: DESC is required to provide for the construction, maintenance, and operation of upstream fish passage facilities as prescribed by the Secretary of the Interior and Secretary of Commerce. Actual construction and operation of the fish passage facility will be required within two years after fish passage facilities are installed at the Augusta diversion dam downstream of the Project. Fish passage facilities have not yet been installed at the Augusta diversion dam.

Article 409: DESC filed an Aquatic Plant Management Plan for the Project according to Article 409 on May 23, 1996. FERC approved the plan on December 4, 1996. DESC continues to implement appropriate plant control measures according to this plan.

Article 410: As required in this article, DESC maintains a 50-foot shoreline buffer of trees on licensee-owned land at the Project.

Articles 413 and 414: DESC developed their original Recreation Plan in 1997. An updated Recreation Plan was filed with FERC on February 5, 2014 and supplemented September 11, 2014. FERC approved the revised Recreation Plan on March 24, 2015. DESC filed a recreation plan status report pursuant to paragraph (G) of the March 24, 2015 Order and Article 414 on July 16, 2015. FERC approved this status report on July 7, 2016. The next update will need to be filed between April 1 and October 1, 2021.

3.9 A DESCRIPTION OF NEW FACILITIES OR COMPONENTS TO BE CONSTRUCTED, PLANS FOR FUTURE DEVELOPMENT OR REHABILITATION OF THE PROJECT, AND CHANGES IN PROJECT OPERATION

There are no current plans for additional facilities, or modification of existing Project structures or equipment. Additionally, no changes to currently licensed operations are planned for the Project. Studies in progress may result in modifications of Project features or operations, and any such plans will be submitted as part of the FLA.

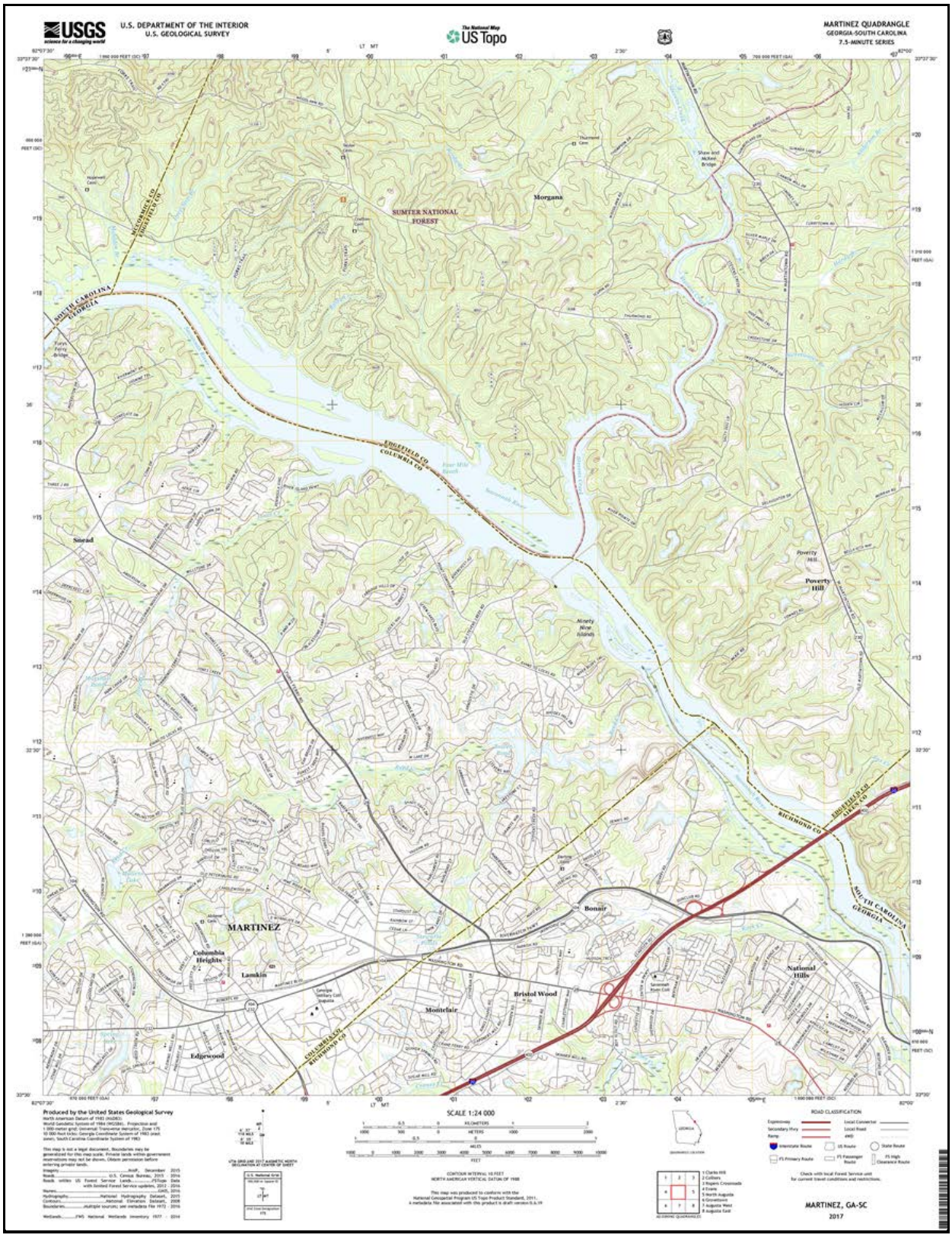
4.0 EXISTING ENVIRONMENT AND RESOURCE IMPACTS [§ 5.6 (d)(3)(i)]

4.1 GEOLOGY AND SOILS [§ 5.6 (D)(3)(II)]

4.1.1 DESCRIPTION OF GEOLOGICAL FEATURES

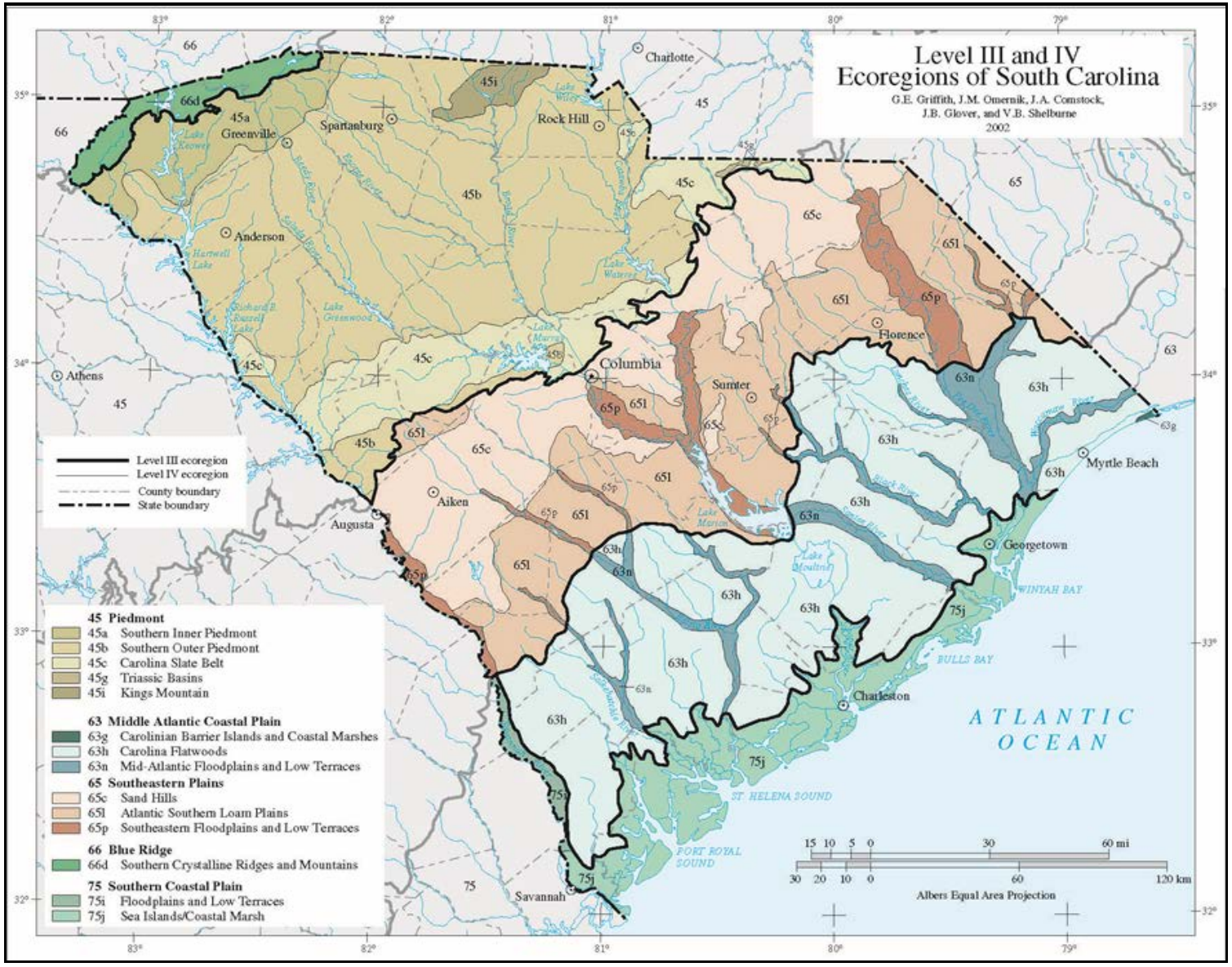
The Project is located along the Columbia County, Georgia and Edgefield and McCormick Counties South Carolina border in the Piedmont physiographic region. The region generally consists of rolling hills dissected by narrow stream and river valleys. Elevations within the region range from approximately 400 feet to 1,000 feet (SCDNR 2019).

The Piedmont region within South Carolina is subdivided into four ecoregions. The Project is located within the Southern Outer Piedmont ecoregion; which tends to have lower elevations, less relief, and irregular plains when compared to other Piedmont ecoregions. The Piedmont region within Georgia is subdivided into five ecoregions. As is the case with South Carolina, the Project is located within the Southern Outer Piedmont ecoregion. General rock types within the region include gneiss, schist, and granite overlain by saprolite and red, clayey subsoils. Local formations within the Project area include migmatite paragneiss and schist of Kiokee belt in Georgia and the Savannah River terrane in South Carolina (SCDNR 2019). The most common rock types are metasedimentary, including biotite-amphibole paragneiss, sillimanite schist, and quartzite.



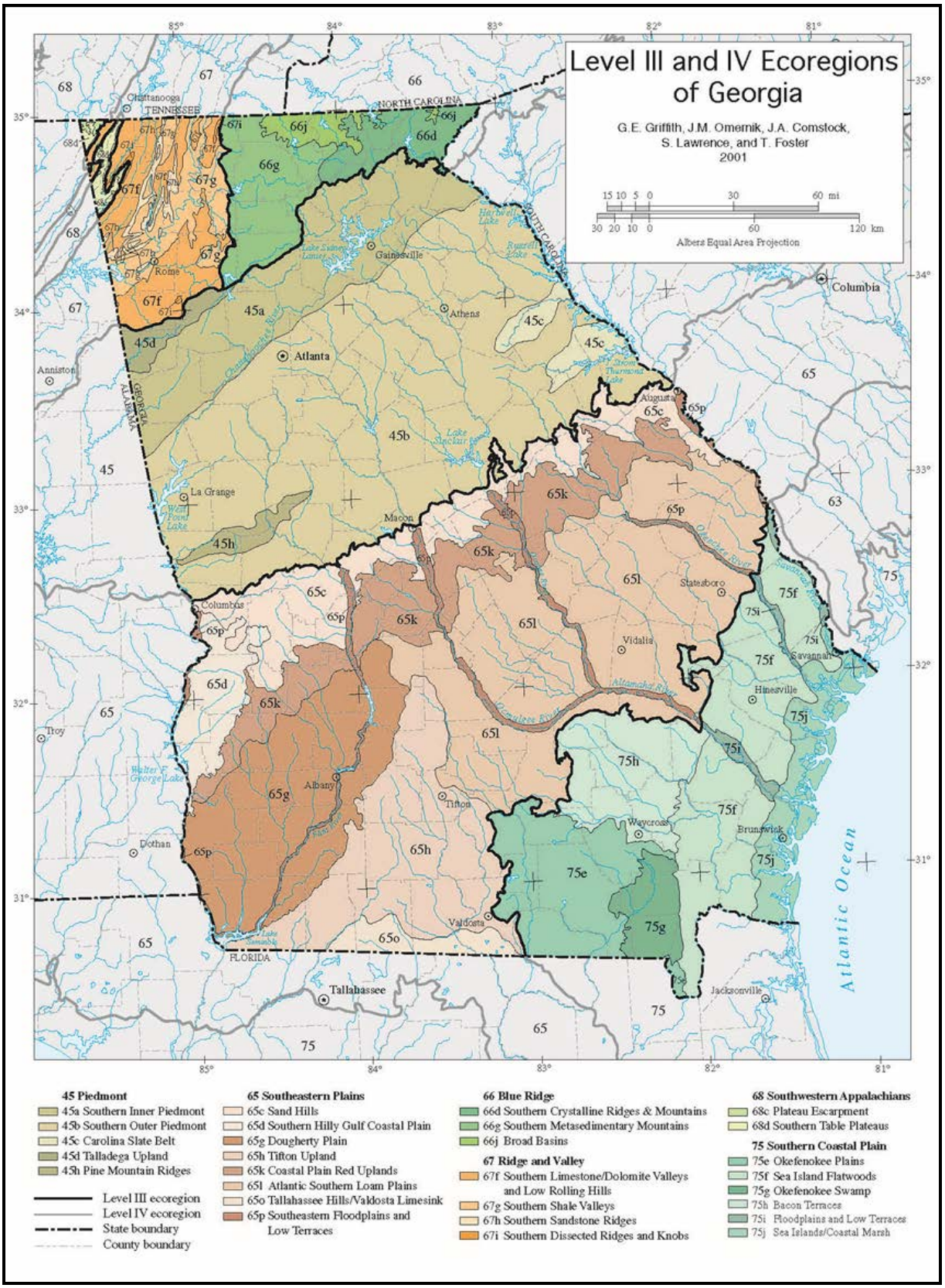
Source: USGS 2017

FIGURE 4-1 TOPOGRAPHY IN THE PROJECT AREA



Source: Griffith et al. 2002

FIGURE 4-2 ECOREGIONS IN SOUTH CAROLINA



Source: Griffith et al. 2001

FIGURE 4-3 ECOREGIONS IN GEORGIA

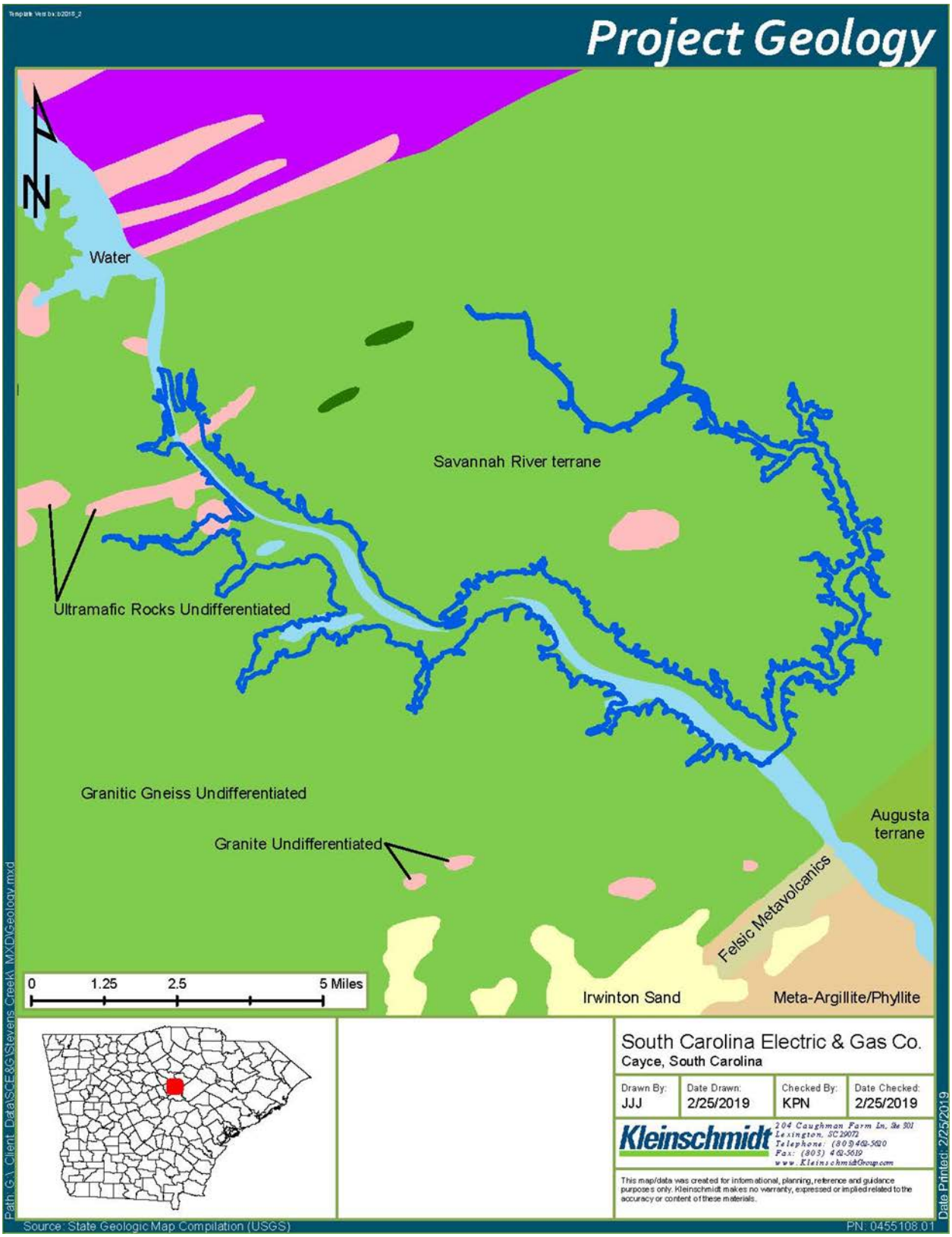


FIGURE 4-4 GENERAL GEOLOGY SURROUNDING THE PROJECT

4.1.2 DESCRIPTION OF SOIL TYPES

Table 4-1 and Figure 4-5 describe soils surrounding the Project area. The most prevalent soil families in the Project area include the Wehadkee, Chewacla, Congaree, Toccoa, Cartecay, and the Cecil-Pacolet (NRCS 2014). The Wehadkee family soils, consisting primarily of silt loams, are poorly drained with zero percent to two percent slopes. Chewacla family soils, consisting of silt loams, loams, and sandy clay loams, are somewhat poorly drained with zero percent to two percent slopes. Congaree family soils, consisting primarily of silt loams, are well drained with zero percent to two percent slopes. Toccoa family soils, consisting of primarily sandy loams, are moderately well drained with zero percent to two percent slopes. Cartecay family soils, consisting of very fine sandy loams, are somewhat poorly drained with zero percent to two percent slopes. Cecil-Pacolet complex consists of both Cecil and Pacolet family soils. Cecil family soils, consisting of sandy loams, clays, and loams, are well drained with 15 percent to 25 percent slopes. Pacolet family soils, consisting of sandy loam and clay, are also well drained with 15 percent to 25 percent slopes (NRCS 2014).

TABLE 4-1 GENERAL GEOLOGY SURROUNDING THE PROJECT

Columbia, McDuffie, and Warren Counties, Georgia			
Map Unit Symbol	Map Unit Name	Acres in AOI*	Percent of AOI
AkA	Altavista sandy loam, 0 to 2 percent slopes	24.0	0.4%
AmB	Appling sandy loam, 2 to 6 percent slopes	30.2	0.5%
AmC	Appling sandy loam, 6 to 10 percent slopes	14.6	0.2%
CfB2	Cecil sandy clay loam, 2 to 6 percent slopes, eroded	6.0	0.1%
CfC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	9.1	0.1%
CfE2	Cecil sandy clay loam, 10 to 25 percent slopes, moderately eroded	73.0	1.2%
CK	Chewacla and Congaree soils	474.5	7.7%
EnD	Enon sandy loam, 10 to 15 percent slopes	20.2	0.3%
GeB	Grover sandy loam, 2 to 6 percent slopes	0.0	0.0%
GeC	Grover sandy loam, 6 to 10 percent slopes	0.6	0.0%
GeD	Grover sandy loam, 10 to 15 percent slopes	0.2	0.0%
HeB	Helena loamy coarse sand, 2 to 6 percent slopes	6.2	0.1%
HeC	Helena loamy coarse sand, 6 to 10 percent slopes	6.4	0.1%
MdB	Madison sandy loam, 2 to 6 percent slopes	0.0	0.0%
MdC	Madison sandy loam, 6 to 10 percent slopes	8.7	0.1%
MdE	Madison sandy loam, 10 to 25 percent slopes	5.5	0.1%
Tv	Toccoa loam	266.9	4.4%
W	Water	1,079.7	17.6%
WeB	Wedowee loamy sand, 2 to 6 percent slopes	1.9	0.0%
WeC	Wedowee loamy sand, 6 to 10 percent slopes	6.2	0.1%
WeD	Wedowee loamy sand, 10 to 15 percent slopes	19.1	0.3%
WeE	Wedowee loamy sand, 15 to 25 percent slopes	7.9	0.1%
Wf	Wehadkee silt loam	621.2	10.1%
WhB	Wickham fine sandy loam, 2 to 6 percent slopes	92.0	1.5%
Subtotals for Soil Survey Area		2,774.4	45.3%
Edgefield County, South Carolina			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ApB	Appling sandy loam, 2 to 6 percent slopes	7.0	0.1%
ApC	Appling sandy loam, 6 to 10 percent slopes	11.6	0.2%
CaB	Cataula sandy loam, 2 to 6 percent slopes	1.8	0.0%
CaC	Cataula sandy loam, 6 to 10 percent slopes	4.7	0.1%
CcB	Cecil sandy loam, 2 to 6 percent slopes	3.1	0.1%
CcC	Cecil sandy loam, 6 to 10 percent slopes	1.5	0.0%
CcD	Cecil sandy loam, 10 to 15 percent slopes	71.3	1.2%
CpE	Cecil-Pacolet complex, 15 to 25 percent slopes	240.1	3.9%
Cw	Chewacla loam, 0 to 2 percent slopes, frequently flooded	74.8	1.2%
EN	Enoree silt loam, 0 to 2 percent slopes, frequently flooded	29.4	0.5%
HwB	Hiwassee sandy loam, 2 to 6 percent slopes	6.9	0.1%
HwC	Hiwassee sandy loam, 6 to 10 percent slopes	32.1	0.5%
HwD	Hiwassee sandy loam, 10 to 15 percent slopes	0.1	0.0%
MeB	Mecklenburg sandy loam, 2 to 6 percent slopes	0.1	0.0%
Rv	Riverview silt loam	44.3	0.7%

To	Toccoa sandy loam	438.1	7.2%
W	Water	1,328.2	21.7%
WeE	Wateree sandy loam, 10 to 25 percent slopes	2.0	0.0%
WkE	Wilkes sandy loam, 15 to 40 percent slopes	14.8	0.2%
WnB	Winnsboro fine sandy loam, 2 to 6 percent slopes	1.0	0.0%
WnD	Winnsboro fine sandy loam, 10 to 15 percent slopes	2.2	0.0%
Subtotals for Soil Survey Area		2,315.1	37.8%
McCormick County, South Carolina			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ApB	Appling loamy sand, 2 to 6 percent slopes	4.3	0.1%
ApC	Appling loamy sand, 6 to 10 percent slopes	0.4	0.0%
Ca	Cartecay and Toccoa soils	352.4	5.8%
CdB	Cecil sandy loam, 2 to 6 percent slopes	16.0	0.3%
CdC	Cecil sandy loam, 6 to 10 percent slopes	1.6	0.0%
Cn	Chewacla loam, 0 to 2 percent slopes, frequently flooded	90.0	1.5%
LoE	Louisburg loamy sand, 10 to 25 percent slopes	2.3	0.0%
PaF	Pacolet sandy loam, 15 to 40 percent slopes	0.4	0.0%
W	Water	283.6	4.6%
We	Wehadkee soils	282.4	4.6%
Subtotals for Soil Survey Area		1,033.5	16.9%
Totals for Area of Interest		**6,123.0**	**100.0%**

Source: NRCS 2014
*AOI area of interest

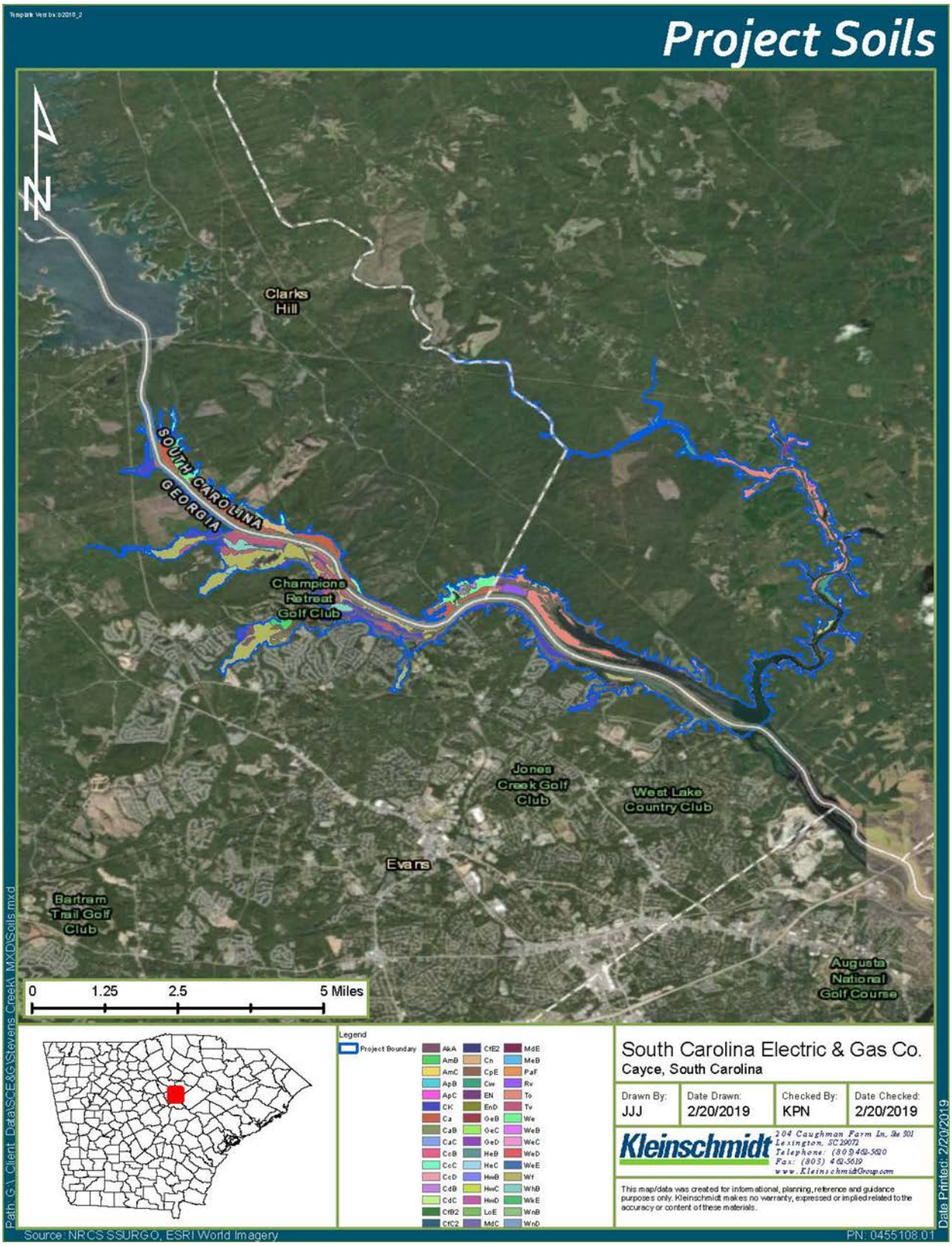


FIGURE 4-5 SOILS WITHIN PROJECT BOUNDARY

4.1.3 DESCRIPTION OF RESERVOIR SHORELINES AND STREAM BANKS

Most of the area within the Project boundary consists of gradual slopes ranging from zero percent to five percent. Some smaller portions of the shoreline contain steeper slopes ranging from 5 percent to 45 percent. Figure 4-6 illustrates representative slopes within the Project boundary.

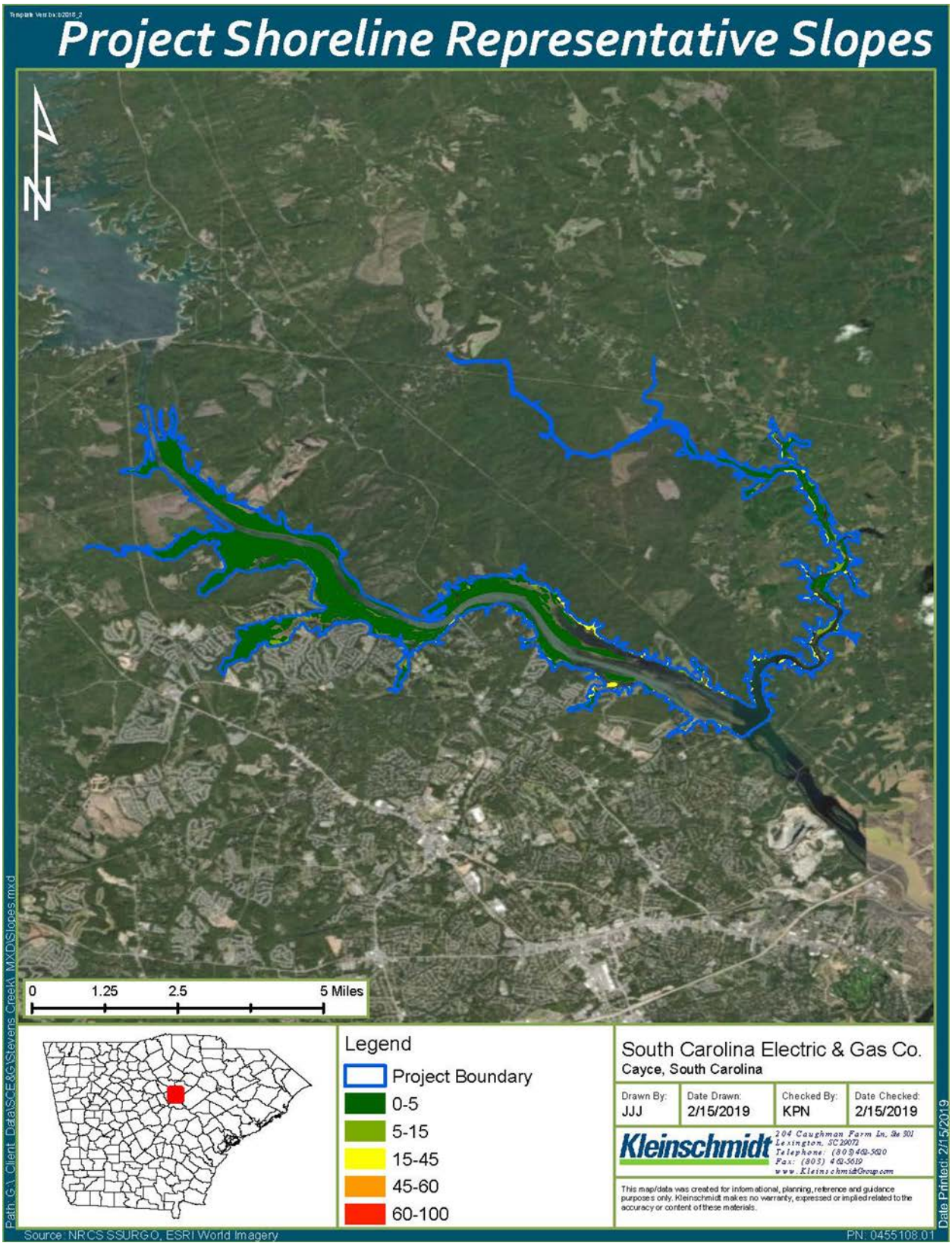


FIGURE 4-6 SLOPES WITHIN PROJECT BOUNDARY

Shorelines within the Project boundary are subject to anthropogenic disturbances including residential developments and structures to support recreational and Project-related activities. Shorelines surrounding the Project are primarily forested, with a large majority of the northern shoreline bordering USFS lands. The western shoreline in Georgia and the eastern shoreline in South Carolina contain the areas most influenced by residential development.

4.1.4 EXISTING EROSION, MASS SOIL MOVEMENT, SLUMPING, OR OTHER FORMS OF INSTABILITY

DESC performs annual shoreline inspections at Stevens Creek Reservoir to identify any areas of erosion along the shorelines. Annual erosion inspections are generally conducted simultaneously with required inspections of historic properties at the Project. Shoreline inspections at the Project are conducted upstream of Stevens Creek Dam following both the Stevens Creek and Savannah River arms. Stevens Creek shorelines are inspected up to the Woodlawn Road Bridge. Savannah River shorelines are inspected up to the Thurmond Dam. Inspections during 2017 and 2018 found no signs of significant erosion. Shorelines were found to be well vegetated with aquatic vegetation as well as mature timber that provides adequate protection from erosion during normal river flows and plant operations.

4.1.5 POTENTIAL ADVERSE EFFECTS AND ISSUES

Fluctuations of Stevens Creek Reservoir caused by operations of Thurmond Dam could contribute to shoreline erosion at the reservoir. DESC monitors the shorelines annually for signs of erosion. Shoreline erosion is currently not a significant issue at Stevens Creek Reservoir.

Sedimentation within the Project reservoir was identified as a concern during public scoping meetings. Sedimentation can occur specifically around the confluence of Stevens Creek and the Savannah River. Individuals indicated that navigation can be difficult in this area due to high sediment deposits, causing boaters to enter the buoy lines upstream of the dam to access the main river channel. Although a navigation concern, the sedimentation has not caused any issues with Project operations. High sediment load in the Project waters is attributed to heavy rains and high flows in the Project area. Sediment deposits appear to change depending on these factors.

4.1.6 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

No mitigation or enhancement measures relating to geology and soils at the Project are planned. Should questions about Project effects on geology or soils arise during relicensing, DESC will consider appropriate actions to mitigate. If any major structural changes of the Project are planned, construction will comply with appropriate sediment erosion control requirements; however, no structural changes to the Project are proposed.

4.1.7 REFERENCES

Griffith, G.E., J.M. Omernik, J.A. Comstock, S. Lawrence, and T. Foster. 2001. Level III and IV Ecoregions of Georgia: Corvallis, Oregon. U.S. Environmental Protection Agency (map scale 1:1,500,000).

Griffith, G.E., J.M. Omernik, J.A. Comstock, J.B. Glover, and V.B. Shelburne. 2002. Level III and IV Ecoregions of South Carolina: Corvallis, Oregon. U.S. Environmental Protection Agency (map scale 1:1,500,000).

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U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2014. Web Soil Survey. Online URL: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed February 5, 2019.

U.S. Geological Survey (USGS). 2017. Martinez Quadrangle, Georgia-South Carolina, 7.5-Minute Series. The National Map: US Topo.

4.2 WATER RESOURCES [§ 5.6 (D)(3)(III)]

DESC operates the Project to generate clean, renewable energy and re-regulate highly variable river flows discharged by the USACE from the Thurmond Dam. DESC's operational protocols include releasing all Thurmond Dam discharges on a weekly basis and operating to achieve full pool in the Stevens Creek reservoir by Friday evening to provide a continuous weekend discharge. Article 402 of the existing license requires the licensee to obtain the predicted Thurmond Dam discharge schedule from the USACE to minimize pool fluctuations while providing discharges in response to Thurmond Dam's planned operational schedule. DESC maintains the Stevens Creek reservoir between EL 183.0 feet and 187.5 feet NGVD.

DESC files updates to the operating plan with FERC every five years pursuant to License Article 403. The operating plan describes operational protocols at the Project based on releases from Thurmond Dam during flood conditions (i.e., higher than 30,000 cfs), high flow conditions (8,300 to 30,000 cfs), normal flows (4,200 to 8,300 cfs), low flows (4,000 to 4,200 cfs), drought (3,800 to 4,000 cfs), and severe drought (flows less than 3,800 cfs). FERC approved the most recent operation plan on June 22, 2018. The intent of the operating plan is to develop minimum flows for Stevens Creek under various operating conditions, improve operational efficiency, minimize reservoir fluctuations (particularly during March through June spawning periods), provide more uniform downstream flows, and to address planned storage under different Thurmond Dam operating scenarios. Re-regulation of river flows benefits downstream water users (e.g., Augusta Canal), sustains aquatic habitats, and improves water quality by re-oxygenating water released from anoxic zones at the Thurmond Dam.

4.2.1 DRAINAGE AREA

The Project is approximately 8 RMs upstream of Augusta, Georgia, and 209 RMs from the Atlantic Ocean. The drainage area at the Project is approximately 7,173 square miles (FERC 1995) and is shown in Figure 4-7.

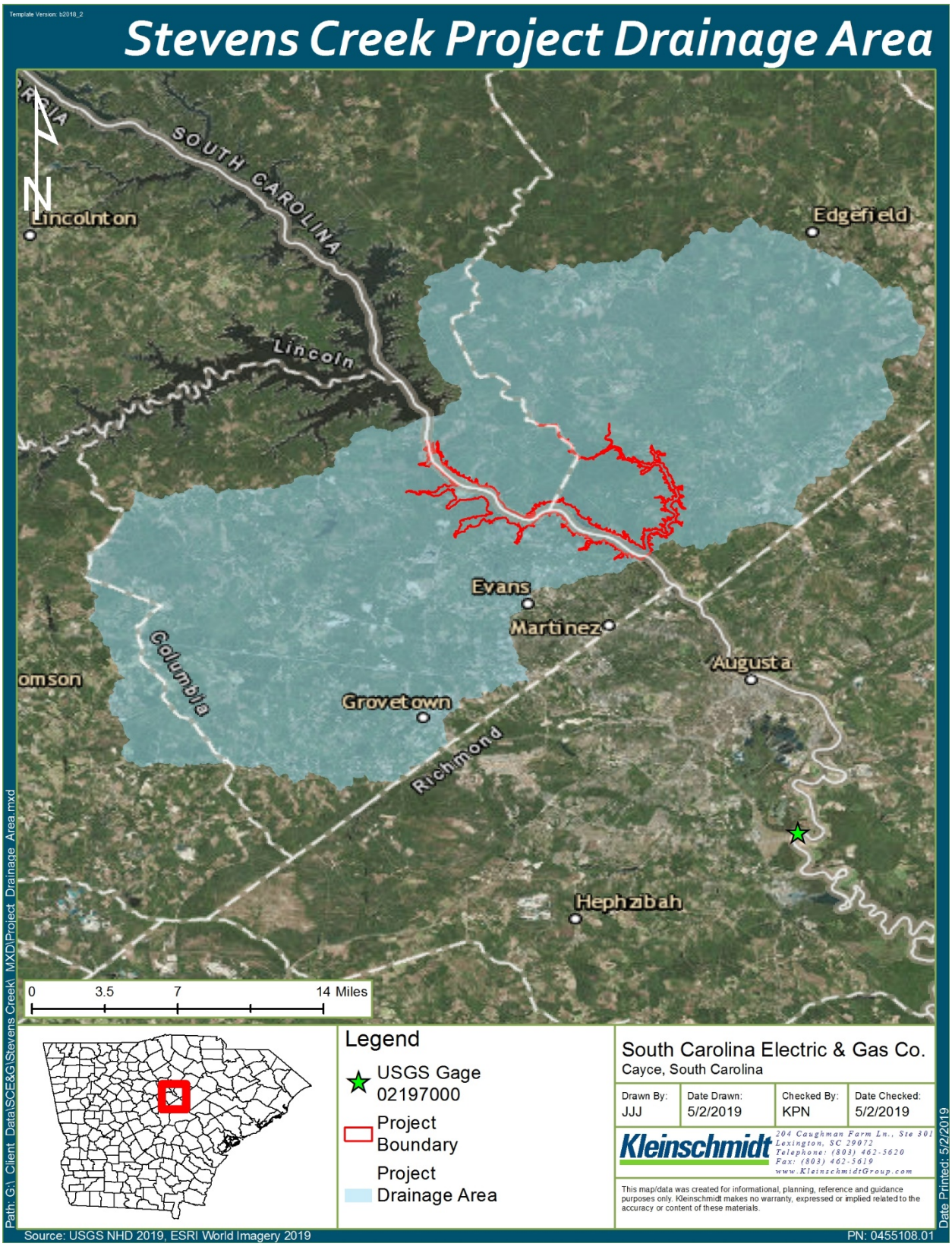

FIGURE 4-7 STEVENS CREEK PROJECT DRAINAGE AREA

4.2.1.1 RIVER FLOW CHARACTERISTICS

Mean, median, minimum, and maximum river flows by month as reported by USGS at river gage # 02197000 (Savannah River – Augusta; located just downstream of the New Savannah Bluff Lock and Dam (NSBLD) approximately 21 RMs downstream of the Stevens Creek Dam) are provided in Table 4-2. Annual and monthly flow duration curves are provided in Appendix F. Data from USGS gage # 02197000 was pro-rated by a factor of 0.95 (i.e., river flow values at the USGS gage were reduced by five percent) to account for the difference in the drainage area at the Project (7,173 square miles) and the gage (7,510 square miles). The period of record for this hydrologic analysis is 30 years (1998 to 2018).

TABLE 4-2 MONTHLY MINIMUM, MEAN, AND MAXIMUM RIVER FLOWS AT USGS GAGE # 02197000

MONTH	AVERAGE	MEDIAN	MINIMUM	MAXIMUM
January	11,712	8,166	4,311	49,637
February	12,560	9,005	5,661	43,343
March	12,779	9,452	4,941	32,678
April	10,240	8,058	5,034	29,809
May	9,377	7,468	5,317	30,136
June	8,980	7,627	5,264	36,296
July	9,363	7,807	5,343	40,673
August	9,354	8,172	5,297	34,202
September	8,312	7,549	5,441	24,205
October	8,687	8,687	4,732	49,339
November	9,398	7,236	4,444	42,199
December	11,260	7,868	5,372	33,817
Annual	10,152	7,807	4,311	49,637

Source: USGS 2018

4.2.2 EXISTING AND PROPOSED USES OF PROJECT WATERS

DESC operates the Project to generate hydropower and re-regulate flows from the Thurmond Dam Project. The USACE is authorized by Congress to manage the Thurmond Dam Project for water supply, water quality, hydropower production, flood risk management, downstream navigation, recreation, and fish and wildlife management.

The Augusta Diversion Dam and Augusta Canal, a 13-mile-long historic and functional canal, are approximately one-mile downstream of the Project. The Augusta Canal was designed to harness

water power at the Fall Line[3] to drive mills, provide transportation of goods, and provide a municipal water supply. It is the only canal in the United States in continuous use for its original purposes of providing power, transport, and municipal water. Today, the Augusta Canal provides drinking water to the City of Augusta, recreational and tourism opportunities, and hydropower.

Municipalities and industries withdraw water from and discharge treated waste water into the Savannah River in compliance with state permitting requirements. Entities near the Project withdrawing water from or discharging treated waste water into the Savannah River include the City of Augusta (GA), the City of North Augusta (SC), Columbia County (GA) Water and Sewer, and Edgefield County Water and Sewer (SC). Columbia County's Little River Water Pollution Control Plant discharges to the Savannah River within the Project reservoir approximately one mile upstream of the Highway 28 bridge crossing.

4.2.3 Existing Instream Flow Uses of Streams in the Project Area That Would be Affected by Project Operation

DESC will continue to re-regulate river flow released from the USACE's upstream hydropower facilities. DESC is proposing no changes to operations that would affect the USACE facilities, the City of Augusta's Diversion Dam and canal system, or other water users. DESC holds all flowage easements to operate the Project.

4.2.4 Relevant Federally Approved Water Quality Standards Applicable to Project Waters

The Environmental Protection Division of GADNR is charged with establishing and maintaining the quality and quantity of Georgia's water resources. South Carolina's water quality is managed and administered by the South Carolina Department of Health and Environmental Control. The Savannah River at the Project is a Class A water, with a designated use of drinking water. All fresh water systems in Georgia and South Carolina must meet the following criteria:[4]

- DO: A daily average of 5.0 milligrams per liter (mg/L) and no less than 4.0 mg/L for water supporting warm water species of fish.

[3] A 20-mile-wide geologic boundary that divides the Piedmont and Coastal Plain physiographic provinces.
[4] Rules and Regulations of the State of Georgia (http://rules.sos.ga.gov/GAC/391-3-6-.03); South Carolina Water Classifications and Standards (https://live-sc-dhec.pantheonsite.io/sites/default/files/media/document/R.61-68.pdf).

- pH: Within the range of 6.0 – 8.5.
- Water Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than 5°F above intake temperature except that in estuarine waters the increase will not be more than 1.5°F.
- Safe Drinking Water Standards – numerous standards exist for safe drinking water and pollutant discharges (e.g., arsenic, polychlorinated biphenyl [PCB]); however, given that the Project does not produce or discharge toxins, these standards are not discussed further.

The states of Georgia and South Carolina classified the Savannah River from Clarks Hill Lake (Thurmond Dam Reservoir) to Johnson's Landing as impaired due to low DO. The impaired reach includes the Project area, the USACE dams, and the Augusta Diversion Dam. Water released from behind the Thurmond Dam can have low DO levels depending on the depth of the withdrawal and the time of the year. A total maximum daily load (TMDL) was completed by the state of Georgia in 2000. In 2011, USACE installed a major oxygen diffuser system in the Thurmond Dam Reservoir to provide supplemental DO to support aquatic and fisheries habitat. The system consists of nine diffuser pipes installed at four elevations that supply DO to the impounded waters. The diffusers are supplied with pure gaseous oxygen from an onsite liquid storage and supply facility. The oxygen supply facility is capable of infusing over 200 tons of oxygen per day.

4.2.5 EXISTING WATER QUALITY INFORMATION

As required by License Article 404 and Article 405 of the Project license, DESC has been involved with the collection and synthesis of DO, pH, conductivity, and water temperature data for the past 22 years at eight monitoring locations throughout the Stevens Creek reservoir and in the tailwater. DESC files annual reports with FERC in January each year describing the monitoring results from the previous year. Data is provided by the USACE and the USGS for incorporation into the annual reports. Annual water quality reports are incorporated by reference into this filing.

Monitoring results from 2010 to 2018 revealed that DO levels in the Thurmond Dam and Stevens Creek reservoirs were above the instantaneous state standard (4 mg/L) during the winter and spring. The Thurmond Dam Reservoir begins to stratify annually in early summer, resulting in decreased DO levels near the low-level turbine intakes. DO levels typically become hypoxic/anoxic by mid-August within the hypolimnion of the J. Strom Thurmond forebay. DO levels in discharges from J. Strom Thurmond are typically below 4 mg/L starting in early July and

continuing through October. During these seasonally low DO months, the main body of the Stevens Creek Reservoir in the Savannah River remained above the instantaneous standard for DO of 4 mg/L. DO levels in the Savannah River immediately downstream of the Project (i.e., in the tailwater) also remained above the 4 mg/L standard. The lowest DO levels in the Stevens Creek Reservoir are typically found in Stevens Creek, approximately three miles upstream of its confluence with the Savannah River. The J. Strom Thurmond Reservoir typically de-stratifies annually in mid-fall, resulting in DO levels in J. Strom Thurmond and Stevens Creek Reservoirs that meet or exceed state standards. The monitoring data demonstrate that re-oxygenation occurs as water passes through Stevens Creek Reservoir and the Stevens Creek powerhouse. Additionally, values for temperature, pH and specific conductivity were within the normal range through the main body of the reservoir and below the Project. Figure 4-8 depicts the locations at which DESC has collected water quality data under its current license requirements. Box plots of mean monthly water temperature, DO, specific conductance, and pH are provided in Figure 4-9 through Figure 4-14.

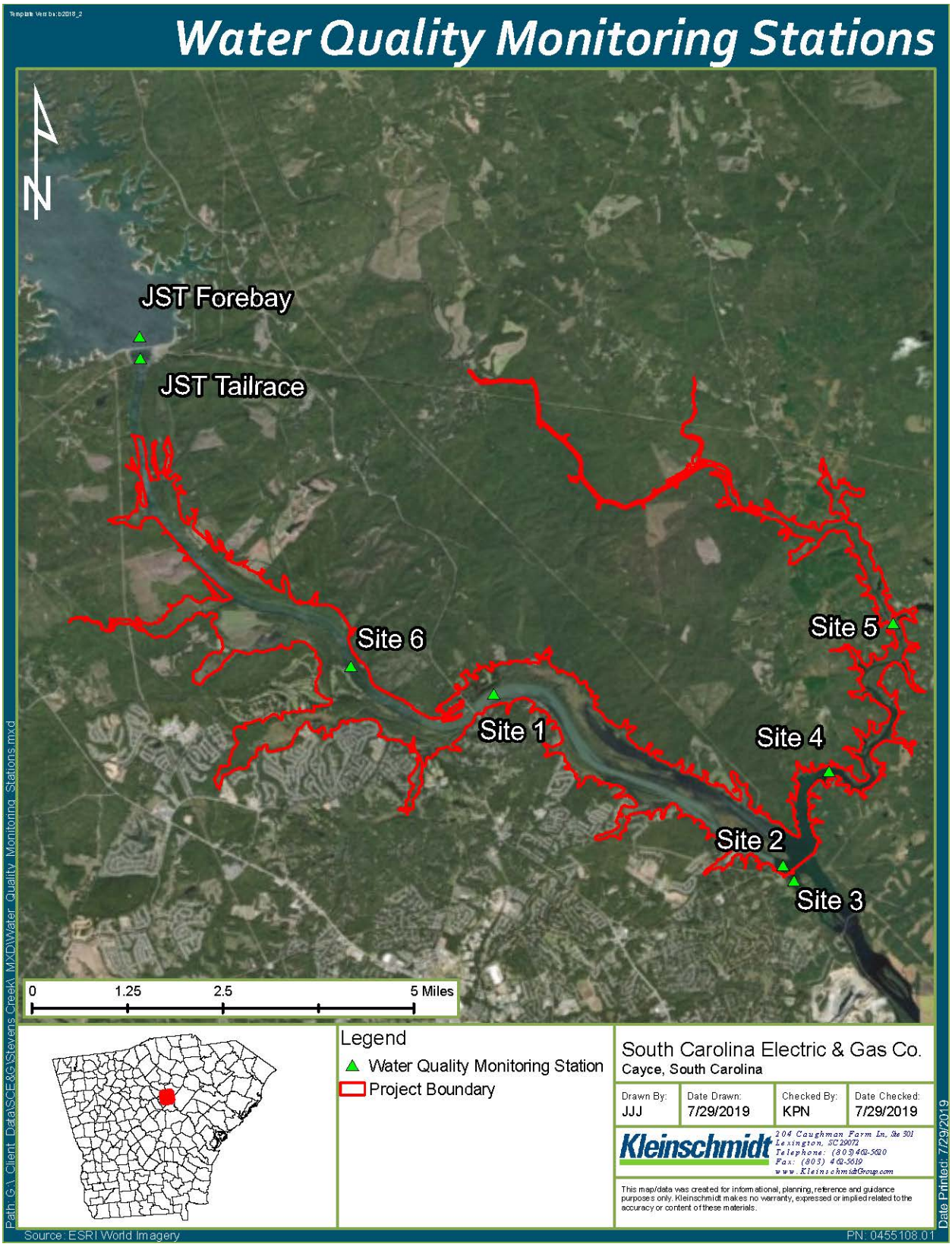

FIGURE 4-8 WATER QUALITY MONITORING STATIONS AT STEVENS CREEK PROJECT

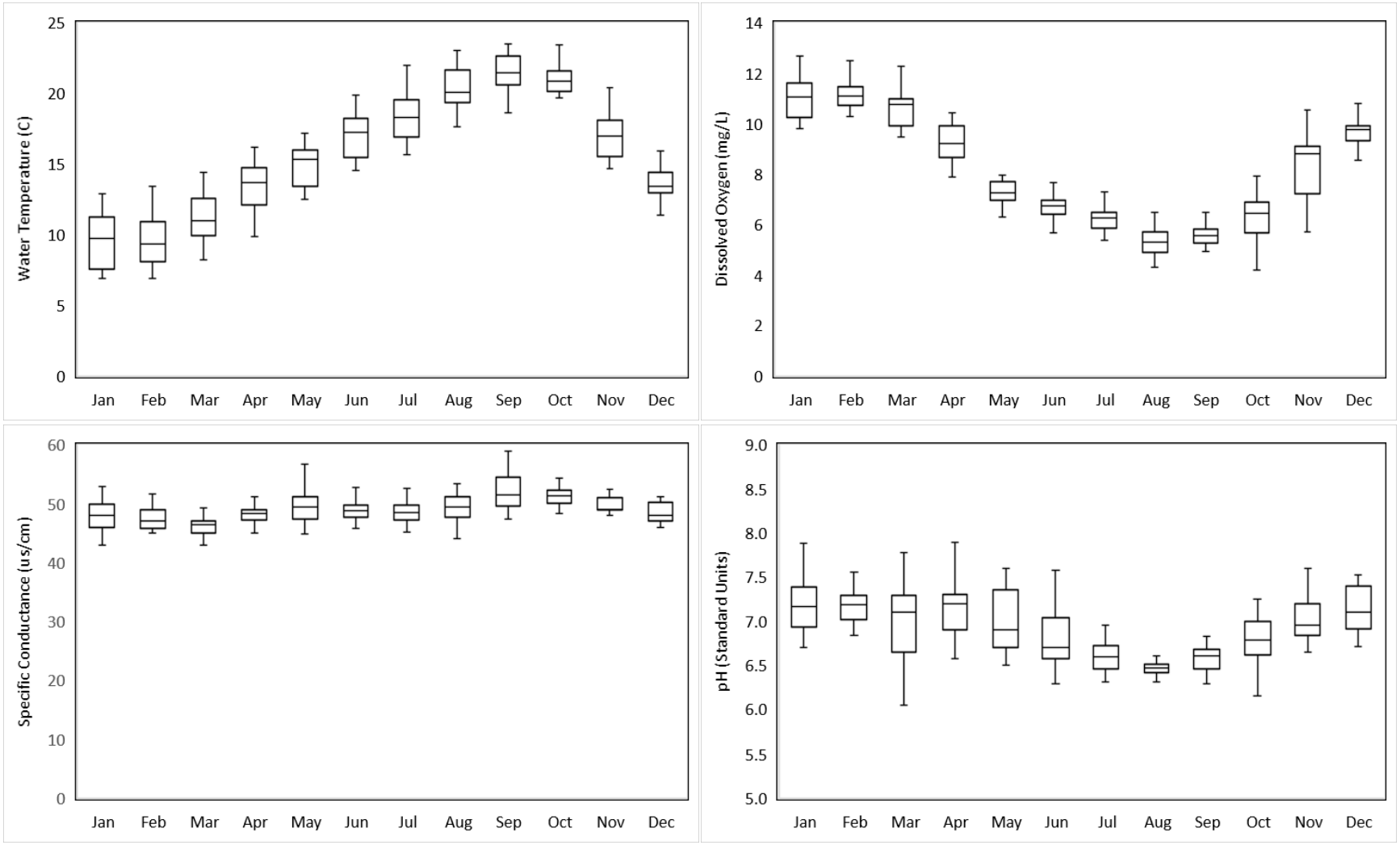

FIGURE 4-9 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 1 (2010 -2018)

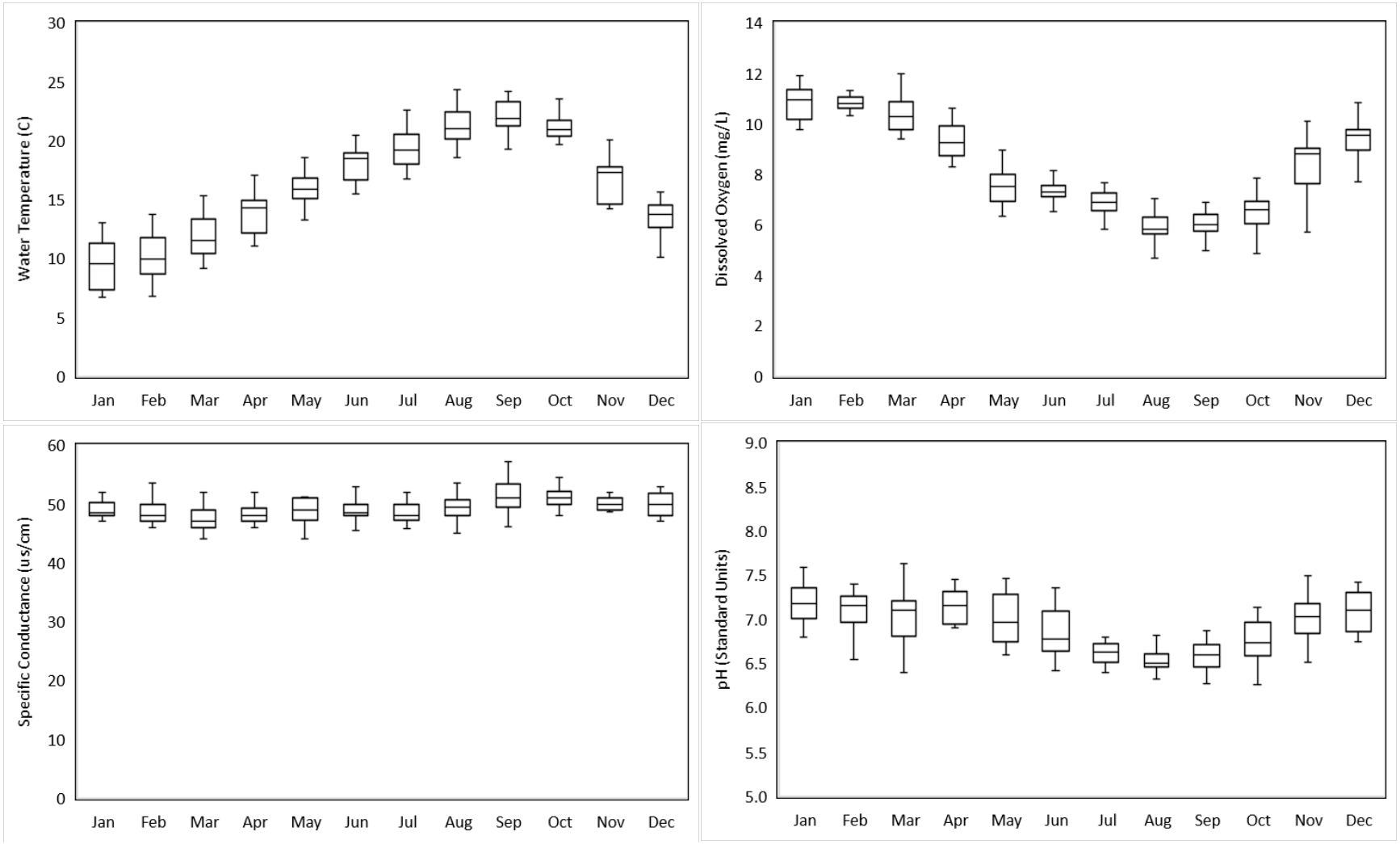

FIGURE 4-10 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 2 (2010 -2018)

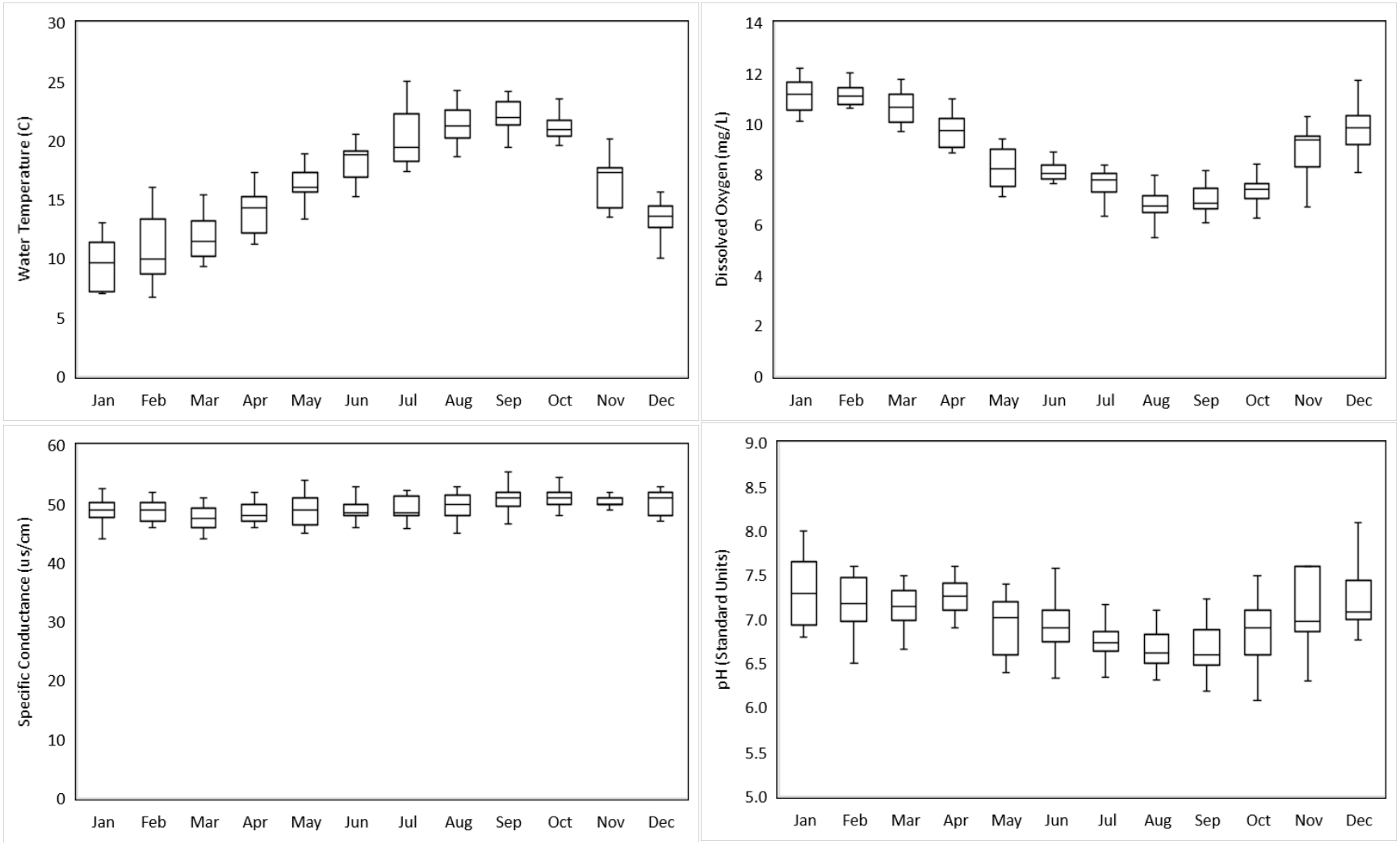

FIGURE 4-11 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 3 (2010 -2018)

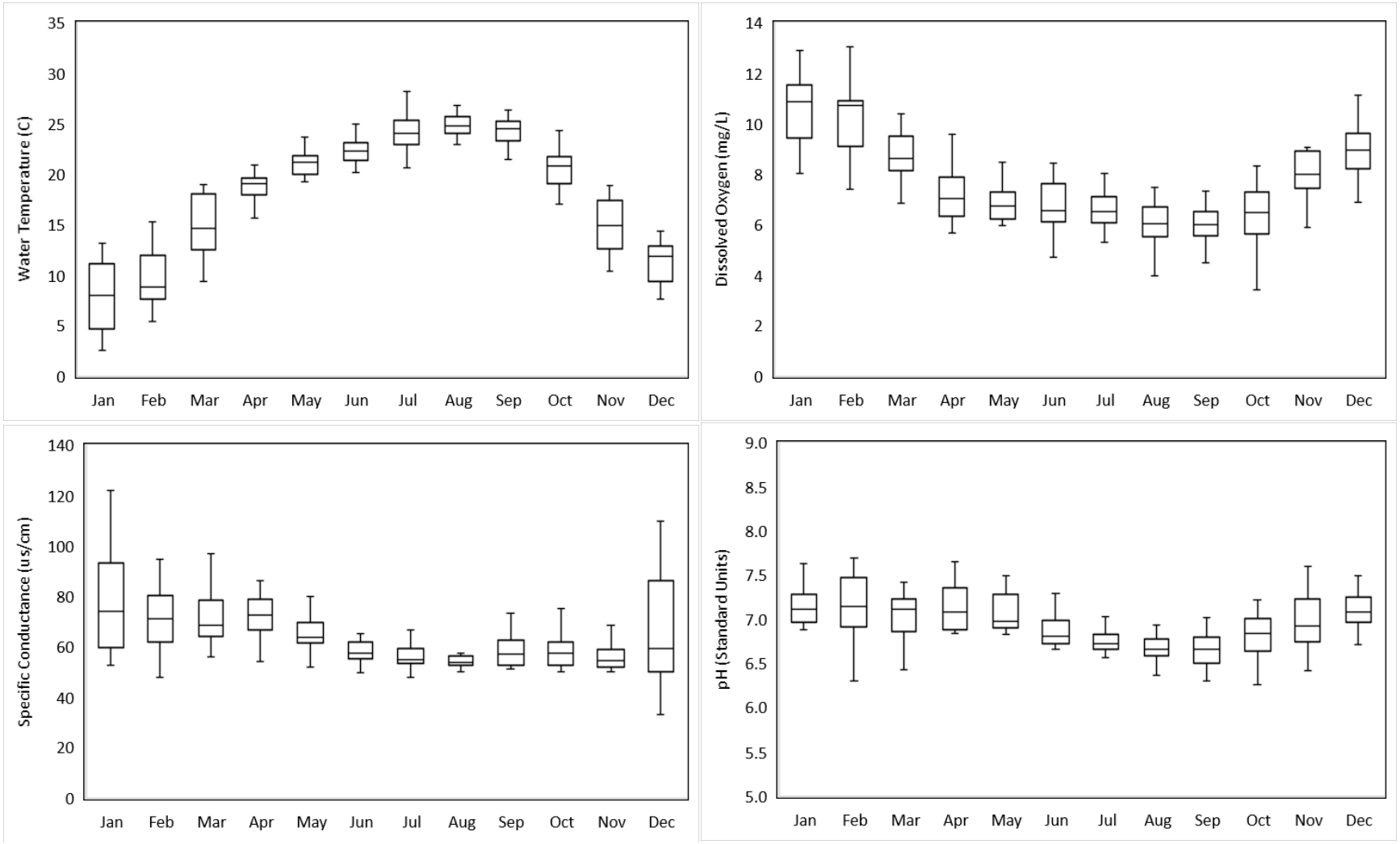

FIGURE 4-12 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 4 (2010 -2018)

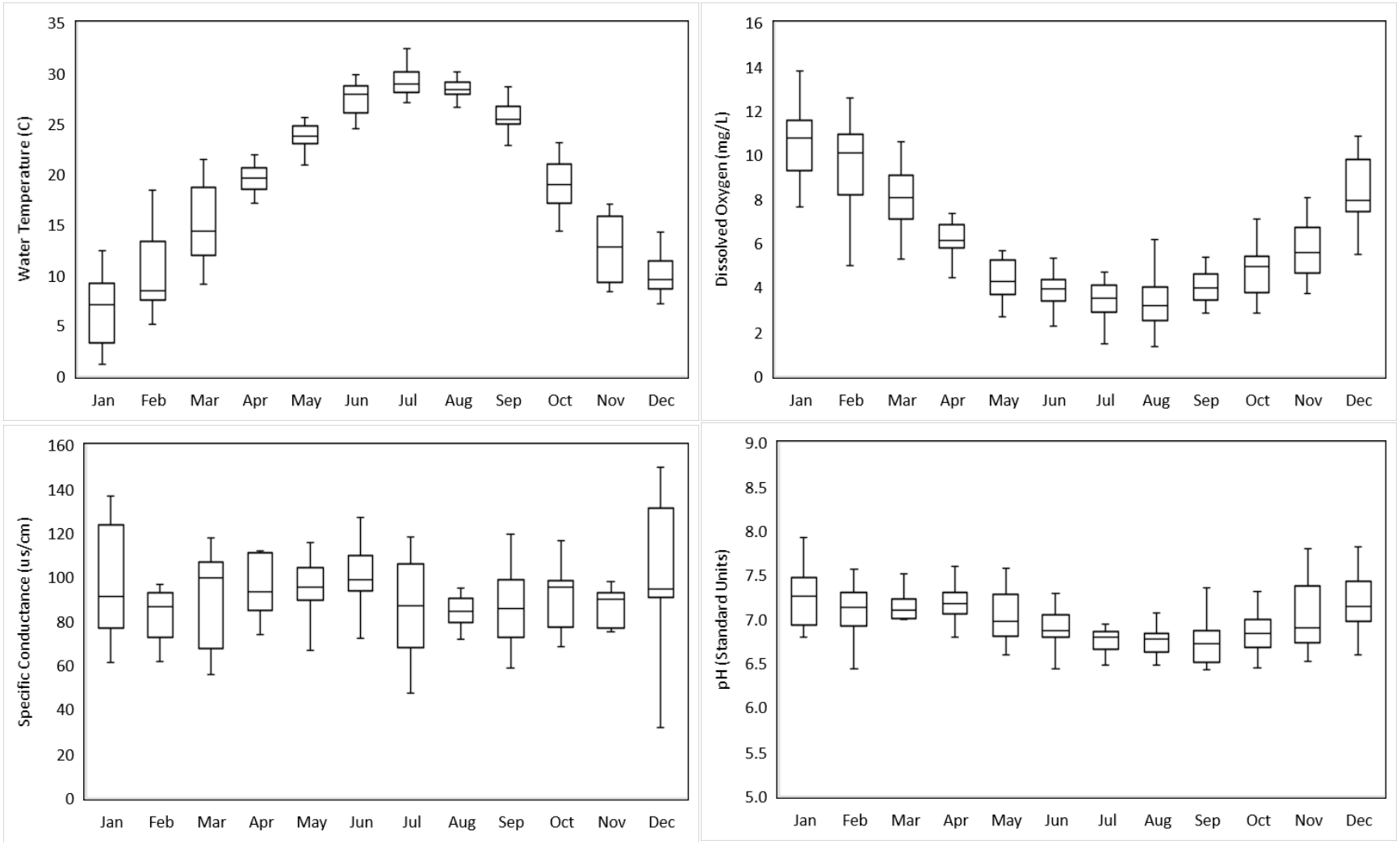

FIGURE 4-13 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 5 (2010 -2018)

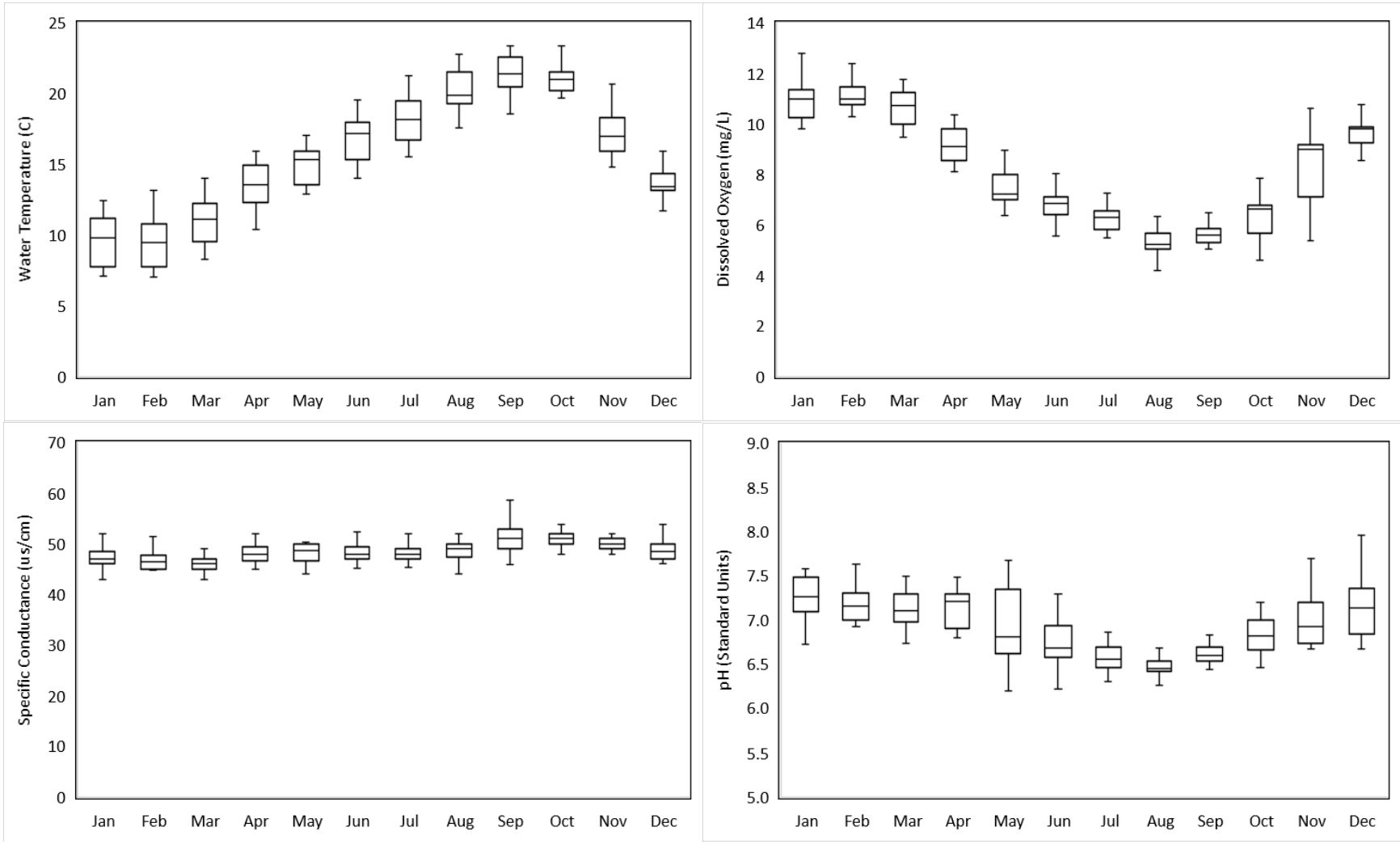

FIGURE 4-14 BOX PLOTS OF WATER QUALITY MEASUREMENT RESULTS AT SITE 6 (2010 -2018)

Phinizy Center for Water Sciences (PCWS) has monitored DO, water temperature, pH, and specific conductance[5] in the Savannah River at several stations since 2005. In water year 2017 (October 1, 2016 – September 30, 2017), PCWS's closest station to the Project was located at RM 202 at the base of the Augusta Shoals, which is approximately 7 RMs downstream of the Stevens Creek Dam. PCWS's sampling at RM 202 during the 2017 water year demonstrated that:[6]

- There were no average daily temperatures or instantaneous readings above the state standard of 90°F; average monthly water temperature ranged from 54.1°F in January to 77.9°F in August.
- There were no daily or instantaneous DO measurements below state standards during the 2017 water year; monthly average DO ranged from 8.2 mg/L in August to 10.5 mg/L in January.
- Monthly average pH met the standard (6.0 to 8.5) throughout the year; average monthly pH ranged from 7.0 to 7.3.
- Instantaneous pH was above 8.5 for 57.5 hours in 2017, primarily in May (86 percent of the values were measured in May); elevated pH values were attributed to high levels of production (i.e., photosynthesis) within the Augusta Shoals.
- Monthly average measurements of specific conductance ranged from 50.6 in November to 55.6 in September; specific conductance was relatively low at RM 202 as compared to stations lower in the river system.

In water years 2014, 2015, and 2016, PCWS monitored water quality at RM 214, which is, approximately 5 miles upstream from the Stevens Creek Dam and 8 miles downstream of the Thurmond Dam. PCWS's sampling during the 2016 water year at station 202 and 214 demonstrated that:[7]

- There were no average daily temperatures or instantaneous readings above the state standard of 90°F; average monthly water temperature ranged from 50.9°F in February to 76.1°F in September at RM 202 and from 48.6°F in February to 72.1°F in October within the Stevens Creek Reservoir at RM 214.
- Mean daily DO levels met or exceeded state water quality standards at RM 202 and 214; monthly average DO ranged from 8.2 mg/L in September to 11.1 mg/L in February at RM 202 and from 5.4 in August to 10.9 in February at RM 214.
- Monthly average pH ranged from 6.6 to 7.4 at RM 202 and from 6.1 to 6.9 at RM 214.
- Monthly average measurements of specific conductance ranged from 47.8 to 51.2 at RM 202 and from 45.8 to 52.9 at RM 214; specific conductance was relatively low at RM 202 and 214 as compared to stations lower in the river system.
- Water quality met or exceeded state standards at both sites.

[5] Specific conductance is a measure of dissolved ions in the water and can be an indication of pollution.
[6] PCWS 2017.
[7] PCWS 2016.

Similar patterns were observed at RM 214 during water year 2015 and 2014 by PCWS, except that daily average DO was below 5 mg/L for six days in the summer of 2015 and 21 days during the summer of 2014; no instantaneous measurements were below 4 mg/L (PCWS 2015;2014). Precipitation in the summer of 2014 and 2015 was below the long-term average, resulting in the early onset of stratification in the JST Reservoir (PCWS 2015; 2014), which may have contributed to the low DO values observed in the Stevens Creek Reservoir. Regardless, given that DO can reach 0.0 mg/L in waters released from the Thurmond Dam, monitoring data demonstrate that re-oxygenation occurs as water passes through Stevens Creek Reservoir, powerhouse, and through the Augusta Shoals.

PCWS monitored concentrations of nutrients and carbon at RM 202 and 214 in 2016 and 2017 (Table 4-3). Nutrients and carbon are important components of aquatic ecosystem function and can cause water quality problems if they are present in large qualities. Primary production can be limited by one or more of these nutrients, usually phosphorus or nitrogen. PCWS analyzed water samples from RMs 214 and 202 for ammonia (NH3), nitrate/nitrite (NOx), total nitrogen, total phosphorus, dissolved organic carbon (DOC), and total organic carbon (TOC). Table 4-3 summarizes the monitoring results. Median nutrient (nitrogen and phosphorus) concentrations within the river met or exceeded levels recommended by the U.S. Environmental Protection Agency (EPA) that are considered minimally impacted by human activities and protective of aquatic life and recreational uses (PCWS 2017).

TABLE 4-3 NUTRIENT AND CARBON CONCENTRATION (MG/L) AT RIVER MILE 202 AND 214, 2016 AND 2017

	River Mile 214		River Mile 202	
Variable Measured	**2016 (Min/Max)**	**2017 (Min/Max)**	**2016 (Min/Max)**	**2017 (Min/Max)**
NH3	0.00 / 0.14	Not measured	0.00 / 0.14	0.00 / 0.14
NOx	0.11 / 0.27		0.13 / 0.33	0.06 / 0.26
Total N	0.10 / 0.60		0.00 / 0.64	0.00 / 0.59
Total P	0.01 / 0.06		0.00 / 0.05	0.00 / 0.10
DOC	2.70 / 6.91		3.20 / 6.10	2.00 / 5.77
TOC	2.40 / 5.92		2.80 /	2.20 / 14.00

Source: PCWS 2016, 2017

4.2.6 RESERVOIR CHARACTERISTICS

The Stevens Creek Reservoir is approximately 25 RMs long, extending 13 miles upstream to the Thurmond Dam and 12 miles into Stevens Creek. The surface area of the reservoir is 2,400 acres at the normal full pond EL 187.5 feet[8] (FERC 1995). Substrates consist mostly of sand and silt (FERC 1995). The gradient of the river bottom is moderately steep in the upper reservoir but is less steep in areas downstream of the Route 28 bridge (FERC 1995). The Savannah River at the Stevens Creek Dam is approximately 3,500-feet-wide with numerous islands and shoreline habitats. The river narrows to approximately 700-feet near the Thurmond Dam. The maximum drawdown of 4.5-feet exposes approximately 575 acres of littoral zone habitat (FERC 1995).

As required by License Article 404 and Article 405 of the Stevens Creek Project license, SCE&G has collected DO, pH, conductivity, and water temperature data for the past 22 years at monitoring stations throughout the Stevens Creek reservoir and in the tailwater. Measurements were collected once monthly on two consecutive days during the months of November to May. In June to October, measurements were collected diurnally (morning and afternoon) on two consecutive days twice per month. Measurements were collected at the surface (0.2 meters) and at 1-meter intervals. Figure 4-15 to Figure 4-18 provide a summary of vertical profile measurements collected at Site 2, located in the Project forebay, from 2010 to 2018. The data in the figures represent the monthly average value at each depth strata for each parameter during the monitoring period. Based on the data, the Stevens Creek reservoir does not appear to exhibit thermal or chemical stratification and is relatively homogenous and well-mixed.

[8] Elevations reported using the National Geodetic Vertical Datum.

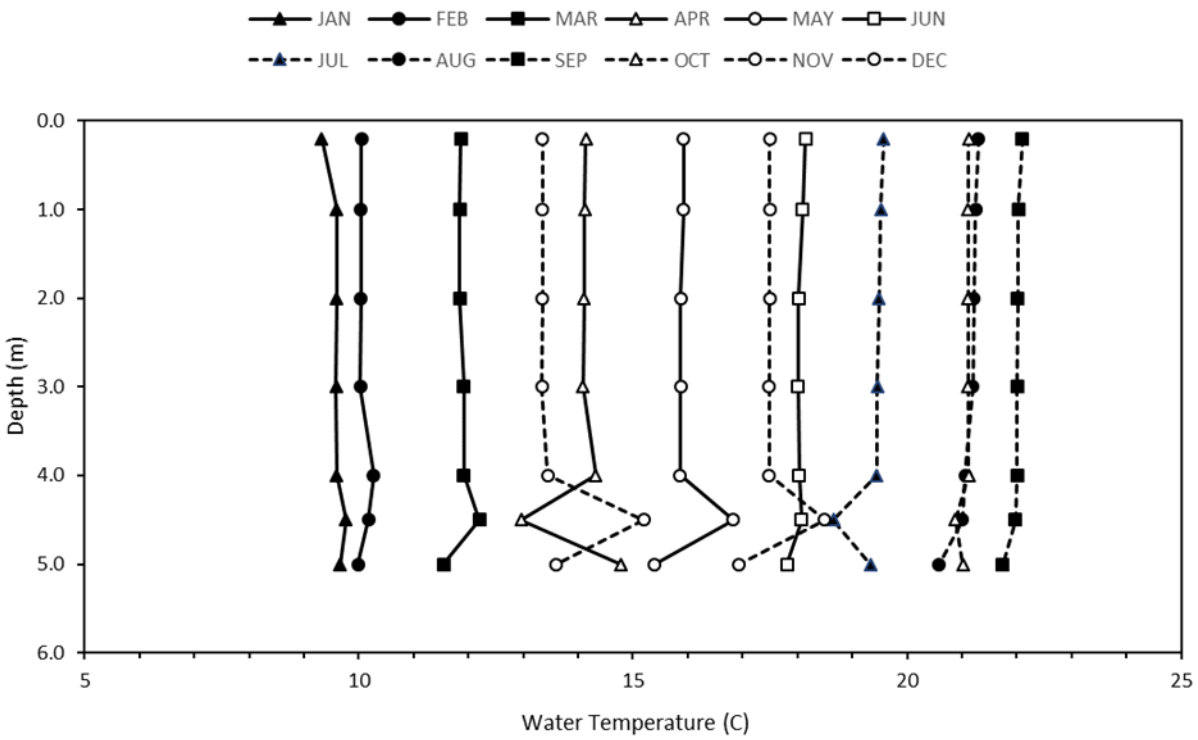

FIGURE 4-15 VERTICAL PROFILE WATER TEMPERATURE MEASUREMENTS IN THE PROJECT FOREBAY FROM 2010 TO 2018

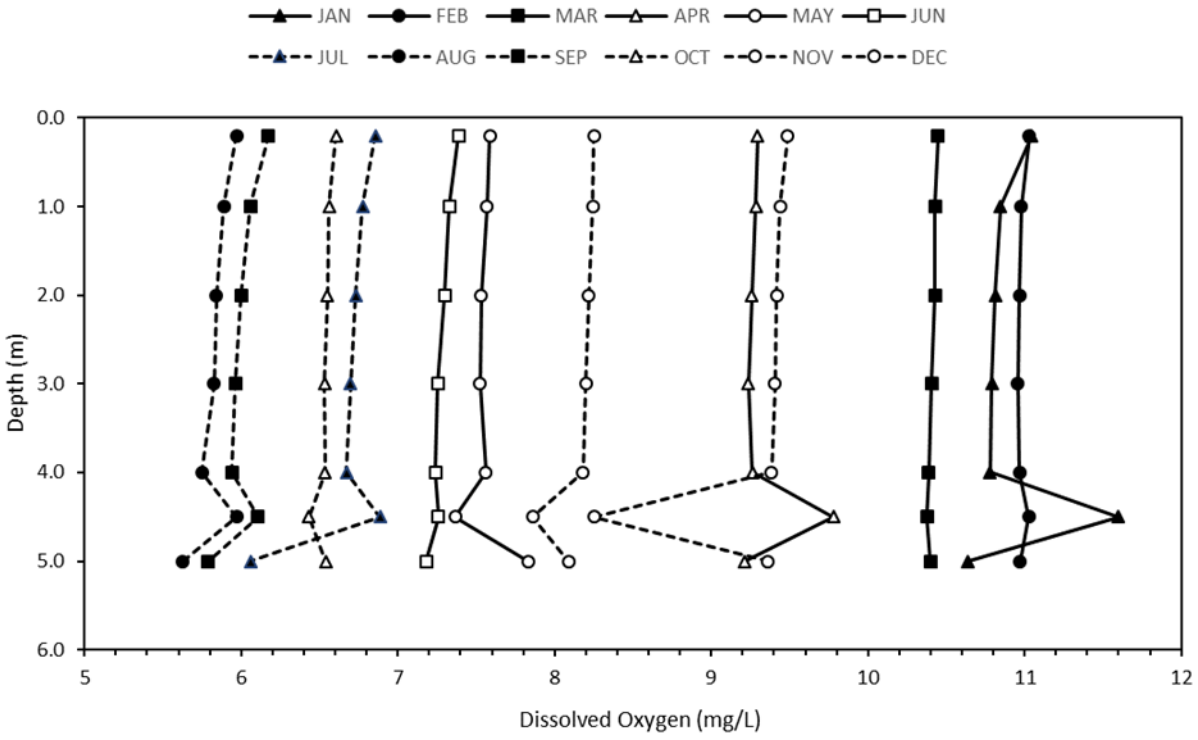

FIGURE 4-16 VERTICAL PROFILE DISSOLVED OXYGEN MEASUREMENTS IN THE PROJECT FOREBAY FROM 2010 TO 2018

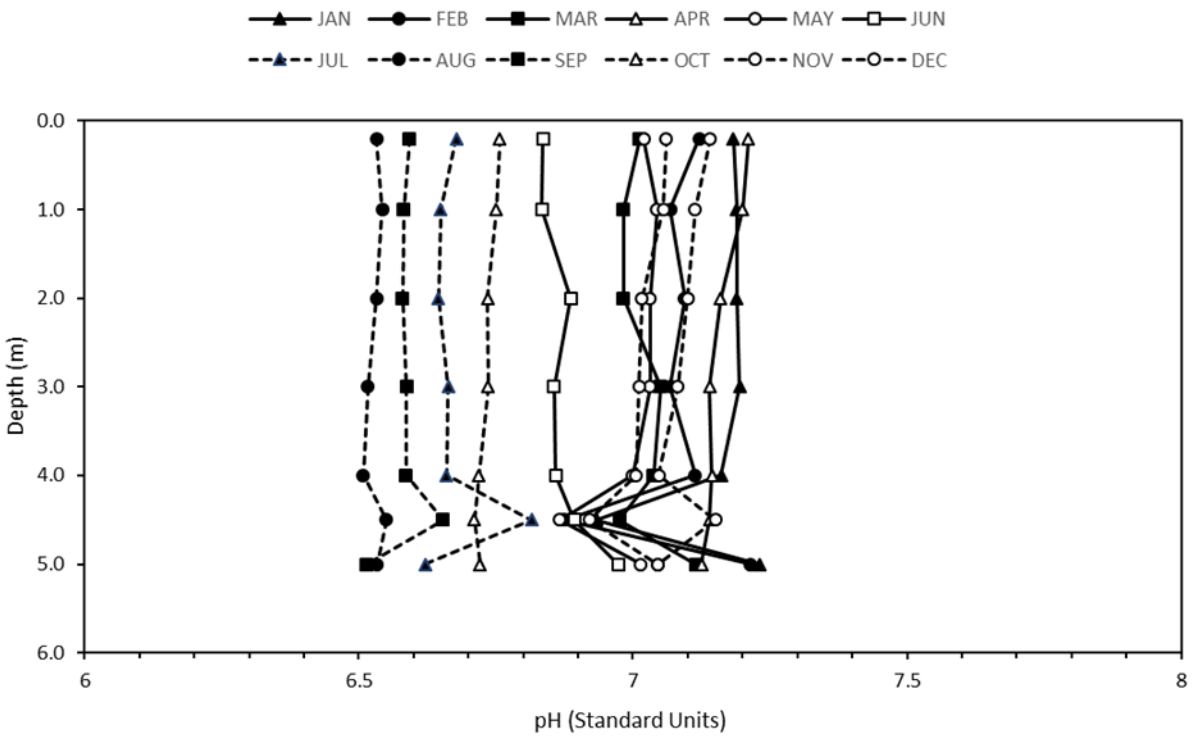

FIGURE 4-17 VERTICAL PROFILE PH MEASUREMENTS IN THE PROJECT FOREBAY FROM 2010 TO 2018

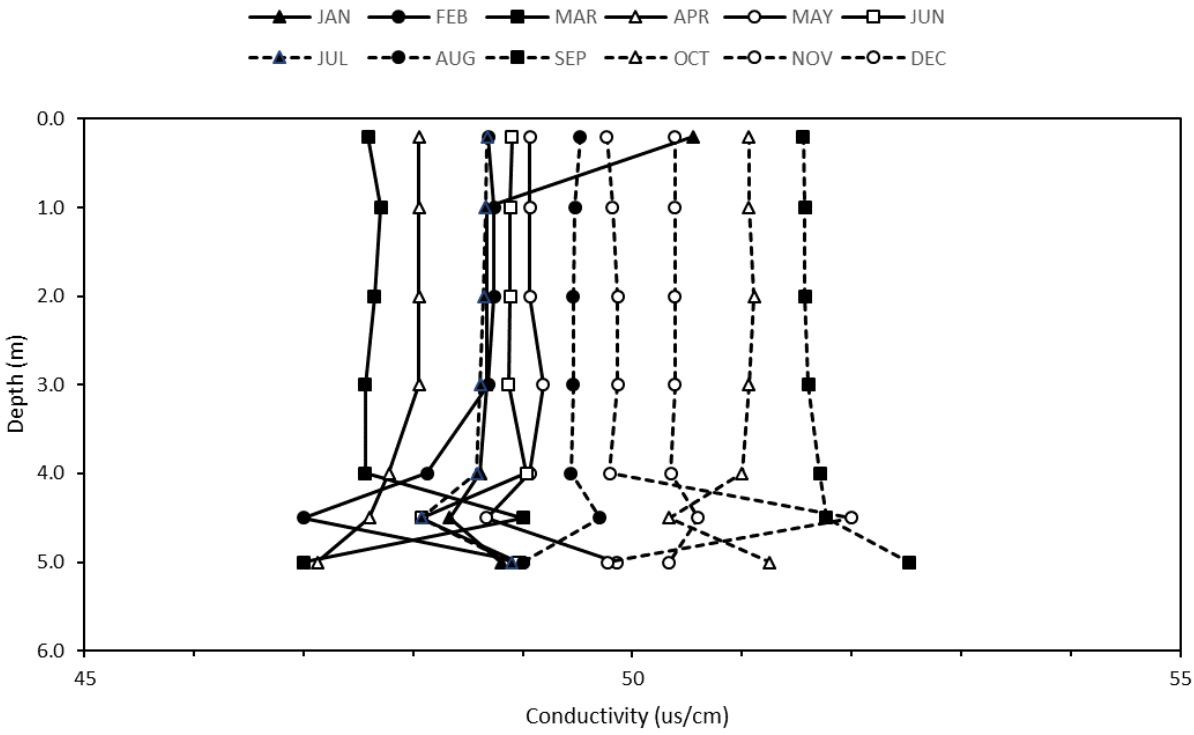

FIGURE 4-18 VERTICAL PROFILE CONDUCTIVITY MEASUREMENTS IN THE PROJECT FOREBAY FROM 2010 TO 2018

4.2.7 GRADIENT OF AFFECTED DOWNSTREAM REACHES

The Savannah River is at mean sea level (msl) for 15 miles above its mouth and then rises gradually at a slope of 0.00011 as it reaches Augusta (Carlston 1969). Above Augusta, the river slope increases as it crosses the Fall Line, rising 50 feet in 6 miles across the Fall Line and through Augusta Shoals (Carlston 1969).

4.2.8 POTENTIAL ADVERSE EFFECTS AND ISSUES

No adverse effects or issues related to water resources have been identified. Operation of the Project will continue to moderate flow releases from upstream dams and re-oxygenate water that has low DO levels.

4.2.9 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

PLACEHOLDER

4.2.10 REFERENCES

Carlston, C. 1969. Longitudinal Slope Characteristics of Rivers of the Mid-Continent and the Atlantic East Gulf Slopes. International Association of Scientific Hydrology. Bulletin. 14: 4, 21-31.

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4.3 FISH AND AQUATIC RESOURCES [§ 5.6 (D)(3)(IV)]

4.3.1 EXISTING FISH AND AQUATIC COMMUNITIES

4.3.1.1 AQUATIC HABITAT

The Stevens Creek reservoir provides approximately 25 RMs of shallow, littoral, and shoreline habitat for cool and warm water fish species and other aquatic species (e.g., aquatic macroinvertebrates, amphibians and aquatic reptiles), extending 13 miles upstream to the Thurmond Dam and 12 miles into Stevens Creek. The surface area of the reservoir is 2,400 acres at the normal full pond EL 187.5 feet[9] (FERC 1995). Habitat in the Stevens Creek reservoir is characterized by shallow, clear water with numerous stumps, snags, and aquatic macrophyte (i.e., rooted plants) beds; however, the Stevens Creek arm of the reservoir can be more turbid (FERC 1995). Substrates consist mostly of sand and silt (FERC 1995). The gradient of the river bottom is moderately steep in the upper reservoir but is less steep in areas downstream of the Route 28 bridge (FERC 1995). The Savannah River at the Stevens Creek Dam is approximately 3,500-feet-wide with numerous islands and shoreline habitats. The river narrows to approximately 700-feet near the Thurmond Dam.

The one-mile-long reach of the Savannah River immediately downstream of the Stevens Creek Dam is impounded by the Augusta Diversion Dam. The Savannah River in this reach is riverine and relatively shallow with numerous islands and former shoal habitat (FERC 1995). Discharge from the Project typically ranges from 4,500 to 8,300 cfs under normal flow conditions. Substrates in the reach include rock outcrops, boulders, sand, and silt (Entrix 2002a). Water depth may exceed ten feet, depending on river flow conditions (Entrix 2002a). Previous research by DESC documented water depths of five feet or more are common throughout the reach (FERC 1995). Macrophyte beds are common, especially in areas downstream of the Highway 28 bridge (FERC 1995).

4.3.1.2 RESIDENT FISH SPECIES

The middle Savannah River supports a diverse, productive, and healthy fish community typical of a large river in the southeastern United States (Marcy et al. 2005). At least 70 species of fish representing 15 families occur in the Savannah River in the vicinity of the Project (Table 4-4).

[9] Elevations reported using the National Geodetic Vertical Datum.

Common fish species include Bluegill, Yellow Perch, Largemouth Bass, Redbreast Sunfish, Threadfin Shad, Golden Shiner, Longnose Gar, Gizzard Shad, Chain Pickerel, White Bass, Pickerel, Northern Hogsucker, Brown Bullhead, Yellow Bullhead, Redeye Bass, White Crappie, and Black Crappie (Avondale 2001). Entrix (2002a) reported that Redbreast Sunfish, Yellow Perch, Bluegill, Gizzard Shad, Spottail Shiner, and Spotted Sucker were the most abundant fish species in the middle Savannah River. The dominant species by biomass are reported as Common Carp, Spotted Sucker, Longnose Gar, Gizzard Shad, and American Shad (Entrix 2002). Cool water fishes such as Yellow Perch, Smallmouth Bass, Striped Bass, and Redeye Bass are bolstered by releases of cool water from the Thurmond Dam (Entrix 2002a).

The Robust Redhorse, an uncommon, large-bodied sucker that historically occupied the Savannah River, was documented in the Augusta Shoals area in the 1990s and 2000s. The Savannah River now contains a substantial population of Robust Redhorse, although no estimates of the size of the Savannah River population have been made (GADNR 2016a). New individuals continue to be encountered, indicating relatively steady recruitment into the Savannah River population. Repeated brood stock collection indicates that the Savannah River is likely the most stable of the known wild populations (GADNR 2016a).

Bartram's Bass (*Micropterus* sp. cf *cataractae*), historically known as Redeye Bass, is a species of interest among state fishery management agencies. Savannah River populations of this species have shown to be genetically distinct and are listed as a species of Highest Conservation Concern by SCDNR. The primary threat to this species is hybridization with Alabama Bass and Smallmouth Bass, which are both introduced species. Although this species is known to thrive in a variety of habitats, hybridization has severely impacted this species in lentic environments, above the fall line, in the Savannah River system (SCDNR 2015). State agencies and universities are continuing to investigate this species and its status. Relicensing documents will be updated with additional information regarding this species' presence in the Project vicinity.

The Savannah River provides excellent angling opportunities for common cool and warm water game fish including Largemouth Bass, Smallmouth Bass, Redear Sunfish, Bluegill, Redbreast Sunfish, White Catfish, Channel Catfish, hybrid Bass, Striped Bass, Black Crappie, Yellow Perch, and Chain Pickerel (GADNR 2018). The Largemouth Bass population is healthy despite drought conditions that have contributed to slightly slower growth rates over the last few years. Fishing for

catfish is excellent in the Savannah River; White Catfish make up the majority, but Channel Catfish tend to be a bit larger. Since 2005, Striped Bass greater than 27 inches have been open to anglers. The number of Striped Bass and the number of legal-size fish have rebounded due to a stocking program by GADNR that began in the 1990s. Striped and hybrid Bass are stocked annually to help control forage fish populations and provide great action for big fish.

Nearby J. Strom Thurmond Lake provides 1,200 miles of shoreline and 71,100 acres of water for experienced and novice anglers. Hartwell Lake and R. B. Russell Lake also provide ample angling opportunities. Striped and hybrid Bass are stocked each year to help control forage fish populations and provide great action for big fish. The Bassmaster Elite Series fishing tournament was held on Thurmond Lake in 2007. Abundant forage fish (e.g., Threadfin Shad and Blueback Herring) provide for rapid growth of game species. In 2016, there were over 100 bass tournaments on Thurmond, Hartwell, and R. B. Russell, and the main stem of the Savannah River totaling over 12,500 fishing hours; three to four-pound bass are common (GADNR 2016). Numerous recreation areas, fishing piers, and bank fishing areas provide fishing opportunities in Savannah River lakes. There are over 30 public fishing areas near the Project, most of which are along the shoreline of J. Strom Thurmond Lake. Fishing access to the Savannah River is also provided at Savannah Rapids Park in Augusta, and at three Project recreation sites.

TABLE 4-4 FISH SPECIES TYPICAL OF AQUATIC HABITATS IN THE STEVENS CREEK PROJECT VICINITY

FAMILY	SCIENTIFIC NAME	COMMON NAME
Lepisosteidae	*Lepisosteus osseus*	Longnose Gar
Amiidae	*Amia calva*	Bowfin
Anguillidae	*Anguilla rostrate*	American Eel
Clupeidae	*Alosa aestivalis*	Blueback Herring
	Dorosoma cepedianum	Gizzard Shad
	Dorosoma petenense	Threadfin Shad
Cyprinidae	*Carassius auratus*	Goldfish
	Ctenopharyngodon idella	Grass Carp
	Cyprinus carpio	Common Carp
	Cyprinella leedsi	Bannerfin Shiner
	Cyprinella nivea	Whitefin Shiner
	Hybognathus regius	Eastern Silvery Minnow
	Hybopsis rubrifrons	Rosyface Chub
	Nocomis leptocephalus	Bluehead Chub
	Notemigonus crysoleucas	Golden Shiner
	Notropis hudsonius	Spottail Shiner
	Notropis chalybaeus	Ironcolor Shiner
	Notropis cummingsae	Dusky Shiner
	Notropis lutipinnis	Yellowfin Shiner
	Notropis maculatus	Taillight Shiner
	Notropis petersoni	Coastal Shiner
	Opsopoeodus emiliae	Pugnose Minnow
	Semotilus atromaculatus	Creek Chub
Catostomidae	*Erimyzon oblongus*	Creek Chubsucker
	Erimyzon sucetta	Lake Chubsucker
	Hypentelium nigricans	Northern Hogsucker
	Minytrema melanops	Spotted Sucker
	Moxostoma collapsum	Notchlip Redhorse
Ictaluridae	*Ameiurus brunneus*	Snail Bullhead
	Ameiurus catus	White Catfish
	Ameiurus natalis	Yellow Bullhead
	Ameiurus nebulosus	Brown Bullhead
	Ameiurus platycephalus	Flat Bullhead
	Ictalurus punctatus	Channel Catfish
	Ictalurus furcatus	Blue Catfish
	Noturus gyrinus	Tadpole Madtom
	Noturus insignis	Margined Madtom
	Noturus leptacanthus	Speckled Madtom
Esocidae	*Esox americanus*	Redfin Pickerel
	Esox niger	Chain Pickerel

FAMILY	SCIENTIFIC NAME	COMMON NAME
Aphredoderidae	*Aphredoderus sayanus*	Pirate Perch
Fundulidae	*Fundulus chrysotus*	Golden Topminnow
	Fundulus lineolatus	Lined Topminnow
Poeciliidae	*Gambusia holbrooki*	Eastern Mosquitofish
Atherinopsidae	*Labidesthes sicculus*	Brook Silverside
Moronidae	*Morone americana*	White Perch
	Morone chrysops	White Bass
	Morone saxatilis	Striped Bass
Centrarchidae	*Centrarchus macropterus*	Flier
	Enneacanthus gloriosus	Bluespotted Sunfish
	Lepomis auratus	Redbreast Sunfish
	Lepomis cyanellus	Green Sunfish
	Lepomis gibbosus	Pumpkinseed
	Lepomis gulosus	Warmouth
	Lepomis macrochirus	Bluegill
	Lepomis marginatus	Dollar Sunfish
	Lepomis microlophus	Redear Sunfish
	Lepomis punctatus	Spotted Sunfish
	Micropterus salmoides	Largemouth Bass
	Micropterus coosae	Redeye Bass
	Micropterus sp. cf. coosae	Bartram's Bass
	Pomoxis annularis	White Crappie
	Pomoxis nigromaculatus	Black Crappie
Percidae	*Etheostoma fricksium*	Savannah Darter
	Etheostoma fusiforme	Swamp Darter
	Etheostoma hopkinsi	Christmas Darter
	Etheostoma inscriptum	Turquoise Darter
	Etheostoma olmstedi	Tessellated Darter
	Perca flavescens	Yellow Perch
	Percina nigrofasciata	Blackbanded Darter

Source: Marcy et al. 2005

4.3.1.3 DIADROMOUS FISH SPECIES

Historically, the Savannah River basin supported seven diadromous species: American Shad, Blueback Herring, Hickory Shad, American Eel, Striped Bass, Atlantic Sturgeon, and Shortnose Sturgeon. All seven species are known to occur downstream of the Augusta Diversion Dam presently; Striped Bass and Blueback Herring occur throughout the USACE reservoirs due to stocking efforts to establish a game fishery. Atlantic and Shortnose Sturgeon are listed as endangered species under the Endangered Species Act (ESA). Shortnose Sturgeon were listed in

1967 and Atlantic Sturgeon were listed in 2012 (Section 4.6). Atlantic Sturgeon and Shortnose sturgeon historically migrated throughout the Savannah River to reach spawning or rearing grounds at the Augusta Shoals.

Major river channel modifications near Savannah for shipping and commerce have occurred since colonial times. These activities have altered salinity, decreased DO at depth, increased flushing rates in the lower estuary, and reduced freshwater tidal wetlands, all of which have adversely affected migratory fish species and their habitats (SCNDR and GADNR 2014). There are six dams on the Savannah River, of which only the first dam, the NSBLD at RM 187, approximately 21 RMs downstream of the Project, has an upstream fish passage system. The Augusta Diversion Dam, which is approximately 19 RMs upstream of the NSBLD and one-mile downstream of the Stevens Creek Dam, does not have fish passage, nor do the three USACE dams upstream of the Project.

The USACE is currently implementing the Savannah Harbor Expansion Project (SHEP) to deepen the 18.5-mile outer harbor to 49 feet at mean low water and the Savannah River channel (i.e., inner harbor) to 47 feet (USACE 2018). As mitigation for the SHEP, the USACE is currently required to provide sturgeon passage at NSBLD by repairing and modifying the existing structure or by removing the existing structure after constructing in-river fish passage (e.g., a weir) that maintains the existing pool elevation of the Savannah River to protect water supply and recreation use (USACE 2018). The lock at NSBLD was designed for navigation and initially provided limited fish passage. In the late 1980s, the USACE began implementing more efficient passage methods.

DESC's existing license for the Project requires upstream passage following the construction of a fishway at the Augusta Diversion Dam. The Section 18 prescription in the current Project license includes a requirement to refurbish the navigation lock, which would be operated using attraction flows or other fish attraction mechanisms to provide a minimum of 30 lockages during the shad migration season (SCDNR and GADNR 2014). The FWS and NMFS submitted a preliminary fishway prescription for the Augusta Canal Project (i.e., the Augusta Diversion Dam) in 2004 that included a vertical slot fishway on the Georgia side of the river. Based on comments received from the city of Augusta, and additional evaluation and review by the FWS and NMFS, the fishway prescription was modified to include a vertical slot fishway on the South Carolina side of the

Savannah River. Negotiations between the FWS and NMFS and the city of Augusta are ongoing and construction of the fishway has not been initiated.

4.3.1.4 BENTHIC MACROINVERTEBRATES

The Southeastern Natural Sciences Academy (SNSA) conducted a water quality study within the Savannah River Basin in 2006 and 2007 to characterize the effects of the urban corridor on Savannah River water quality under baseline and storm event conditions. As part of the study, SNSA sampled the benthic macroinvertebrate community at two sampling locations within the Project boundary: 7 miles downstream of Thurmond Dam within the Stevens Creek impoundment, and 4.2 miles upstream of the Stevens Creek and Savannah River confluence.

SNSA researchers deployed pairs of Hester-Dendy sampling plates at each location for approximately 30 days to sample the invertebrate community in the Savannah River and Stevens Creek. The results of the study demonstrated that some EPT taxa[10] were present in the Project area, but at lower densities than in other sampling stations downstream; EPT taxa were lower in pooled waters (i.e., impoundments) upstream of RM 185 compared to free-flowing sections lower in the river. EPT taxa are sensitive species that are generally intolerant of polluted water or water that has low DO levels. SNSA's research indicated that water with low DO released from the Thurmond Dam and flow fluctuations resulting from Thurmond peaking operations adversely affected the benthic macroinvertebrate community at the two sampling sites in the Project area (SNSA 2008).

4.3.1.5 FRESHWATER MUSSELS

In 2006, the Catena Group inventoried freshwater mussels in the Savannah River from the Augusta Shoals area (near RM 203) downstream to estuarine waters (near RM 23). The Catena Group identified 26 species of freshwater mussels during the survey, noting that diverse and viable mussel populations occur throughout the Savannah River. Carolina slabshell, Eastern elliptio, and Roanoke slabshell were the most common native species; however, the most abundant bivalve throughout the Savannah River drainage was the Asian clam (The Catena Group 2007). The Catena Group identified 15 freshwater mussel species that occur downstream of the Project (i.e., between RM 203 and RM 196.2) (Table 4-5). Two rare species identified by the Catena Group (Atlantic

[10] Ephmeroptera, Plecoptera, and Tricoptera.

pigtoe and brother spike) were described as "potentially occurring" based on pending DNA testing. The Atlantic pigtoe, which the FWS is currently planning to list as a federally-threatened species, is presumed extirpated from the southern portion of its range, including the Savannah River basin; proposed critical habitat for species recovery is within North Carolina and Virginia (Federal Register 2018). The brother spike is a state-threatened species in South Carolina and Georgia.

TABLE 4-5 DESCRIPTION OF FRESHWATER MUSSEL SPECIES NEAR STEVENS CREEK PROJECT

SITE LOCATION	SITE DESCRIPTION	NUMBER OF SPECIES	SPECIES COMPOSITION
RM 203	Augusta Shoals – Island	5	Variable spike and Eastern elliptio most abundant; brother spike, Carolina lance, and Carolina slabshell present
RM 202.8	Augusta Shoals – River Run	6	Variable spike and Eastern elliptio most abundant; brother spike, Carolina lance, Atlantic pigtoe, and Carolina slabshell present
RM 202.2	Augusta Shoals	6	Variable spike, Carolina slabshell, and Eastern elliptio most common; Altamaha slabshell, Atlantic pigtoe, and Roanoke slabshell present
RM 201.5	Below King Mill canal discharge	9	Variable spike, Carolina slabshell most abundant; Altamaha slabshell, Carolina lance, Eastern elliptio, delicate spike, Atlantic spike, Roanoke spike, and Eastern creekshell present
RM 196.2	River Run on SC side	7	Variable spike most abundant; Carolina slabshell, Northern lance, Altamaha slabshell, Atlantic spike, Tidewater mucket, and Florida pondhorn present

Source: Catena Group 2006

Researchers found nine live freshwater mussel species in the Augusta Shoal area in 2002: Carolina slabshell, sad elliptio, Roanoke slabshell, variable spike, pod lance, Carolina spike, Eastern elliptio, Florida pondhorn, and Eastern creekshell (Entrix 2002). No state or federally threatened or endangered freshwater mussel species were found (Entrix 2002).

4.3.1.6 INVASIVE AQUATIC SPECIES

Non-native fish species that occur or may occur in the middle or upper Savannah River include Grass Carp, Green Sunfish, Spotted Bass, Smallmouth Bass, Alewife, White Crappie, Threadfin Shad, Fathead Minnow, Blue Catfish, Channel Catfish, Flathead Catfish, White Bass, wiper (hybrid white-striped bass), Yellow Perch, Sauger, and Walleye (USGS 2018). Researchers have documented large numbers of Asian clam in the Savannah River downstream of the Project (Entrix 2002, USGS 2018).

4.3.2 TEMPORAL AND SPATIAL DISTRIBUTION OF FISH AND AQUATIC COMMUNITIES

Warm and cool water fish known to occur in the Savannah River and game and non-game resident species are likely to occur throughout the Project area. The Robust Redhorse is believed to spawn in the Augusta Shoals (Entrix 2002a). Robust Redhorse inhabit mainstream rivers in riffles, runs, and pools (Entrix 2002a). Adults are usually found with tree snags, often in deep water near shore. Spawning occurs in course gravel habitats (GANDR 2016a). In the Savannah River, spawning occurs from late April through early June, when water temperatures approach 64 to 68°F. Spawning has been observed in rivers with water depths ranging from approximately 1 foot to 3.5 feet with water velocities of less than 0.10 feet per second over coarse gravel bed sediments (GADNR 2016a). Suitable gravel spawning habitat was documented approximately 8 RMs downstream of the NSBLD in 2000 (Entrix 2002a).

The Savannah River from RM 40 to the NSBLD provides spawning habitat for American Shad and other migratory species (SCNDR and GADNR 2014). Since the late 1980s, USACE has implemented fish passage at NSBLD using the navigation lock, allowing migratory species access to an additional 20 RMs of the Savannah River from the NSBLD to the base of the Augusta Diversion Dam, which does not have dedicated upstream fish passage (SCNDR and GADNR 2014). However, due to structural issues at NSBLD, lockages for fish passage were discontinued in 2015.

Striped Bass populations in the Savannah River are essentially riverine with spawning occurring in downstream estuarine habitats (Entrix 2002). Upstream migrations of striped bass in the spring and summer are associated with a search for cool water refugia supplied by the hypolimnetic releases from Thurmond Dam rather than spawning habitat (Entrix 2002). Adult fish congregate in the area downstream of NSBLD during warm season months to remain in the cool water that occurs there (Entrix 2002). Some individuals subsequently pass upstream through operation of the NSBLD or during periods of high runoff, when water levels equilibrate on both sides of the dam (Entrix 2002). Juvenile Striped Bass are more tolerant of water temperatures above 77° F and may occur throughout the Savannah River during the summer (Entrix 2002). Adult Striped Bass migrate downstream during fall and are thought to remain in the estuary during the winter (Entrix 2002).

Blueback Herring occur in the main stem of the Savannah River and as land-locked populations within the USACE reservoirs because of stocking efforts (ASMFC 2017). Blueback Herring, which are riverine spawners, typically enter the Savannah River in the spring and out-migrate as young of year fish in the fall. Blueback Herring may pass the NSBLD during high water conditions or during locking activities.

There are spawning populations of Atlantic and Shortnose Sturgeon in the Savannah River (Post et al. 2018). According to historical distribution records much of the historically available spawning and nursery habitat for sturgeons in the Savannah River remains accessible (Post et al. 2018). Shortnose Sturgeon swim up large coastal rivers to spawn, then return to the lower river or estuary for the rest of the year, only occasionally venturing into the Atlantic Ocean. In the southern portion of their range, Shortnose Sturgeon inhabit freshwater during the late spring and summer, migrating to estuarine areas during the fall and winter. Spawning in Georgia for both species begins in February when water temperatures exceed 48°F, and post-spawning migrations downriver begin in March (GADNR 2018a; Federal Register 2012).

4.3.3 ESSENTIAL FISH HABITAT

Essential Fish Habitat (EFH) is designated by NMFS for species with established federal fishery management plans that occupy federal waters, which extend offshore from state waters (three miles in the South Atlantic) to 200 nautical miles, sometimes referred to as the Exclusive Economic Zone. NMFS's Southeast Region's Habitat Conservation Division implements the EFH program in coastal states from North Carolina south to Texas, as well as the Territories of Puerto Rico and the U.S. Virgin Islands (NMFS 2017). The Magnuson-Stevens Act requires federal agencies that authorize, fund, or undertake projects that may adversely affect EFH to consult with NMFS. Through consultation, the Habitat Conservation Division provides recommendations to federal agencies to avoid, minimize, mitigate, or otherwise offset the effects of their actions on EFH.

The Magnuson-Stevens Act created regional fishery management councils to advise NMFS on fishery management issues and EFH. The South Atlantic Council currently manages and has identified EFH for eight fisheries within the Exclusive Economic Zone in the South Atlantic: shrimp, snapper-grouper, Sargassum, corals, dolphin-wahoo, spiny lobster, golden crab, and coastal migratory pelagic species (NMFS 2017). There are no federal fishery management plans

for diadromous fish species that occupy the freshwater, inland regions of the Savannah River basin; therefore, there is no designated EFH near the Project.

4.3.4 POTENTIAL ADVERSE IMPACTS AND ISSUES

4.3.4.1 ENTRAINMENT

During the previous relicensing of the Project, DESC studied entrainment of fishes through the turbines. The study results provided the following:

- Some reservoir fish approaching the Stevens Creek Dam are entrained at the powerhouse intakes and become subject to mortality risks associated with turbine passage;
- Trash racks on the intake structures, consisting of vertical bars with 3-inch to 3.5-inch spacing, generally exclude larger game fish from passing through the turbines;
- Over 90 percent of fish entrained at the Project survive passage;
- Multi-seasonal fish entrainment surveys and intensive entrainment mortality studies conducted at the Project indicate that turbine-induced mortality results in the annual loss of approximately 15,000 fish representing 16 or 17 species under normal operating conditions (FERC 1995);
- Species with the highest estimated mortalities were Threadfin Shad, Bluegill, Yellow Perch, American Eel, and Blueback Herring (FERC 1995);
- Turbine-related morality rates documented in the study (i.e., four to six percent) represent only a small proportion of the high natural mortality that occurs among small fish;
- Adult and catchable-size game fish were less susceptible to turbine entrainment; therefore, the effect of operations on recreational fisheries was expected to be minimal;
- Based on the completed fisheries studies, the effect of entrainment on fish populations residing in Stevens Creek reservoir is minor (FERC 1995).

Because of the study findings, FERC required DESC to develop an enhancement plan related to fish entrainment mortality. License Article 406 requires DESC to set aside annual payments in the amount of $4,700 (1995 dollars) adjusted annually to reflect changes in the Consumer Price Index, to finance specific resource-based enhancements in the Savannah River basin that are developed and implemented in coordination with DOI, SCDNR, and GADNR. The fisheries enhancements plan was to be developed instead of implementing extremely expensive and marginally effective fish protection measures (e.g., screens, bar racks, louvers) (FERC 1995). The first 10-year plan was submitted on July 3, 1996 and a FERC order modifying and approving the plan was issued on August 15, 1996. The second 10-year plan was submitted on November 7, 2005, and a FERC order modifying and approving the plan was issued on October 20, 2006. The third 10-year plan, covering the period 2016 to 2025 was approved by FERC on February 25, 2016.

In 2013, the Stevens Creek fisheries enhancement fund contributed to the development of research related to stocking Redear Sunfish in the Stevens Creek impoundment. The objectives of the study were to evaluate the effectiveness of stocking and gather baseline information about the Redear Sunfish population in Stevens Creek reservoir. A three-month angler survey revealed that Largemouth Bass and Sunfish are the primary species sought by anglers and that the reservoir is almost exclusively a local fishery. Stocking was successfully performed in the fall of 2006 and 2007. Electrofishing evaluations the following year revealed that stocked fish were making a substantial contribution to the cohort. Growth data showed that hatchery fish were larger than wild fish. The researchers concluded that stocking appears to be a good management tool for the Stevens Creek reservoir; however, continued evaluation of possible effects on wild fish is warranted (Bulak 2013).

DESC and the stakeholders identified two priority enhancement areas for the most recent enhancement plan (2016 to 2025): 1) fisheries and freshwater mussel restoration and/or enhancement, and 2) river bottom habitat enhancement. Recent and expected continued improvement of DO conditions due to installation of auto-venting turbines at the Thurmond Dam and an oxygen diffuser system in the Thurmond reservoir have made stocking or re-introduction of fish species a viable option for resource enhancement in the Stevens Creek area. Fish reintroduction was designated as a priority resource enhancement action in the 2016 to 2025 plan. American Shad, Robust Redhorse, and Striped Bass were identified by the stakeholders as potential species for re-introduction. Cool-water species such as Walleye or Sauger may be evaluated for introduction. Additional focus of the third ten-year plan will be on the evaluation and enhancement of freshwater mussel resources. DESC identified the use of stone to provide bottom structure in areas of flow as a potential means of improving fish spawning and rearing habitat near the Project. Removal of accumulated sediment was also identified as a potential method for improving spawning and rearing habitat.

4.3.4.2 RESERVOIR FLUCTUATION

Daily and weekly fluctuations of the Stevens Creek reservoir within a 4.5-foot band to accommodate flow releases from Thurmond Dam result in routine changes to the water surface elevation, microhabitat characteristics (e.g., water depth and water velocity), and change water

levels along shoreline habitats. The maximum drawdown of 4.5-feet exposes approximately 575 acres of littoral zone habitat (FERC 1995). The most notable effect on shoreline habitats is in shallow water flats and tributary embayments, which can provide quality spawning habitat for centrarchid species (e.g., bass, sunfish species). Backwatering effects of these fluctuations results in flow direction reversals in Stevens Creek for several miles upstream of its confluence with the river. Fisheries sampling in Project waters demonstrates good reproductive success, regardless of the reservoir fluctuations (FERC 1995).

4.3.5 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

PLACEHOLDER

4.3.6 REFERENCES

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4.4 WILDLIFE AND BOTANICAL RESOURCES [§ 5.6 (D)(3)(V)]

The Project is located in a small area that is designated as Southern Outer Piedmont Ecoregion, just south of a portion of South Carolina that is designated as Carolina Slate Belt (Griffith et al. 2002). The Georgia portion of the Project also lies within this land class designation. The Southern Outer Piedmont Ecoregion is characterized by rolling hills with broad, shallow, stream-cut valleys. Oak-hickory forests are widely distributed in this ecoregion, and in some areas these hardwoods are co-dominant with pines (SCDNR 2005). The landscape has a long history of deforestation associated with economic uses including agriculture. These anthropogenic alterations have resulted in land that, along with mixed hardwood and oak-hickory-pine forests, include agricultural land and forests that are managed for timber production. Loblolly pine plantations are an especially prevalent form of timber production in this region (Griffith et al. 2002; SCDNR 2005). This habitat supports wildlife typical of the Piedmont, including white-tailed deer, raccoon, box turtle, copperhead, and American toad (Conant and Collins 1998, Reid 2006). The following sections provide additional detail regarding the wildlife and botanical communities found in the Project area and vicinity. Rare, threatened and endangered wildlife and botanical species that may occur in the Project area are discussed in Section 4.6.

4.4.1 UPLAND HABITAT(S) IN THE PROJECT VICINITY

The Project boundary includes the area around Stevens Creek reservoir between EL 192.5 feet and 198.5 feet, thus, this area includes only a small area of upland habitat. Nearby areas include some upland pine forests, a habitat that may be utilized by the federally listed red-cockaded woodpecker. Project operations do not affect areas where this habitat type occurs. Second growth stands of natural and agriculturally propagated loblolly pine are present in the area, as are hardwood-pine stands that include white oak and sweetgum (FERC 1995).

4.4.1.1 PINE FORESTS

Naturally occurring and agriculturally produced pine forests are present in the Project vicinity. These are generally even-aged stands that are characterized by a closed canopy and little understory growth. While the low vegetated diversity in these stands does not produce habitat for many wildlife species, it can be suitable habitat for the federally listed red-cockaded woodpecker (FERC 1995; SCDNR 2005).

4.4.1.2 MIXED PINE-HARDWOOD FOREST

Mixed pine-hardwood forests in the Project vicinity include loblolly pine and a variety of hardwood species including multiple oak species, hickory species, red maple, and winged elm. Understory in this habitat type can include species such as yaupon holly, American beautyberry, and multiple species of woody vines (FERC 1995).

4.4.1.3 HARDWOOD FOREST

Hardwood dominant stands occur on side slopes and along stream edges. This habitat type is found in some low-lying areas adjacent to the reservoir. Along with oak and hickory species, American beech is present along with smaller understory trees include flowering dogwood. Wet tolerant species including water oak, willow oak, sweetgum, and river birch are found closer to the reservoir (FERC 1995).

4.4.1.4 WETLAND

Wetlands are discussed in greater detail in Section 4.5. Wetlands in the Project vicinity are found in low lying areas adjacent to the reservoir, as well as areas directly downstream of the dam. Riverine wetlands associated with floodplain type habitat are found along the riverbank and on islands in the mainstem river as well as the impoundment. Submerged and aquatic vegetation that is found in shallow water habitats at Stevens Creek include creeping primrose, floating bladderwort, water-starwort, variable-leaf pondweed, and coontail (FERC 1995).

4.4.2 PLANT AND ANIMAL SPECIES IN THE PROJECT VICINITY

A variety of wildlife species typical of the Southern Outer Piedmont ecoregion of South Carolina and Georgia inhabit the forested, wetland, and aquatic habitats of the Project vicinity, including amphibians, reptiles, birds, and mammals.

4.4.2.1 MAMMALS

The portion of the state in which the Project is located does not have as high a diversity of mammals as compared to the Coastal Plain and the mountains (SCDNR 2015). Mammals that are documented or expected to occur in the Project vicinity include species typically found in the Piedmont and Sandhills regions of South Carolina. Species include white tailed deer, black bear, eastern cottontail, grey squirrel, red fox, grey fox, coyote, muskrat, beaver, hispid cotton rat,

eastern mole, house mouse, eastern spotted skunk, opossum, and raccoon (FERC 1995; Reid 2006).

4.4.2.2 AMPHIBIANS AND REPTILES

The Southern Outer Piedmont Ecoregion does not have the herpetofauna biodiversity as some other parts of the state (SCDNR 2005); however, several species of reptiles and amphibians are likely to occur in the Project vicinity. These include box turtle, copperhead, and American toad (Conant and Collins 1998).

4.4.2.3 BIRDS

The multiple habitat types in the Project vicinity, including forested, wetland, and upland habitats, support a diverse bird population. Over 300 bird species are documented in the adjacent Sumter National Forest. This includes dabbling ducks such as wood duck, mallard, and green-winged teal. Bald eagles and red-cockaded woodpecker are known to nest in or adjacent to the Project vicinity. Multiple migratory and non-migratory birds also occur in the Project vicinity (FERC 1995; Peterson 2002).

4.4.3 INVASIVE UPLAND PLANT AND WILDLIFE SPECIES

Non-native wildlife species known or expected to occur in the Project vicinity include feral hogs and coyotes (FERC 1995; Reid 2006). There are also numerous exotic plant species that are known to occur in the Piedmont and Sandhills regions of South Carolina and are expected to occur in the Project area and vicinity. Previous studies conducted by the USFS suggest that exotic plants are prevalent in this part of South Carolina (SCDNR 2005). The South Carolina Exotic Pest Plant Council (SCEPPC) has identified numerous exotic plant pest species that occur in the Piedmont ecoregion of South Carolina (Table 4-6). Site-specific data are not available, but any of the species listed in Table 4-6 may occur in the Project area. Some of the more ubiquitous species include kudzu, mimosa, and Japanese honeysuckle. These species could occur in abundance.

TABLE 4-6 SEVERE EXOTIC PLANT PEST SPECIES OCCURRING IN THE PIEDMONT ECOREGION

COMMON NAME	SCIENTIFIC NAME
Trees	
Tree of heaven	*Ailanthus altissima*

mimosa, silktree	*Albizia julibrissin*
chinaberry	*Melia azedarach*
princess tree/royal paulownia	*Paulownia tomentosa*
Chinese tallow tree	*Triadica sebifera*
Shrubs	
thorny olive	*Elaeagnus pungens*
autumn olive	*Elaeagnus umbellata*
two-color bush clover, shrub lespedeza	*Lespedeza bicolor*
Japanese privet	*Ligustrum japonicum*
Chinese privet	*Ligustrum sinense*
Japanese knotweed	*Polygonum cuspidatum*
multiflora rose	*Rosa multiflora*
Vines	
English ivy	*Hedera helix*
Japanese climbing fern	*Lygodium japonicum*
Japanese honeysuckle	*Lonicera japonica*
kudzu	*Pueraria montana*
Asian/Japanese wisteria	*Wisteria floribunda*
Chinese wisteria	*Wisteria sinensis*
bigleaf periwinkle	*Vinca major*
common periwinkle	*Vinca minor*
Grasses/Sedges	
tall fescue	*Lolium arundinaceus*
Japanese stilt grass, Nepalese browntop	*Microstegium vimineum*
Chinese silvergrass	*Miscanthus sinensis*
bahia grass	*Paspalum notatum*
golden bamboo, fishpole bamboo	*Phyllostachys aurea*
Johnson grass	*Sorghum halepense*
Herbs	
tropical spiderwort, Bengal dayflower	*Commelina bengalensis*
wart removing herb, marsh dewflower, aneilema	*Murdannia keisak*
tropical soda apple	*Solanum viarum*

Source: SCEPPC 2008

4.4.4 TEMPORAL OR SPATIAL DISTRIBUTION OF COMMERCIALLY, RECREATIONALLY, OR CULTURALLY IMPORTANT SPECIES

Multiple migratory waterfowl species are known to occur on the Savannah River during the fall and winter months. Diving ducks such as lesser scaup, ring-necked ducks, and buffleheads, as well as dabbling ducks such as mallards and green-winged teal, pass through the area during the annual migration. Additionally, some wood ducks occur in the area year-round, with others migrating through during the fall and winter (Peterson 2002). These species attract high volumes of waterfowl hunters to the area.

4.4.5 POTENTIAL ADVERSE EFFECTS AND ISSUES

No adverse effects or issues related to wildlife and botanical resources have been identified.

4.4.6 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

No measures related to wildlife or botanical resources have been identified.

4.4.7 REFERENCES

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4.5 FLOODPLAINS, WETLANDS, RIPARIAN, AND LITTORAL HABITAT [§ 5.6(D)(3)(VI)]

4.5.1 DESCRIPTION AND MAP OF WETLANDS, RIPARIAN, AND LITTORAL HABITAT

The FWS maintains the National Wetlands Inventory (NWI) that provides reconnaissance level information on the location, type, and size of wetlands and deep-water habitats (USFWS 2019). The NWI indicates that wetland and deep-water habitats occurring within the Project vicinity include freshwater emergent, freshwater forested and shrub wetlands, freshwater ponds and lakes, and riverine habitat. Most of the mapped wetland in the Project area is classified as L1UBHh, which is a lacustrine system (Figure 4-19). The Project area also contains palustrine emergent, palustrine forested and/or palustrine shrub, and palustrine unconsolidated bottom systems around reservoir islands and in backwater coves.

Lacustrine habitat within the Project vicinity is constituted of the permanently impounded habitat located above the Stevens Creek Dam. This classification describes deep water habitats created by dammed river channels and contains less than 30 percent vegetative cover (USFWS 1992).

Palustrine habitat includes all freshwater wetlands such as freshwater emergent wetlands, freshwater forested and shrub wetlands, and freshwater ponds. Ponds are freshwater bodies of water with an area of less than 20 acres. Palustrine wetlands are most commonly found along shorelines of lake or rivers and contain water depths less than two meters and salinity less than 0.5 percent (USFWS 1992).

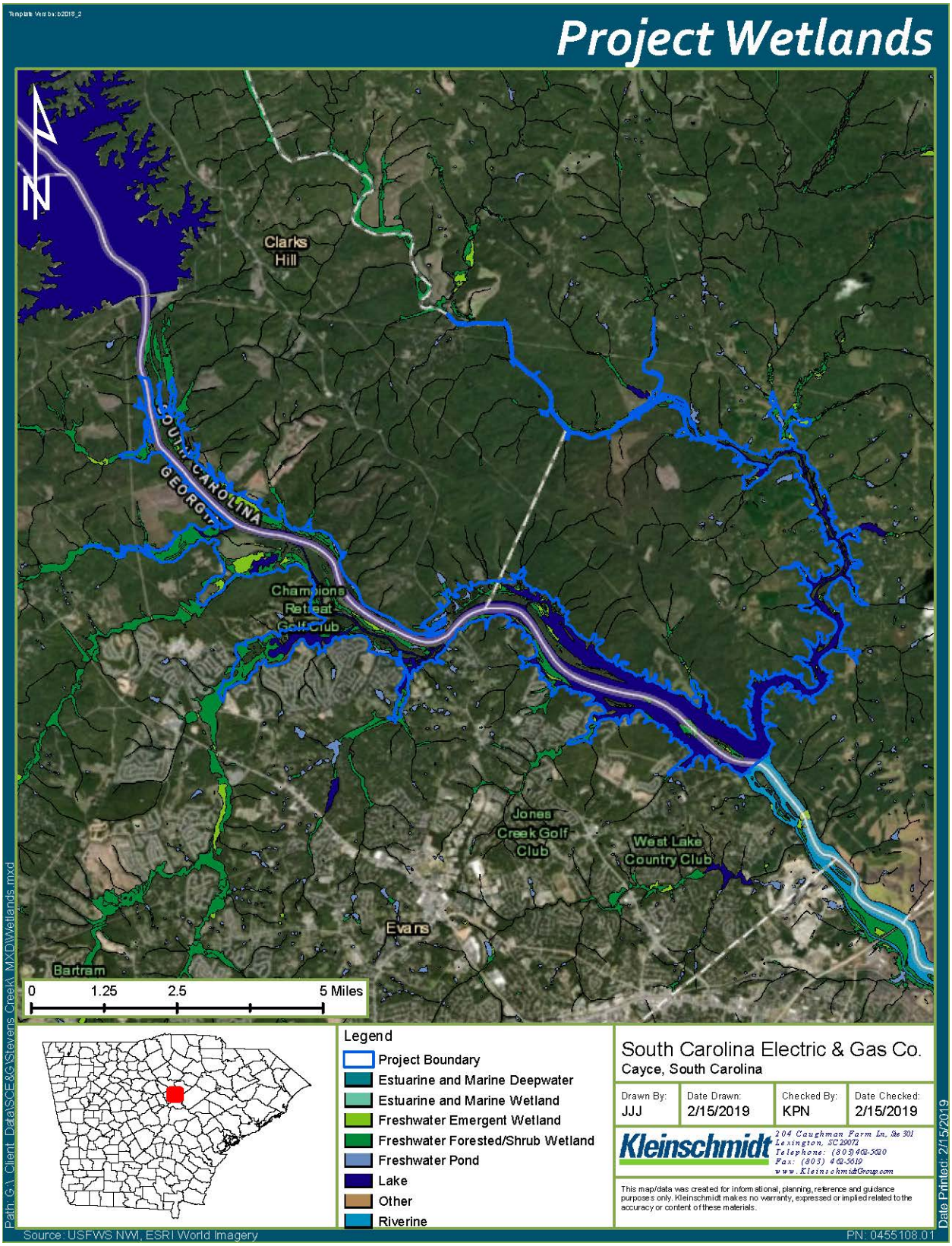

FIGURE 4-19 PROJECT WETLAND HABITAT

4.5.2 LIST OF PLANT AND ANIMAL SPECIES, INCLUDING INVASIVE SPECIES, THAT USE THE WETLAND, LITTORAL, AND RIPARIAN HABITAT

SCDNR lists priority species in South Carolina by ecoregion and habitat. Many plant and animal species have the potential to occur in the littoral, wetland, and riparian habitats of the Project. Species within the Piedmont ecoregion that utilize these habitats are listed in Table 4-7.

TABLE 4-7 SPECIES EXPECTED TO OCCUR IN LITTORAL, WETLAND, AND RIPARIAN HABITATS IN THE PROJECT VICINITY

COMMON NAME	SCIENTIFIC NAME	STATE PRIORITY FOR CONSERVATION
Mammals		
Northern river otter	*Lontra canadensis*	
mink	*Neovison vison*	High
big brown bat	*Eptesicus fuscus*	Highest
red bat	*Lasiurus borealis*	Highest
hoary bat	*Lasiurus cinereus*	Highest
tri-colored bat	*Perimyotis subflavus*	Highest
Southern fox squirrel	*Sciurus niger niger*	Moderate
Birds		
prothontary warbler	*Protonaria citrea*	
Acadian flycatcher	*Empidonax virescens*	High
wood duck	*Aix sponsa*	High
blue-winged teal	*Anas discors*	Moderate
mallard	*Anas platyrhynchos*	Highest
American black duck	*Anas rubripes*	Highest
great blue heron	*Ardea herodias*	Moderate
red-shouldered hawk	*Buteo lineatus*	Moderate
broad-winged hawk	*Buteo platypterus*	Moderate
green heron	*Butorides virescens*	Highest
chuck-will's-widow	*Caprimulgus carolinensis*	High
whip-poor-will	*Caprimulgus vociferus*	High
belted kingfisher	*Ceryle alcyon*	High
yellow-billed cuckoo	*Coccyzus americanus*	High
pileated woodpecker	*Dryocopus pileatus*	Moderate
little blue heron	*Egretta caerulea*	Highest
Acadian flycatcher	*Empidonax virescens*	High
rusty blackbird	*Euphagus carolinus*	Highest
American coot	*Fulica americana*	Moderate
red-bellied woodpecker	*Melanerpes carolinus*	Moderate
red-headed woodpecker	*Melanerpes erythrocephalus*	Moderate
Reptiles		
spotted turtle	*Clemmys guttata*	
yellowbelly slider	*Trachemys scripta scripta*	High
common snapping turtle	*Chelydra serpentina*	

spiny softshell turtle	*Apalone spinifera*	Moderate
snapping turtle (Common)	*Chelydra serpentina*	Moderate
painted turtle (Eastern)	*Chrysemys picta picta*	Moderate
river cooter	*Pseudemys concinna*	Moderate
Eastern box turtle	*Terrapene carolina*	Moderate
yellow-bellied slider	*Trachemys scripta*	High
Amphibian		
Eastern narrowmouth toad	*Gastrophyrne carolinensis*	
Northern cricket frog	*Acris crepitans*	Moderate
Chamberlain's dwarf salamander	*Eurycea chamberlainii*	Highest
four-toed salamander	*Hemidactylium scutatum*	High
pickerel frog	*Rana palustris*	High
Freshwater Fishes		
American eel	*Anguilla rostrata*	Highest
Plants		
golden canna	*Canna flaccida*	
swamp tupelo	*Nyssa biflora*	
willow oak	*Quercus phellos*	
loblolly pine	*Pinus taeda*	
cypress-knee sedge	*Carex decomposita*	High

Sources: SCDNR, 2005, 2008, 2015

Two species of non-native, invasive aquatic plant occur at the Project, including Brazilian elodea (Egeria densa) and Eurasian watermilfoil (Myriophyllum spicatum) (SCDNR 2008). Operations at the upstream Thurmond Project can cause large mats of these plants to develop and clog the intake screens at the Stevens Creek Dam (SCDNR 2008a). On May 23, 1996, DESC filed an Aquatic Plant Management Plan for the Project, pursuant to Article 409 of the current license. The plan was modified and approved by FERC on December 4, 1996. Per the modified plan, DESC explored the use of herbicides to aid in the control and management of invasive aquatic plants. However, today DESC only employs the use of mechanical harvesting at the plant intake as a means to control these plant species. Aquatic plant material that is removed from the trash racks is raked into a hopper and hauled to an area upstream, unloaded and stockpiled for drying. After it has dried, the material is composted on Project lands or hauled away for permanent disposal. DESC also has signs posted at all boat ramps requesting boaters to remove aquatic plants from boats and trailers to help prevent the spread of these species to other waters.

4.5.3 POTENTIAL ADVERSE IMPACTS AND ISSUES

Reservoir fluctuations because of operations at Thurmond Dam could impact littoral and riparian areas within the Project boundary. Reservoir fluctuations could contribute to erosion or loss of

aquatic habitat. Moreover, nuisance aquatic vegetation was noted as a stakeholder concern during initial issues scoping.

4.5.4 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

Although no mitigation or enhancement measures relating to floodplains, wetlands, littoral and riparian areas are planned at this time, current Project operations are aimed at minimizing shoreline erosion and loss of aquatic habitat through re-regulation operations. Additional measures to minimize impacts to wetland, riparian and littoral habitats, including the control of nuisance aquatic vegetation, will be considered during relicensing.

4.5.5 REFERENCES

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4.6 RARE, THREATENED, AND ENDANGERED SPECIES [§ 5.6 (D)(3)(VII)]

DESC used the FWS's Information for Planning and Consultation (IPaC) online system to identify federally-protected species that may occur near the Project. The area under consideration included the main stem of the Savannah River from the Thurmond Dam downstream to the NSBLD (approximately 44 RMs), the main stem of Stevens Creek, from the Stevens Creek Dam upstream to the top of the Project boundary (approximately 12 RMs), and associated shoreline habitats. According to the IPaC, eight federally-protected species could occur near the Project (Table 4-8; see IPaC report, Appendix G). Of these, only the relict trillium is known to occur within the Project area (GADNR, February 4, 2019, letter regarding known occurrences of conservation species; Appendix G). NMFS is responsible for the protection of threatened and endangered anadromous and marine fish species. Atlantic sturgeon and shortnose sturgeon, two species that inhabit freshwater seasonally, are listed under the ESA as threatened and endangered, respectively (Table 4-8).

4.6.1 CRITICAL HABITAT AND HABITAT USE

No critical habitat for federally-protected species occurs within the Project area (IPaC Report, Appendix G). Critical habitat for Atlantic sturgeon (designated in 2017 by NMFS) begins at the mouth of the Savannah River and extends to the NSBLD, which is located at RM 180, approximately 20 RMs downstream of the Project. There is no designated critical habitat for shortnose sturgeon. SCDNR documented 13 adult and two juvenile shortnose sturgeon make presumed spawning runs to potential spawning habitat near RM 130 during late winter and early spring over a five-year period from 2014 to 2018 (Post et al. 2018). Similarly, SCDNR documented four adult Atlantic sturgeon make presumed spawning runs to potential spawning habitat between RM 104 and to within approximately 9 RMs of NSBLD during late winter and early spring from 2014 to 2018 (GADNR 2017; Post et al. 2018). Juveniles of both species tend to stay lower in the river system closer to the mouth (GADNR 2017, Post et al. 2018, Collins et al. 2002). Hall et al. (1991) reported that shortnose sturgeon made spawning runs upstream to between RM 111 and 118 and between RM 170 and 172; Collins and Smith (1993) reported that shortnose sturgeon made spawning runs upstream to between RM 111 and 141. GADNR reports that shortnose and Atlantic sturgeon may inhabit the Savannah River up to or near the NSBLD at RM 180 (Appendix G).

TABLE 4-8 FEDERALLY-PROTECTED SPECIES THAT MAY OCCUR IN THE STEVENS CREEK PROJECT AREA

COMMON NAME	STATUS	DESCRIPTION OF HABITAT REQUIREMENTS AND RANGE IN PROJECT AREA	RECOVERY PLAN REFERENCE
Red-cockaded woodpecker	Endangered	Mature forests with old growth longleaf pines and loblolly pines; ***not known to occur in Project area but may occur in surrounding upland habitats. Given habitat requirements, unlikely to be adversely affected by Project relicensing.***	USFWS 2003
Wood stork	Threatened	Various freshwater and estuarine wetlands for nesting, feeding, and roosting throughout range; ***Occurs occasionally in Project area.***	USFWS 1997
Gopher tortoise	Candidate	Terrestrial species that inhabits xeric, sandy upland habitats in the Southeast; ***not known to occur in or near the Project area.***	None
Carolina heelsplitter	Endangered	One population known from Turkey Creek, a tributary to Stevens Creek in the upper Stevens Creek watershed;* ***not known to occur in or near the Project area.***	USFWS 1996
Harperella	Endangered	Sunny, rocky, or gravel shoals and margins of clear, swift-flowing stream sections; ***not known to occur in or near the Project area.***	USFWS 1990
Miccosukee gooseberry	Threatened	Upland plant that grows in deciduous forest stands; occurs within a 35-acre plot within the Stevens Creek Heritage Preserve; ***not known to occur in Project area but may occur in surrounding upland habitats. Given habitat requirements, unlikely to be adversely affected by Project relicensing.***	No recovery plan identified; see five-year review (USFWS 2015)
Relict trillium	Endangered	Known to occur in understory of mature, undisturbed hardwood forest stands; ***known to occur near Project area – given habitat requirements, unlikely to be adversely affected by Project relicensing.***	USFWS 1991
Smooth coneflower	Endangered	Typically found in open woods, cedar barrens, roadsides, clear cuts, dry limestone bluffs and power line rights-of-way; ***not known to occur in or near the Project area.***	USFWS 2011
Atlantic Sturgeon	Endangered	May occupy Savannah River from mouth upstream to NSBLD during spawning runs.	Post et al. 2018
Shortnose Sturgeon	Endangered	May occupy Savannah River from mouth upstream to NSBLD during spawning runs.	Post et al. 2018

Source: USFWS 2019

* Turkey Creek is approximately 40 RMs upstream from the Stevens Creek Dam.

The states of Georgia and South Carolina maintain databases of rare and protected species. In February 2019, the state of Georgia provided a description and list of 29 species of rare plants and animals that are known to occur near the Project, including three federally-listed species (Table 4-9; Attachment B). The state of South Carolina provides a list of state-threatened, state-endangered and federally-listed plants and animals that are known to occur in the two counties where the Project is located: Edgefield County and McCormick County. This list is provided in Table 4-10 and Attachment B.

TABLE 4-9 LIST OF RARE AND STATE-LISTED SPECIES IN THE STATE OF GEORGIA AND THEIR KNOWN LOCATIONS

COMMON NAME	LOCATION
Carolina trefoil	Extirpated, occurred 2.2 miles from site
Side-oats grama	Uncertain location near project site
Curly-heads	Approximately 1 mile from the site
Log fern	Approximately 1 mile from the site
Georgia plume	Approximately 1.4 miles from the site
False-rue anemone	Approximately 0.8 miles from the site
Shoals spider lily	Approximately 0.9 miles from the site
Pineland Barbara	Classified by GADNR as “on-site”
Yellow nailwort	Classified by GADNR as “on-site”
Dixie mountain	Approximately 0.6 miles from the site
Winged purslane	Classified by GADNR as “on-site”
Ocmulgee skullcap	Approximately 0.9 miles from the site
Pale yellow trillium	Approximately 0.2 miles from the site
Relict trillium*	Classified by GADNR as “on-site”
Shortnose sturgeon*	Approximately 18.5 miles from the site
Atlantic sturgeon*	Approximately 19.2 miles from the site
American berberry	Approximately 2.9 miles from the site
Spotted turtle	Approximately 20.8 miles from the site
Savannah Elimia	Approximately 0.4 miles from the site
Delicate spike	Approximately 1.3 miles from the site
Carolina slabshell	Approximately 1.3 miles from the site
Brother spike	Approximately 3.4 miles from the site
Roanoke slabshell	Approximately 1.4 miles from the site
Atlantic pigtoe	Classified by GADNR as “on-site” (historical siting)
Yellow lampmussel	Approximately 1.3 miles from the site
Robust redhorse	Classified by GADNR as “on-site”
Dwarf waterdog	Approximately 21.2 miles from the site
Ironcolor shiner	Approximately 9.5 miles from the site
Savannah lilliput	Approximately 15.7 miles from the site

Source:
***** Federally-listed species

TABLE 4-10 LIST OF STATE-LISTED SPECIES IN EDGEFIELD COUNTY AND MCCORMICK COUNTY, SOUTH CAROLINA

EDGEFIELD COUNTY	MCCORMICK COUNTY
Common Name	**Common Name**
Brook Floater*	Brook Floater*
Blueback Herring*	Monarch Butterfly*
Monarch Butterfly*	Septima's Clubtail*
Atlantic Pigtoe*	Bald Eagle
Bald Eagle	Carolina Heelsplitter*
Carolina Heelsplitter*	Robust Redhorse*
Robust Redhorse*	Wood Stork*
Tricolored Bat*	Tricolored Bat*
Red-cockaded Woodpecker*	Red-cockaded Woodpecker*
Webster's Salamander	Webster's Salamander
Carolina Bird-in-a-nest*	Miccosukee Gooseberry*
Miccosukee Gooseberry*	Georgia Aster*
Georgia Aster*	
Relict Trillium*	

Source: SCDNR 2015a, SCDNR 2015b
*Federally-listed species

4.6.2 FOREST SERVICE SENSITIVE SPECIES

There are approximately 104 acres of Forest System lands within the Project boundary. Therefore, in addition to state and federally listed species, this PAD considers Forest Service Sensitive Species that may occur in the Project vicinity. Forest Service Sensitive Species are those plant and animal species that have been administratively designated by the Regional Forester for which population viability is a concern. Sensitive species considered potentially occurring in the Sumter National Forest are included in Table 4-11. This table comes directly from the Final Environmental Impact Statement for the Revised Land and Resource Management Plan – Sumter National Forest (USFS 2004).

TABLE 4-11 SENSITIVE SPECIES CONSIDERED POTENTIALLY OCCURRING IN SUMTER NATIONAL FOREST

SPECIES	HABITAT	PRIMARY HABITAT GROUPS	RANGE
Webster's Salamander (*Plethodon websteri*)	Moist mesic hardwood slopes with rocky outcrops; Greenwood, Edgefield, and McCormick counties.	Mature Mesic Hardwood-Forests	P*
Southern Appalachian Salamander (*Plethodon teyahalee*)	High elevation, wooded hardwood slopes and forests.	Mature Mesic Hardwood-Forests	M**
Brook Floater (*Alasmidonta varicosa*)	Small streams with gravel bottoms; known from Chattooga, Turkey and Upper Stevens Creek watersheds.	Aquatic; Chattooga, Turkey, Upper Stevens Creek watersheds	P,M
Oconee Stream Crayfish (*Cambarus chaugaensis*)	Fast-moving, rocky 3rd and 4th order streams in tributaries of the upper Savannah River; known most recently from the Chauga River; Noted historically in Ramsey Creek, West Village Creek, Crane Creek, Cedar Creek, and a stream between Long Creek and the Chattooga River (1972 data).	3rd and 4th Order Streams in Chattooga, Chauga watersheds	M
Carolina Darter (*Etheostoma collis*)	Localized populations occur in lower and middle piedmont streams with slow to moderate current. Known from Saluda and Broad River watersheds.	Aquatic; Saluda and Broad River watersheds	P
Rayed Pink Fatmucket (*Lampsilis splendida*)	Primarily a coastal plain species; one occurrence in Middle Saluda River Composite watershed.	Aquatic; Middle Saluda River Composite-	P
Robust Redhorse (*Moxostoma robustum*)	Known from the Savannah River near the fall line. Recently introduced into the Broad River.	Aquatic; Lower Savannah and Broad River Watersheds	P
Bachman's Sparrow (*Aimophila aestivalis*)	Occurs on piedmont districts in stands with open canopies and grassy understories.	Early Succession; Woodlands, Savannas, Grasslands	P
Migrant Loggerhead Shrike (*Lanius ludovicia migrans*)	Breeds in open areas dominated by grasses interspersed with shrubs, trees, or bare ground. Prefers agricultural landscapes (pastures) in both piedmont and coastal plain.	Pastures/ Agricultural Landscapes; Woodlands, Savannas, Grasslands	P
Diana Fritillary (*Speyeria diana*)	Violets are larval host plant; open areas for nectar sources in summer; mountains.	Mature Mesic Hardwood Forests; Woodlands, Savannas, Grasslands.	M

SPECIES	HABITAT	PRIMARY HABITAT GROUPS	RANGE
Rafinesque's Big-Eared Bat (*Corynorhinus rafinesquii*)	Restricted to the mountains, sandhills, and coastal plain Physiographic regions. May be found in hollow trees or behind loose bark near streams, caves, mines, or human-made structures.	Mines; -Late Successional Riparian	M
Eastern Small-Footed Myotis (*Myotis leibii*)	At southern terminus or range on AP; known from Moody Creek near Lake Cherokee. May commonly roost in hemlock trees near streams in summer.	Mines; -Late Successional Riparian	M
Indigo Bush (*Amorpha schwerini*)	Pine-Oak heaths and oak-hickory communities in the piedmont of South Carolina.	Mature Oak Forests	P
Fort Mountain Sedge (*Carex communis var.amplisquama*)	Found in mountain rich coves, at Tamassee Knob, East Fork of the Chattooga, and White Rock Cove on the Andrew Pickens.	Basic Mesic Forests	M
Radford's Sedge (*Carex radfordii*)	Occurs in basic and mature mesic hardwood forests on the Andrew Pickens.	Mature Mesic Hardwood	M
A Liverwort (*Cheilolejeunea evansii*)	Bark of trees in moist escarpment gorge or gorge- like habitats, with best development in relatively open microsites within shaded gorges.	Late Successional Riparian	M
Spreading Pogonia (*Cleistes bifaria*)	Dry ridgetops under pines.	Woodlands, Savannas, and Grasslands	M
Whorled Horsebalm (*Collinsonia verticillata*)	Found in basic mesic forests along the Brevard Geologic Belt in South Carolina.	Basic Mesic Forests	M
Mountain Witch Alder (*Fothergilla major*)	Known from oak-hickory forests in mountains; may occur on monadnocks or north-facing slopes in piedmont.	Mature Oak Hickory Forests	M
Shoal's Spider Lily (*Hymenocallis coronaria*)	Rocky river shoals; sandhills and piedmont.	River Channels-	P
Butternut (*Juglans cinerea*)	Basic mesic forests along the Brevard Geologic Belt usually at old homesites.	Basic Mesic Forests-	M
Fraser's Loosestrife (*Lysimachia fraseri*)	Open stands or rights-of-ways with grassy understories; mountains,	Woodlands, Savannas, Grasslands	M
Sweet Pinesap (*Monotropsis odorata*)	Shortleaf pine-oak heaths in the southern Appalachians and piedmont.	Mature Oak Forests	P,M
Gorge Leafy Liverwort (*Plagiochila caduciloba*)	Found on damp, shaded, vertical rock faces along streams in mountain gorges; Southern Appalachian endemic.	Rock Outcrops and Cliffs	M

SPECIES	HABITAT	PRIMARY HABITAT GROUPS	RANGE
Sharps Leafy Liverwort (*Plagiochila sharpii*)	Found on damp, shaded, vertical rock faces along streams in mountain gorges; Southern Appalachian endemic.	Late Successional Riparian	M
Carolina Plagiomnium (*Plagiomnium carolinianum*)	Damp, shaded, vertical rock faces along streams in mountain gorges; known from Long Creek and Opossum Creek on the Andrew Pickens.	Rock Outcrops and Cliffs	M
Oglethorpe Oak (*Quercus oglethorpensis*)	Upland wetland depressions and streamside forests in the Carolina Slate belt.	Bogs, Fens, Seeps, Seasonal Ponds	P
Liverwort (*Radula sullivantii*)	Wet shaded rocks and crevices.	Spray cliffs	M
Hartwig's Locust (*Robinia viscose var.hartwegii*)	Pine-oak heaths and roadsides in the mountains; one location known near Village Creek on the Andrew Pickens.	Woodlands, Savannas, Grasslands	M
Sun-Facing Coneflower (*Rudbeckia heliopsidis*)	Open forests with herbaceous understories; known from roadsides in the vicinity of Lake Cherokee on the Andrew Pickens.	Woodlands, Savannas, Grasslands	M
Southern Oconee Bells *Shortia galacifolia var.galacifolia*)	Large colonies in mixed mesic forests near Lake Jocassee; introduced on the Andrew Pickens.	Mature Hemlock Forests	M
Georgia Aster *Symphyotrichum georgianus*)	Open stands or rights-of-ways with grassy understories; lower elevations in piedmont and mountains.	Woodlands, Savannas, and Grasslands	P,M
Ashleaf Goldenbanner *Thermopsis mollis var.fraxinifolia*)	Pine-oak heaths and roadsides in the mountains.	Woodlands, Savannas, Grasslands	M
Lanceleaf Trillium *Trillium lancifolium)*	Basic mesic forests in piedmont.	Basic Mesic Forests	P
Nodding Trillium (*Trillium rugelli*)	Rich wooded slopes over mafic or calcareous rocks.	Basic Mesic Forests	P,M
Jeweled Trillium (*Trillium simile*)	Basic mesic forests in mountains.	Basic Mesic Forests	M
Piedmont Strawberry (*Waldsteinia lobata*)	Mixed mesic hardwood forests known from lower elevations in the mountains.	Mature Mesic Hardwood Forests	M

Source: USFS 2004
* Piedmont
** Mountain

4.6.3 POTENTIAL ADVERSE EFFECTS AND ISSUES

No adverse effects or issues related to federally listed rare, threatened, and endangered species have been identified. Additionally, no effects to Forest Service sensitive species have been identified. Operation of the Project will continue to moderate flow releases from upstream dams and re-oxygenate water that has low DO levels, which will benefit aquatic species inhabiting the Savannah River downstream of the Project.

4.6.4 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

PLACEHOLDER

4.6.5 REFERENCES

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4.7 RECREATION AND LAND USE [§ 5.6 (D)(3)(VIII)]

The Project is located within Edgefield and McCormick counties, South Carolina and Columbia County, Georgia, in the Piedmont ecoregion. The Project is located on approximately 104 acres of federal land in the Sumter National Forest.

4.7.1 EXISTING RECREATIONAL FACILITIES WITHIN THE PROJECT BOUNDARY

On February 5, 2014 and supplemented on September 11, 2014, DESC filed a revised Recreation Management Plan (RMP) pursuant to Article 413 of the existing license. On March 24, 2015, FERC issued an order Modifying and Approving the Revised Recreation Plan Pursuant to Article 413. Below is a summary of the existing Project recreation sites and each site's existing amenities.

Currently there are five recreation sites associated with the Project. These sites are listed below in Table 4-13, shown in Figure 4-20 and described in further detail in the following paragraphs.

TABLE 4-12 EXISTING PROJECT RECREATION SITES AT THE STEVENS CREEK PROJECT

RECREATION SITE NAME	RECREATION SITE NAME AS LISTED IN 2014 RECREATION PLAN	RECREATION SITE NAME AS LISTED IN 1995 PROJECT LICENSE/EXHIBIT G DRAWINGS
Stevens Creek Recreation Site	SC Recreation Site #1	Stevens Creek Recreation Site
Fury's Ferry Recreation Site	SC Recreation Site #2	Fury's Ferry Recreation Site
Mims Recreation Site	SC Recreation Site #3	Recreation Site #1
Chota Drive Recreation Site	SC Recreation Site #4	Recreation Site #2
Betty's Branch/Riverside Park	SC Recreation Site #5	GA Recreation Site

Source: SCE&G 2014

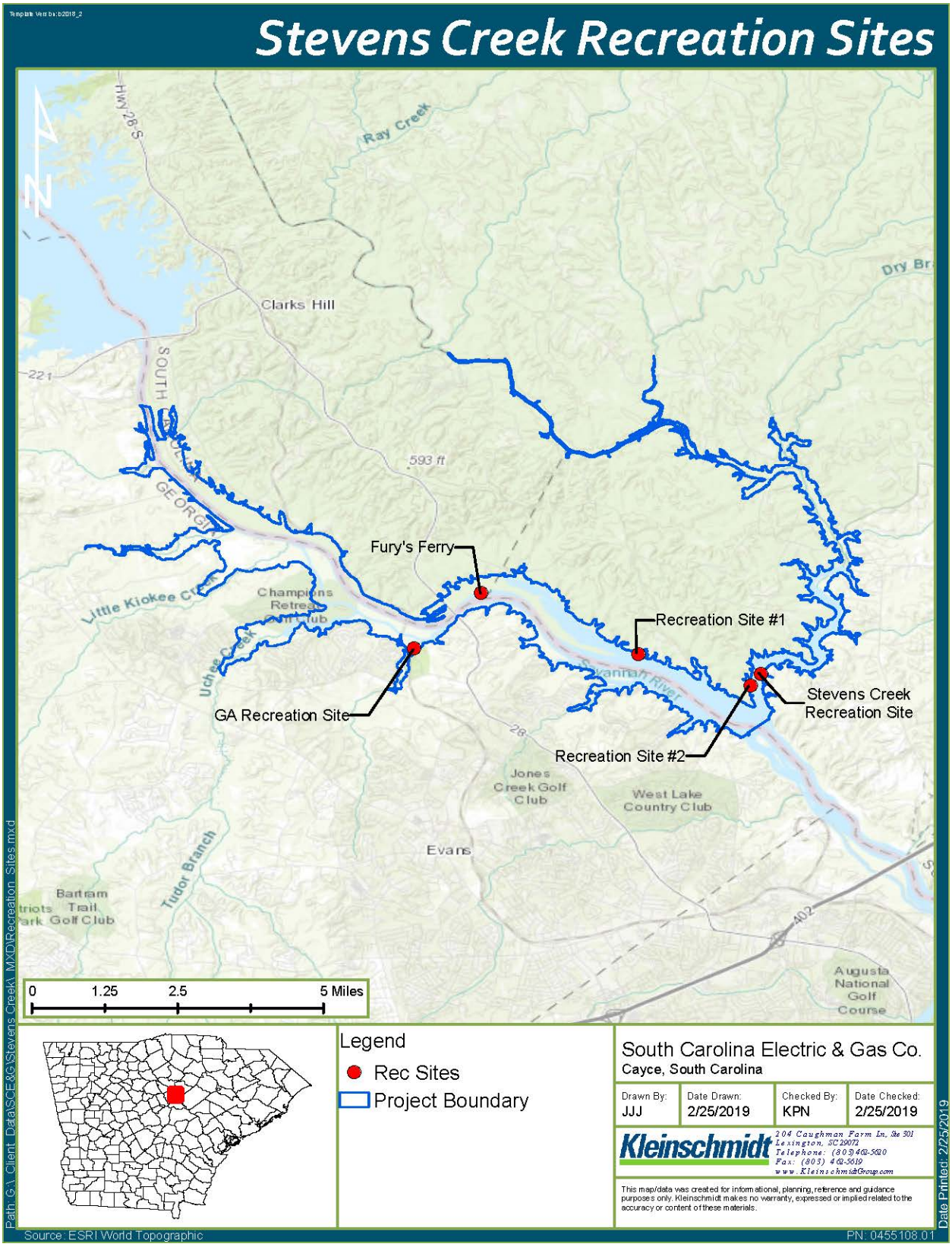

FIGURE 4-20 EXISTING PROJECT RECREATION SITES AT THE STEVENS CREEK PROJECT

4.7.1.1 STEVENS CREEK RECREATION SITE

The Stevens Creek Recreation Site is located on DESC-owned property on the Stevens Creek arm of the Project reservoir. This recreation site currently has the following amenities (SCE&G 2014):

- A single-lane concrete boat ramp;
- A paved turn-around area;
- Three picnic tables (one barrier free);
- A paved access road;
- One barrier-free restroom;
- A parking area for approximately eight trailers and two vehicles (one barrier-free parking space); and,
- A safety sign.

DESC maintains the recreation site by collecting litter and trash at the site; inspecting signs, handicapped facilities, and parking areas quarterly, with maintenance and repair as needed; and mowing and edging five times a year during the growing season (SCE&G 2014).

4.7.1.2 FURY'S FERRY RECREATION SITE

The Fury's Ferry Recreation Site is located on the Savannah River portion of the Project reservoir on U.S. Forest Service (USFS)-owned property. This recreation site currently has the following amenities (SCE&G 2014):

- A single-lane concrete boat ramp;
- Two picnic tables;
- An unpaved turn-around area;
- A gravel access road;
- Signage;
- An unpaved parking area for approximately 20 vehicles;
- A primitive (undeveloped) camping area; and
- A ten-acre hunting reserve.

The existing license originally required additional modifications to the Fury's Ferry Recreation Site. However, USFS developed the Forks Area Trail System (FATS) in the vicinity of Fury's Ferry, which is not associated with the Project. This facility provides over 30 miles of trail system,

parking areas, developed restroom facilities, and potable water. While the license recommended modifications to the Fury's Ferry site, the USFS requested that no improvements be made to the site due to their recreation realignment strategy. Therefore, no improvements were made. The site is maintained by the USFS in accordance with their normal maintenance processes, including monitoring use and maintenance of landscaping and roads (SCE&G 2014).

4.7.1.3 MIMS RECREATION SITE

This site originally existed as an informal access area, however, DESC proposed to formalize the site in the 2014 Recreation Plan. The Mims Recreation Site is located on USFS property and includes the following amenities (SCE&G 2014):

- A gravel access road;
- A gravel turn-around;
- A gravel parking area for two vehicles;
- An informal path to the boat launching area;
- A hand-carry boat launch; and
- Bank fishing access.

The existing license and the 2014 Recreation Plan required the following modifications to the Mims Recreation Site (SCE&G 2014):

- Reorient travel access road;
- Enlarge travel turn-around;
- Formalize path to 8-foot-wide gravel path;
- Improve access to bank fishing by minor clearing of underbrush;
- Expand parking to four vehicles with trailer and two vehicle spaces (one of each barrier-free); and
- Installation of signage.

On October 10, 2018, DESC met at the Mims Recreation Site with representatives from the USFS to discuss the proposed improvements per the 2014 Recreation Plan. The USFS indicated that this site is no longer supported by the current Forest Service Recreation Plan and is not consistent with the recent Forest Service Sustainable Recreation Strategy. The USFS sent a letter to DESC on November 19, 2018 requesting that proposed modifications at the site be deferred until further discussions occur during the relicensing process. Based on discussions with Commission staff it

was recommended that DESC consult with the appropriate agencies to remove this recreation site from the current Recreation Plan.

4.7.1.4 CHOTA RECREATION SITE

The Chota Recreation Site is located on USFS property and is on the Stevens Creek arm of the Project reservoir. This site has the following amenities (SCE&G 2014):

- A gravel access road;
- A gravel turn-around area;
- An undeveloped path;
- A canoe launching area; and,
- Bank fishing access.

Due to the location of the Chota Recreation Site, which is close to archaeological sites, the USFS requested that this site maintain its primitive existence and requested no improvements be made. This site is located on USFS property and is maintained by USFS in accordance with normal maintenance processes, including use monitoring and landscaping maintenance (SCE&G 2014).

4.7.1.5 BETTY'S BRANCH/RIVERSIDE PARK

As required by the license, DESC developed the Betty's Branch recreation site with representatives from Columbia County, Georgia (SCE&G 2014). Betty's Branch is primarily a fishing site with appurtenant facilities located on the Georgia side of the Savannah River and is part of the multi-use Riverside Park, developed by Columbia County, Georgia. Riverside Park includes facilities for baseball, softball, tennis, picnicking, and water-related activities such as fishing and boating. DESC dredged Betty's Branch to allow boat access through Little River to the Stevens Creek Reservoir. DESC provided funds to cover dredging costs and aided in the design of a boat ramp, dock and fishing platform. Existing amenities associated with the Project and located at the Betty's Branch site include:

- A boat ramp;
- A boat dock;
- A barrier-free fishing pier; and
- Safety signage.

The Riverside Park is owned and operated by Columbia County and maintained by Columbia County in accordance with their normal maintenance processes. However, the amenities listed above are considered Project recreation facilities. According to the Memorandum of Agreement (MOA) Columbia County is responsible for the operation and maintenance of these facilities. In the MOA with Columbia County, DESC is responsible for the maintenance dredging of Betty's Branch, which provides access for the boat ramp. As stated in the MOA, DESC will inspect the dredged area every five years and maintain on an as-needed basis (SCE&G 2014).

4.7.2 RECREATIONAL USE OF PROJECT LANDS AND WATERS

According to the 2015 Form 80 for the Project, the Project received an estimated annual total of 12,210 recreation days. The peak weekend average for the Project, including daytime and nighttime visits, is approximately 732 recreation days. FERC defines a "recreation day" as a visit by a person to a development for recreational purposes during any portion of a 24-hour period. Peak weekends are defined by FERC as a weekend when recreational use is at its peak for the season, typically Memorial Day, Independence Day and Labor Day. A "peak weekend" includes the three-day period surrounding the mentioned holidays.

Capacity utilization estimates for Project recreation amenities located within the Project boundary are listed in Table 4-14.

TABLE 4-13 CAPACITY UTILIZATION OF PROJECT RECREATION AMENITIES LOCATED WITHIN THE PROJECT BOUNDARY

RECREATION AMENITY TYPE	NUMBER OF FERC APPROVED RECREATION AMENITIES	CAPACITY UTILIZATION*
Boat Launch Areas	3	30
Reservoir Fishing	1	30
Trails	1	20
Picnic Areas	2	30
Informal Use Areas	3	20

Source: FERC 2015
* Reported in Percentage

4.7.3 EXISTING SHORELINE BUFFER ZONES WITHIN THE PROJECT BOUNDARY

Shoreline around the Project is largely undeveloped, as a large portion of the land is owned by the USFS. DESC owns approximately 353 acres of land within the Project boundary and maintains flowage rights on the remainder of the Project land. Public access is not allowed on Project land and DESC maintains a buffer of trees along the shoreline. DESC encourages reservoir landowners to maintain a buffer of trees. Access to the reservoir is mainly limited to gravel USFS roads, private roads, and other local unimproved roads (SCE&G 2014).

4.7.4 CURRENT AND FUTURE RECREATION NEEDS LISTED IN EXISTING STATE OR REGIONAL PLANS

Management plans that cover recreation resources within the Project vicinity include South Carolina's 2014 State Comprehensive Outdoor Recreation Plan (SC SCORP); Georgia's State Comprehensive Outdoor Recreation Plan 2017-2021 (GA SCORP); Columbia County's Comprehensive Plan; Edgefield County's Comprehensive Plan; McCormick County's Comprehensive Plan; and the City of Augusta's Comprehensive Plan.

4.7.4.1 SOUTH CAROLINA'S 2014 STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

The SC SCORP serves as a recreation and natural resources planning and development guide for a variety of government and NGOs (SCPRT 2014). Specifically, the SC SCORP considers outdoor recreation issues as they relate to the needs of residents and visitors to South Carolina, examines recreational resources within the state, analyzes the demand for recreational opportunities, develops a plan for addressing recreation needs and issues, and identifies funding opportunities

and issues of national importance (SCPRT 2014). The SC SCORP does not provide any recommendations regarding the Project, however the recreation goals outlined in the SC SCORP may be used by state, county, or municipal governments, including McCormick and Edgefield counties. The goals of the SC SCORP listed below may be relevant to the Project.

- Promote healthy lifestyles and communities through outdoor recreation, parks and associated amenities.
- Stewardship and conservation of South Carolina's natural and recreational resources.
- Sustaining economic benefits of outdoor recreation by utilizing and leveraging the State's outdoor recreation resources and attractions (SCPRT 2014).

4.7.4.2 GEORGIA STATE COMPREHENSIVE OUTDOOR RECREATION PLAN 2017-2021

The GA SCORP provides information on important issues and consideration facing the state's parks and guidance to the state's policy makers, practitioners and citizens for protecting key resources and addressing outdoor recreational needs of the state's citizens (GSP 2016). While the GA SCORP does not provide specific recommendations for recreation at the Project, it does provide three strategic action statements that broadly apply to the Project. These strategic action statements are listed below.

- Reinforce the connection between health, quality of life and outdoor recreation at all levels of government service.
- Support and maintain Georgia's outdoor recreation resources so that the state remains attractive to new business and industry, draws tourists across state borders and grows the state tax base.
- Continue to protect the natural landscapes which help to make recreating outdoors fun and exciting and to preserve critical land and water resources (GSP 2016).

4.7.4.3 EDGEFIELD COUNTY 2019 COMPREHENSIVE PLAN

The Edgefield County Comprehensive Plan considers nine elements for planning purposes, including population, economic development, natural resources, cultural resources, community facilities, housing, land use, transportation, and priority investments (Robert and Company 2019). A majority of these elements consider a recreation component. The county has a short-term plan regarding recreation that includes the following components: prepare a county recreation plan to support a range of parks and cultural resources and coordinate plans with town resources; create a

501(3)c entity to promote and enhance recreation facilities and activities (including staff and training); identify, develop and construct new recreation facilities in the Merriwether area; identify, develop and construct new recreational activities building in the Johnston-Edgefield-Trenton area; support "greenway" corridor along Ten Governors Trail and access to USFS facilities and resources; and partner with other entities to support cultural resources partnerships for the arts, senior citizen programs, and quality of life projects (Robert and Company 2019).

4.7.4.4 McCormick County Comprehensive Plan 2015

The McCormick County Comprehensive Plan considers several elements that focus on recreation components, including natural resources, cultural resources, community facilities and land use. The plan includes a goal of encouraging county and municipal governments to work with recreation groups to develop a plan for upgrading recreation facilities in the county, especially facilities for young children (McCormick County 2015).

4.7.4.5 Columbia County Comprehensive Plan, Vision 2035

The Columbia County Comprehensive Plan, Vision 2035, provides the community's primary goals for achieving its vision for growth and development over the next 20 years. The plan highlights the need to plan for activity centers and major corridors, green space, parks, economic development and public infrastructure as the fastest growing county in the region (Columbia County 2015). A goal of the of the plan's resource conservation theme is to permanently protect 20 percent of the county's land as greenspace consistent with the Columbia County Greenspace Program. A goal of the plan's social and economic development theme is to enhance recreation opportunities for residents, including updating the 2002 Recreation Master Plan (Columbia County 2015).

4.7.5 Current Shoreline Management Plan Or Policy

DESC does not currently have a Shoreline Management Plan for the Project. DESC owns limited land surrounding the reservoir and retains flowage easements on the reminder of Project boundary land. It is DESC's policy to implement the South Carolina Department of Health and Environmental Control (SCDHEC) Stormwater Best Management Practices (BMPs) during any construction activities. These BMPs help prevent excessive runoff and erosion resulting from land disturbing activities. General guidelines include fitting the activity to the topography and soils;

minimizing erosion of the disturbed areas; stabilizing disturbed areas immediately; retaining or accommodating runoff; retaining sediment; and not encroaching upon water courses. Besides these BMPs, DESC does the following when managing the Stevens Creek shoreline:

- Plant alternative native species when possible, paying particular attention to any added benefits of providing food sources and wildlife habitat.
- Ensure materials will, to the extent possible, blend in with the natural environment and maintain Project aesthetics.
- Minimize destruction of the natural vegetation directly adjacent to the reservoir, and where possible, on the land inside the Project boundary.
- Minimize unauthorized use and vandalism at recreation sites.
- Blend the recreation development into the existing landscape character by selective vegetation removal and landscaping.
- Revegetate, stabilize and landscape new construction areas and slopes damaged by erosion.

In addition, DESC conducts annual shoreline inspections at the Stevens Creek reservoir. If specific areas of shoreline erosion are identified, DESC will consult with the USFS, GADNR and SCDNR, as appropriate, to address adverse effects such as unstable slopes or suspended sediments. Deficiencies of the shoreline are noted and repaired as necessary.

4.7.6 THE NATIONAL WILD AND SCENIC RIVER SYSTEM

The Project is not located on a designated wild and scenic river segment. No portion of the Savannah River is designated as wild and scenic.

4.7.7 PROJECT LAND BEING CONSIDERED FOR INCLUSION IN THE NATIONAL TRAILS SYSTEM OR AS A WILDERNESS AREA

No Project lands are being considered for inclusion in the National Trails System or as a Wilderness Area.

4.7.8 REGIONALLY OR NATIONALLY IMPORTANT RECREATION AREAS IN THE PROJECT VICINITY

There are several local, state, and federal recreation facilities located near or adjacent to the Project, including three state parks and three national forest park and recreation areas within 25 miles of the Project dam. An additional 12 state parks and nine national forest park and recreation areas are

located within 50 miles of the Project dam. Immediately upstream of the Project are the USACE's J. Strom Thurmond Project, Richard B. Russel Project, and Hartwell Project. Each of these projects provide extensive recreation opportunities to the public (FERC 1995).

Adjacent to the north end of the Stevens Creek reservoir is the USACE's J. Strom Thurmond Recreation Area. On the South Carolina side of the recreation area, facilities include: a visitor's information center; a concrete boat ramp; a fishing pier; a fish cleaning station; picnic tables and grills; trash receptacles; and a parking area. On the Georgia side of the recreation area, facilities include: a concrete boat ramp; a bank fishing area; picnic tables and grills; and a parking area (FERC 1995).

In addition to the J. Strom Thurmond Recreation Area, the 70,000-acre J. Strom Thurmond reservoir provides eight other recreation areas, thirteen campgrounds, five state parks, three county parks, five private marinas, three USFS access points, and the U.S. Army's Fort Gordon Recreation Area (FERC 1995).

The Richard B. Russel reservoir is smaller than that of the downstream J. Strom Thurmond Project: however, it provides similar recreation facilities to the public. The Hartwell reservoir, the furthest upstream of the three USACE projects, is smaller than the J. Strom Thurmond reservoir, however, due to its close proximity to Atlanta, it receives significant use (FERC 1995).

The Sumter National Forest's Long Cane District is located adjacent to the Project and provides two campgrounds, picnic areas, hunt camps, boating sites, a swimming beach, and a rifle range. Hunting, camping, and site-seeing are the most popular recreation activities at the Sumter National Forest (FERC 1995).

Immediately southeast of the Project are two parks maintained by Richmond County, Georgia and the city of Augusta. These parks provide picnicking, game courts, and fishing opportunities for the public. In addition, the Augusta Canal, located downstream of the Project, is open to the public for non-motorized boating. Parking areas, canoe put-ins and an 8.5-mile bicycle trail are located along the canal (FERC 1995).

4.7.9 NON-RECREATIONAL LAND USE AND MANAGEMENT WITHIN THE PROJECT BOUNDARY

Project operations, maintenance, and recreation are the primary activities on Project lands. The land use types within the Project boundary consist mostly of privately-owned lands and rural residential developments (FERC 1995) (Figure 4-21). On the South Carolina side of the Project is the Sumter National Forest, which is managed for recreation and timber harvesting. Timber harvesting is the primary land use on both public and private lands at the Project. Agricultural use in the Project boundary is limited due to a large amount of wooded lands (FERC 1995).

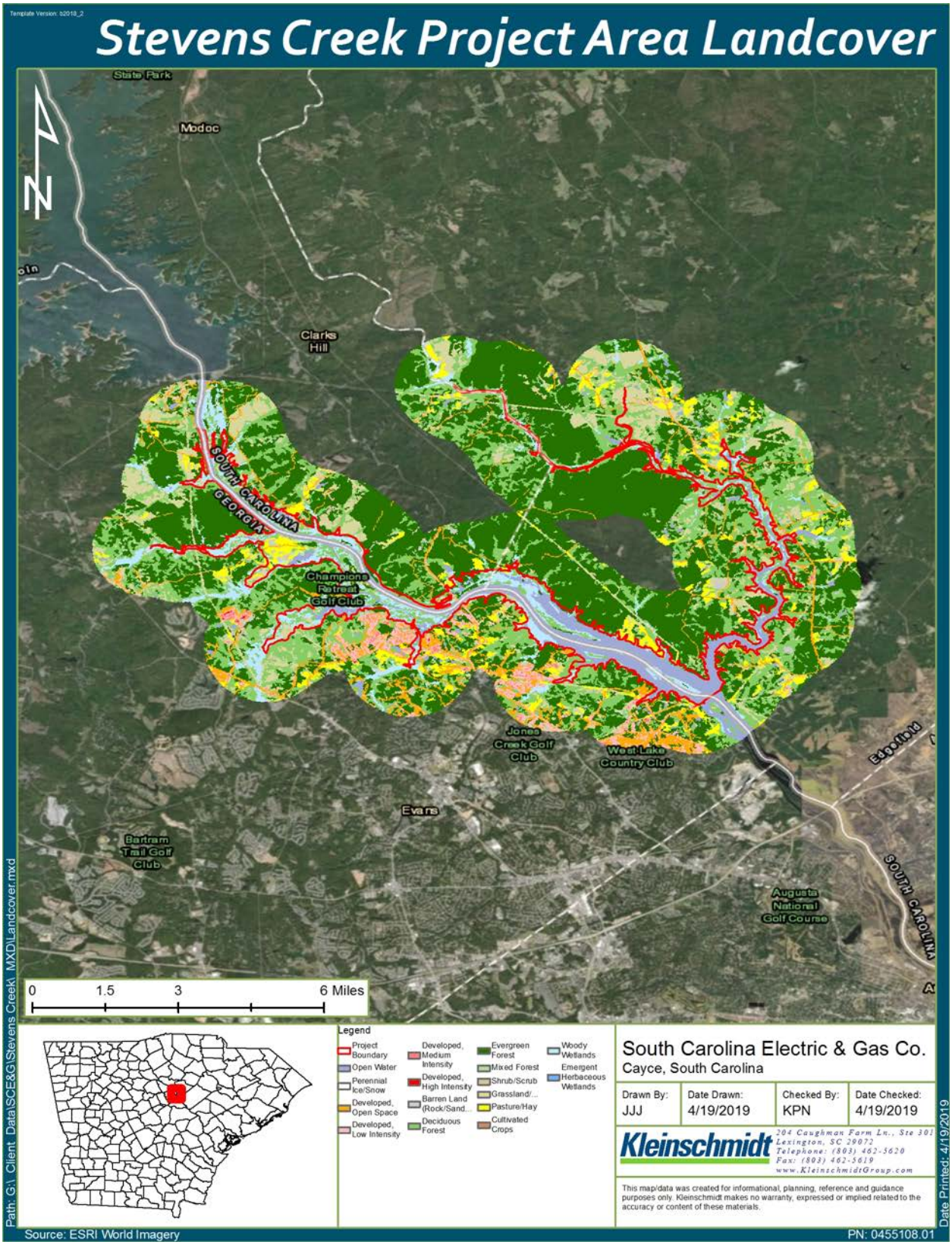

FIGURE 4-21 LAND USE MAP OF THE PROJECT

4.7.10 RECREATIONAL AND NON-RECREATIONAL LAND USE AND MANAGEMENT ADJACENT TO THE PROJECT BOUNDARY

The largest land use categories for lands adjacent to the Project are agricultural/forestry, residential, public and recreation. Land use classifications in Edgefield County, South Carolina and Columbia County, Georgia are included in Table 4-15 and Table 4-16. Land uses in McCormick County, South Carolina are described in the paragraph below.

TABLE 4-14 LAND USE CLASSIFICATION IN EDGEFIELD COUNTY, SOUTH CAROLINA

LAND USE CLASSIFICATION	ACRES	% OF TOTAL
Rural/Agricultural and Vacant	278,110	85.6
Single-Family Residential	7,008	2.2
Multi-Family Residential	0	0.0
Commercial and Mixed Use	260	0.08
Industrial	360	0.11
Institutional and Public*	32,606	10.0
Towns and Cities	6,734	2.1

Source: Robert and Company 2018
*This category includes USFS lands

TABLE 4-15 LAND USE CLASSIFICATION IN COLUMBIA COUNTY, GEORGIA

LAND USE CLASSIFICATION	ACRES	% OF TOTAL
Agriculture/Forestry	88,985	50.1
Parks/Recreation/Conservation	10,449	5.9
Residential (single-family)	55,200	31.1
Multi-Family	704	0.4
Manufactured Home Park	377	0.2
Commercial	3,003	1.7
Industrial	2,498	1.4
Public/Institutional	10,034	5.6
Transportation/Communication/Utilities	932	0.5

Source: Columbia County 2015

Land uses in McCormick County, South Carolina fall in the following categories: residential/commercial; industrial; institutional; public lands; and agricultural (McCormick 2015). The largest land use in McCormick County is public lands, with more than 100,000 acres of public lands existing within the county, including 48,000 acres of USFS land. The second largest land use in McCormick County is agricultural lands with approximately 24,934 acres (McCormick 2015).

The closest city to the Project is the City of Augusta. Land uses within the City of Augusta are included in Table 4-17.

TABLE 4-16 LAND USE CLASSIFICATIONS IN THE CITY OF AUGUSTA

LAND USE CLASSIFICATION	ACRES	% OF TOTAL
Public Institutional	52,698	25.70
Low Density Residential	37,623	18.40
Agriculture	31,992	15.60
Forestry	23,065	11.30
Rural Residential	19,619	9.60
Industrial	15,592	7.60
Parks, Recreation and Conservation	11,131	5.40
Commercial	8,241	4.00
Transportation, Communication and Utility	2,507	1.20
High Density Residential	2,123	1.00
Office	257	0.10

Source: Augusta Georgia 2018

4.7.11 POTENTIAL ADVERSE EFFECTS AND ISSUES

DESC does not anticipate any adverse effects to recreation or land use with continued operation of the Project.

4.7.12 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

PLACEHOLDER

4.7.13 REFERENCES

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4.8 AESTHETIC RESOURCES [§ 5.6 (D)(3)(IX)]

4.8.1 VISUAL CHARACTER OF THE PROJECT VICINITY

The Project facilities include a 2,000-foot spillway consisting of a cyclopean concrete gravity section with flashboards; a concrete gravity lock between the powerhouse and the spillway section; a reservoir with a surface area of 2,400 acres; a powerhouse integral with the dam that contains a reinforced concrete substructure, a steel-framed brick superstructure, and vertical shaft turbines and generators; a transmission system; and appurtenant facilities. Photo 4-1 through Photo 4-4 include a variety of views of the Project, including the powerhouse and upstream and downstream views.

PHOTO 4-1 OVERVIEW OF PROJECT AREA

PHOTO 4-2 POWERHOUSE

PHOTO 4-3 NAVIGATION LOCK, VIEW LOOKING DOWNSTREAM

PHOTO 4-4 UPSTREAM OF DAM

4.8.2 NEARBY SCENIC ATTRACTIONS

The Sumter National Forest, which overlaps with the Project boundary, is a scenic attraction that brings hikers, boaters, and other visitors to the Project vicinity. It is home to many scenic waterfalls, including the popular Yellow Branch Waterfall. The Sumter National Forest is home to the Chattooga River, a nationally recognized Wild and Scenic River that contains scenic waterfalls and is renowned for its whitewater paddling opportunities (SC Tourism 2019; USDA 2019b).

The Francis Marion National Forest is also nearby, and together, the two national forests span a wide variety of environments, featuring forested areas, rivers, and swamps (USDA 2019a).

4.8.3 VISUAL CHARACTER OF PROJECT LANDS AND WATERS

In the Project area, views include generally forested rolling hills, rural residential areas, forested areas in various stages of regrowth, the Project dam and associated facilities, and the open water areas of the Savannah River and Stevens Creek. Most of the shoreline is forested, limiting views from the water to the water's edge. Due to the heavily forested shoreline, there are limited views of timber management areas adjacent to the reservoir that may be considered less aesthetically

pleasing. The USFS maintains a streamside buffer zone within Sumter National Forest by allowing no more than 50 percent of canopy cover to be cut within a 100-foot strip along the shoreline.

Key viewsheds are located at existing public access points at recreation areas, boat ramps, and bridges. This includes the bridge at Highway 28, Fury's Ferry recreation area, and Stevens Creek recreation area. These points provide generally scenic and unobstructed views of the Savannah River and Stevens Creek.

The hydroelectric facilities, including the powerhouse, lock, and dam, are eligible for the National Register of Historic Places (NRHP). The powerhouse is brick and has visually appealing architectural characteristics.

The area downstream of the existing dam and hydroelectric facilities has remained largely undeveloped. The downstream area represents a typical Piedmont riverine system with rocky shoals; mid-stream islands featuring sycamore, willow, and river birch; and forested river banks. Stallings Island is located directly downstream of the dam and remains in a relatively natural state. Stream banks remain forested down to the river, and instream flows below the dam have not negatively impacted the visual integrity of the river.

The Augusta Diversion Dam is located approximately one mile downstream of the Project and impounds water, thereby affecting the natural stream flow and visual conditions of the Savannah River between the Project and the diversion dam. The water released from the Stevens Creek Dam provides flowing water in the river segment immediately downstream of the dam.

4.8.4 POTENTIAL ADVERSE EFFECTS AND ISSUES

Adverse visual impacts associated with the Project are limited to the industrial quality of the substation and adjacent facilities, as well as the exposure of stream or reservoir bottom during water level fluctuation. These impacts are minimal because the area is not accessible to the public, cannot be seen from key public viewpoints, and can only be seen from the water. For safety reasons, recreational boaters are discouraged from getting too close to the area, thereby limiting their view.

The aesthetic quality of the reservoir shorelines varies daily due to exposure of the stream beds during water level fluctuations; however, this visual impact is minimal.

No adverse aesthetic impacts resulting from operation of the Project are evident downstream of the Project.

4.8.5 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

Since there is limited public viewing of the substation and immediate surroundings, DESC does not propose visual enhancement or mitigation measures.

The current license includes some aesthetic enhancement and mitigation measures, including:

- Develop a plan to control erosion, slope instability, and sedimentation during construction of the proposed recreation enhancements and any other land disturbing or land-clearing activities. DESC must inspect the reservoir shoreline annually for erosion and report its findings to FERC every three years.
- Maintain a buffer area of trees on DESC-owned land around the reservoir to minimize soil erosion and maintain aesthetic quality.
- Protect archaeologic and historic sites within the Project area by developing and implementing a cultural resources management plan.

DESC will continue to follow these measures.

4.8.6 REFERENCES

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4.9 CULTURAL RESOURCES [§ 5.6 (D)(3)(X)]

4.9.1 PREHISTORY AND HISTORY OF THE REGION

For 12,000 years, the Savannah River and Stevens Creek have served Native Americans and European colonists as a major route for transportation to and from the Atlantic Ocean. The waterways supplied basic needs such as drinking water and water for washing and cooking and attracted animals used for food (SCE&G NDA).

By the mid-1700s, the waterways were primarily used for manufacturing purposes. During the Colonial period, falling water was often used to operate machinery, particularly in areas where there were large rivers, high annual precipitation totals, and sharp drops in elevation over short distances. Industrial activity during this period mostly consisted of family-run small mills, such as grist or sawmills (SCE&G NDA).

In the 1820s, large-scale use of water to power industrial activities had begun, with independent companies using waterpower in a complex system of dams, canals and water wheels. Dams were used to store water, canals were used to direct the stored water and water wheels provided the energy to run machines. Water wheels were eventually replaced with impulse wheels and turbines, which allowed for an increase in the amount of power generated and set the groundwork for the hydroelectric industry (SCE&G NDA).

Hydroelectricity supported industrial development by delivering electric current to textile factories, railroads, wood pulp and paper processing factories, and mining operations. Eventually, hydroelectricity was used to run trolleys, illuminate street lights, and supply electricity to stores and homes. Hydroelectricity was the largest source of energy in the Southeast during the 1930s and by 1940 over one third of all electrical power in the United States was produced by hydroelectric facilities (SCE&G NDA).

Hydroelectric development of the Savannah River in the Project area was encouraged by the industrial expansion of the city of Augusta. The Stevens Creek Dam was constructed between 1909 and 1915 by the Georgia-Carolina Power Company. The dam was considered to be one of the most advanced engineering feats of its kind in the Southeast (SCE&G NDA). In the 1950s, Clark's Hill Dam and Reservoir was constructed approximately ten miles above the Project area,

creating the largest lake in the south and sparking a local recreation industry. The electricity produced by these projects attracted large companies to the area including DuPont. Hydroelectric development continued along the Savannah River Basin including the Hartwell Dam and Reservoir completed in 1962 and the Richard B. Russell Dam and Lake Project (originally known as Trotters Shoals Dam) completed in 1986. Today, the economy of the Upper Savannah region relies on pulpwood extraction, textile manufacturing and recreational activities associated with the hydroelectric project reservoirs (SCE&G NDA).

Project History

The original Project facilities were constructed from 1912 through 1914 under the direction of the J.G. White Corporation and included a powerhouse, dam, navigation lock, and related hydroelectric plant (SCE&G 2004). By the mid-1920s, the Augusta area experienced enough industrial growth to warrant an increase in power production. The Stevens Creek powerhouse was expanded in 1925 to include three additional bays and three Westinghouse generators were added over the next two years to boost the plant's electric capacity. A substation was also built to tie the Project in with the Georgia Railway and Power Company (SCE&G 2004).

Since this time, no additional expansion of Stevens Creek facilities has occurred, however the original powerhouse's mullioned windows were replaced with multi-paned industrial sash and the "top-story" windows with glass blocks in the 1920s or 1930s (SCE&G 2004). In addition, the Project went through a series of alterations and/or replacements beginning approximately 40 years later. The navigation lock was refurbished in the 1970s and the powerhouse received a new trash rack support system, new trash racks, and a new trash rake in 1981. Significant maintenance activities occurred on the dam and powerhouse structures during the late 1970s and early 1980s, including replacement of the main plant headgate, exciter headgates, filler gates, gate seals, and the upstream lock gate. Over the course of the 1980s, the original wooden flashboards were eventually replaced by metal, automatic boards of comparable size and several pieces of equipment including the original direct current (DC) exciters, generators, and transformers were partially or completely removed and replaced by modern units (SCE&G 2004).

4.9.2 EXISTING DISCOVERY MEASURES

During the relicensing of the Project in the 1990s, DESC commissioned several studies to identify historic properties that might be affected by Project operations or Project-related activities during the new license term (SCE&G 2004). Phase I and Phase II surveys were conducted from 1991 to 1995 and included that portion of the APE from the Stevens Creek Dam up the Savannah River to the Route 28 bridge, and from the mouth of Stevens Creek upstream to the Woodlawn Road bridge. Besides these relicensing studies, other studies conducted by entities such as the USFS have identified additional archaeological sites within the APE (SCE&G 2004). A list of sites identified during these studies in included in Table 4-18.

FERC issued a new license to DESC for the continued operation of the Project on November 11, 1995. As a license condition, FERC required DESC to prepare and implement a Historic Properties Management Plan (HPMP) for the Project in accordance with a Programmatic Agreement (PA) among FERC, the Advisory Council on Historic Preservation, and the South Carolina and Georgia State Historic Preservation Officers (SHPOs). The existing PA and HPMP were filed with FERC in November 1995 and November 2004, respectively.

4.9.3 IDENTIFICATION OF HISTORIC OR ARCHAEOLOGICAL SITES IN THE PROPOSED PROJECT VICINITY

The Project HPMP, filed with FERC in November 2004, defines the APE for the Project as the lands enclosed by the Project boundary as delineated in DESC's 1995 application for new license and any lands or properties outside the Project boundary where Project operation or Project-related actions may cause changes in the character or use of historic properties, if any exist. The Project extends approximately 13 miles up the Savannah River to the tailrace of the Thurmond Dam and 12 miles up Stevens Creek. The reservoir has a surface area of approximately 2,400 acres, with a full pool EL 187.5 feet NGVD. The Project boundary varies from 5 to 11 feet above full pool, between EL 192.5 feet and EL 198.5 feet. DESC owns 95 acres, or approximately five percent, of land within the Project boundary and holds flowage rights for the remaining Project boundary. The Project boundary encompasses approximately 104 acres of the Sumter National Forest in South Carolina, owned by the USFS. In Georgia, most of the land within the Project boundary is privately owned and contains scattered rural residential development (SCE&G 2004). Outside of the Project boundary, the APE encompasses both shorelines of the Savannah River downstream from the

Stevens Creek Dam for a distance of approximately 2,000 feet, and includes Stallings Island, situated just below the dam (SCE&G 2004). During relicensing consultation with the SHPOs, the Project APE may change. A revised APE will be included with the FLA, if necessary. The current Project APE, as defined in the 2004 HPMP, is depicted in Figure 4-22.

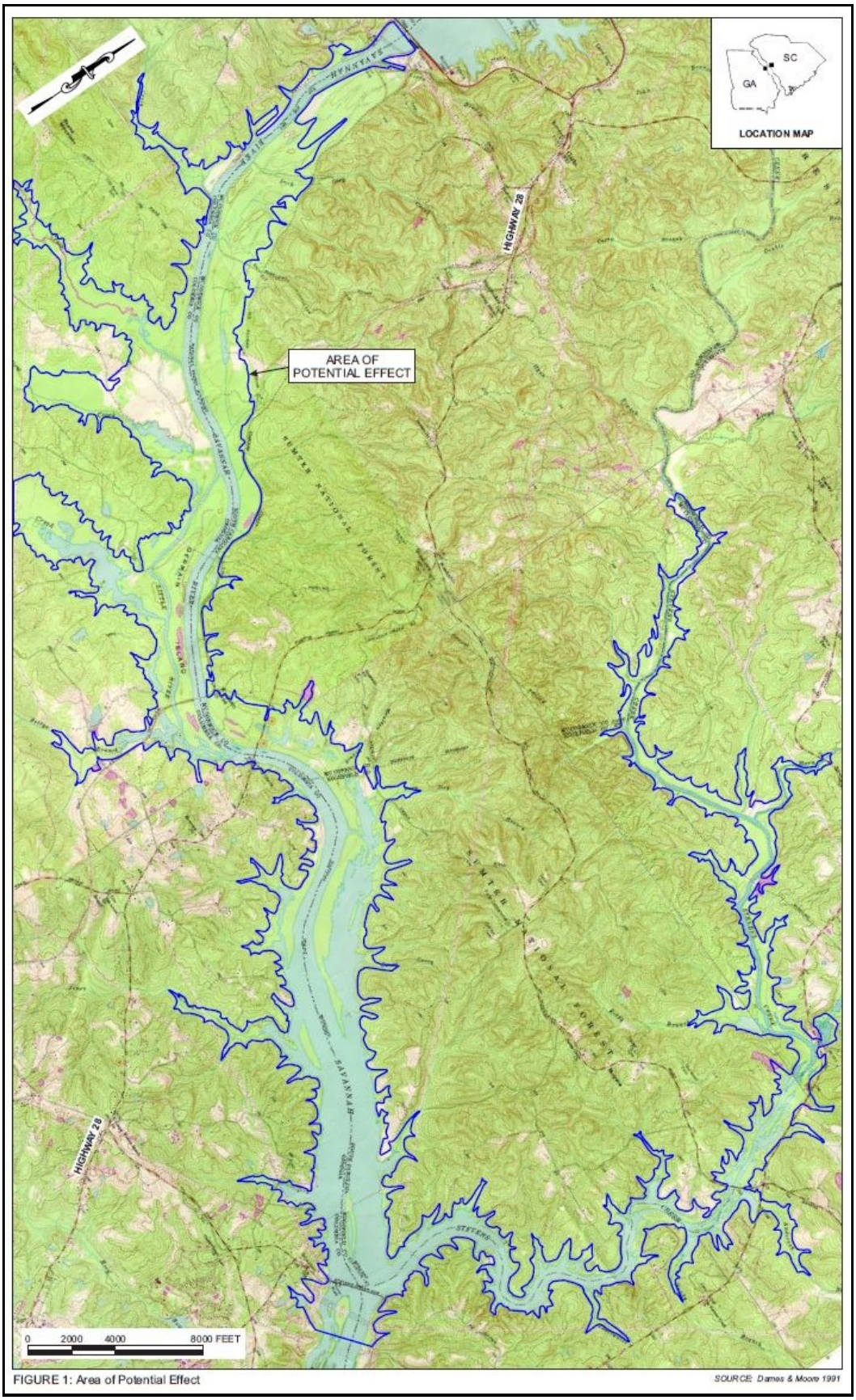

FIGURE 4-22 STEVENS CREEK AREA OF POTENTIAL EFFECT

As mentioned, a variety of studies were completed in the 1990s identifying historic properties within the Project APE. Table 4-18 lists all historic properties in the APE as of 1996. Properties described as "potentially eligible" are those for which existing information is insufficient to determine National Register eligibility. According to the 2004 HPMP, DESC treats these resources as historic properties until such time as they are formally evaluated and found not eligible for the National Register.

TABLE 4-17 STEVENS CREEK HYDROELECTRIC PROJECT: SUMMARY OF HISTORIC PROPERTIES IN THE APE AS OF 1996

SITE NUMBER/ DIMENSIONS AS AVAILABLE	DESCRIPTION	NATIONAL REGISTER STATUS	IMPACTS
38ED5	Prehistoric: Late Archaic shell midden	Potentially eligible; may be associated with Stallings Island	Minor erosion; extensive looting
38ED9 200 x 100 m	High density prehistoric lithic and ceramic scatter with Early Archaic through Late Woodland components; most significant component is extensive Late Archaic occupation, which includes a shell midden and human burials	Eligible	Minor erosion
38ED48 280 x 140m	Low to moderate density prehistoric resource extraction encampment with Late Paleoindian, Late Archaic, and Woodland components	Eligible	Moderate erosion
38ED118 210 x 80m	Moderate density prehistoric Early Archaic, Late Archaic, and Early Mississippian procurement camp	Eligible	Minor erosion
38ED119/283 130 x 80m	High density prehistoric resource procurement encampment with a Middle Archaic component and a possible Late Archaic, Woodland, or Mississippian component; low density historic domestic scatter from early to mid-nineteenth century	Prehistoric: Eligible Historic: Not eligible	None
38ED121	Unknown prehistoric	Potentially eligible	Upper level eroded
38ED282 75 x 50m	Unknown prehistoric	Potentially eligible	Lightly damaged from erosion and logging

SITE NUMBER/ DIMENSIONS AS AVAILABLE	DESCRIPTION	NATIONAL REGISTER STATUS	IMPACTS
38ED285 300 x 80m	High density prehistoric campsite or village; buried intact cultural deposits; presence of complicated ceramics suggests a Woodland-Mississippian component	Potentially eligible	Minor erosion
38ED290 40 x 20m	Unknown prehistoric	Potentially eligible	Minimal inundation
38ED291 60 x 40m	Extremely low density prehistoric lithic scatter representing a short-term resource procurement camp	Potentially eligible	Major erosion
38ED292 50 x 25m	A moderate density prehistoric lithic scatter representing a short term resource procurement camp; buried intact cultural deposit	Potentially eligible	Major erosion
38ED293	A moderate density prehistoric lithic scatter representing a short term resource procurement camp; buried intact cultural deposit	Potentially eligible	Major erosion
38ED388 21 x 5m	Underwater remains of steam-powered barge wrecked in the 1920s	Potentially eligible	Moderately damaged from erosion and inundation
38ED432 245 x 110m	Moderate-density short-term resource extraction encampment with terminal Middle Archaic and Woodland components	Potentially eligible	Minor erosion
38ED433 70 x 30m	Low-density short-term resource procurement encampment with Late Archaic and Woodland components	Potentially eligible	Minor erosion
38ED441 140 x 300m	High density prehistoric scatter; buried Middle Archaic component; presence of possible Early Woodland projectile point; presence of complicated stamped ceramics suggests a Woodland-Mississippian component	Eligible	Major erosion; inundation
38MC699	Unknown historic cemetery; unknown prehistoric	Potentially eligible	Moderate damage from logging and erosion
38MC811 230 x 140m	Moderate density prehistoric resource procurement encampment with a Middle Archaic component; presence of ceramics suggests a Woodland component	Eligible	Minor erosion

SITE NUMBER/ DIMENSIONS AS AVAILABLE	DESCRIPTION	NATIONAL REGISTER STATUS	IMPACTS
38MC915	Prehistoric; Middle Archaic through Middle Woodland	Potentially eligible	Heavily damaged from erosion and construction
9CB1	Stallings Island Site	NRHP; National Historic Landmark	Erosion; vandalism
9CB2	Unknown prehistoric	Potentially eligible	Unknown
9CB7 80 x 100m	Prehistoric: Middle Archaic; possible Late Archaic	Potentially eligible	Cultivated
9CB13 100 x 100m	Prehistoric: Possible steatite quarry	Potentially eligible	Partially cultivated
9CB14	Prehistoric: Possible Late Archaic quarry/lithic reduction site with Woodland period component	Potentially eligible	Partially eroded; looting
9CB15 200 x 100m	Prehistoric: Late and Middle Archaic midden with possible Woodland period component	Potentially eligible	Heavily eroded and partially dug out by bulldozer for dam fill c. 1950
9CB20	Prehistoric: Early and Middle Archaic	Potentially eligible	Some surface shift erosion
9CB21	Unknown prehistoric	Potentially eligible	Intact
9CB24	No information available		
9CB25 1200 x 300m	Prehistoric: Late Archaic shell-midden	Potentially eligible	Erosion from dam water release; vandalism
9CB126/133 1000 x 30m	Unknown prehistoric	Potentially eligible	Cultivated
9CB127/134 500 x 50m	Unknown prehistoric	Potentially eligible	Unknown
9CB128/135 300 x 100m	Prehistoric: archaic, Early Woodland, Mississippian	Potentially eligible	Unknown
9CB130 50 x 15m	Historic: mid-/late 19th century dam ruins	Potentially eligible	Slightly threatened from erosion related to release of water from dam
9CB131 100 x 50m	Prehistoric: Archaic (possibly part of 9CB15)	Potentially eligible	Unknown
9CB132 120 x 30m	High-density Early Archaic through Early Mississippian campsite, with a moderate-to high-density domestic refuse scatter, dating from the early	Prehistoric: eligible Historic: Not eligible	None

SITE NUMBER/ DIMENSIONS AS AVAILABLE	DESCRIPTION	NATIONAL REGISTER STATUS	IMPACTS
	nineteenth to the early twentieth century: historic artifacts are confined primarily to the Ap-horizon and slopewash soils. Prehistoric artifacts retrieved from AP-, Bw-, and Bt-horizon soils		
9CB142 100 x 100m	Prehistoric: Possible Late Archaic and Woodland	Potentially eligible	Cultivated
9CB197 420 x 80m	High-density short-term resource procurement encampment with Middle Archaic, Late Archaic, and Woodland components; a high-density section of the site is derived from intact deposits	Eligible	Minor erosion
NA 825 x 60m	Stevens Creek Hydroelectric facility constructed 1913-1914. Contributing elements are the dam, lock, headwall and headgates, powerhouse, and related powerhouse equipment: turbine-generator units, exciters, governors; disused control board, transfer bus structure, and rheostats	Eligible	None

Source: SCE&G 2004

4.9.4 IDENTIFICATION OF INDIAN TRIBES THAT MAY ATTACH RELIGIOUS AND CULTURAL SIGNIFICANCE TO HISTORIC PROPERTIES

Original natives of the area that is now the state of Georgia include the Apalachee Indians; Cherokee Indians; Hitchiti, Oconee and Miccosukee Indians; Muskogee Creek Indians; Timucua Indians; and the Yamasee and Guale Indians (NLA 2016). In addition, the Shawnee Indians and the Yuchi Indians were driven into the state after Europeans arrived. Native American tribes were evicted from the state during the 19th century. Currently there are no federally recognized Indian tribes in the state of Georgia (NLA 2016). However, there are three tribes in Georgia that are recognized as descendants of these people. These include the Cherokee Indians of Georgia, the Georgia Tribe of Eastern Cherokee, and the Lower Muscogee Creek Tribe (NLA 2016).

Original inhabitants of the area that is now South Carolina include the tribes of Catawba; Cherokee; Creek; Yuchi; Cusabo, and Edisto; and the Carolina Siouan bands, which include the Chicora, Pee Dee, Waccamaw, and Santee (NLA 2016). In addition, the Chicasaw Tribe and the

Shawnee Tribe moved into South Carolina after Europeans arrived. Currently the only federally recognized Indian tribe in South Carolina today is the Catawba Indian Nation (NLA 2016). Other Indian tribes, bands and communities remaining in South Carolina today include the Cherokee Indian Tribe of South Carolina; Chaloklowas Chickasaw Indian People; Chicora Indian Tribe of South Carolina; Edisto Indian Tribe (Natchez-Kusso); Pee Dee Indian Tribe; Santee Indian Tribe of South Carolina; the Waccamaw Indian People; and the Wassamasaw Indian Tribe of the Creek Nation (NLA 2016).

DESC will consult with all federally recognized tribes and other tribes located within Georgia and South Carolina to determine if they have any interest in the Project regarding religious or culturally significant historic properties.

4.9.5 POTENTIAL ADVERSE EFFECTS AND ISSUES

The continued management and operations of the Project may affect historic properties as a result of Project-induced shoreline and riverbank erosion, the construction of any new Project-related recreational facilities, and continuing development along the shoreline. Identified historic properties will be considered during the planning and permitting process, providing a beneficial effect to these resources. Any effects to cultural resources due to proposed changes in Project operation will be considered prior to implementation.

4.9.6 PROPOSED MITIGATION AND ENHANCEMENT MEASURES

DESC currently has an HPMP for the Project and will continue to manage the Project accordingly. The existing HPMP may be revised after consultation with the SC SHPO, the GA SHPO, the Advisory Council on Historic Properties (ACHP), and interested tribes.

FERC developed a PA to comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA). The PA defines certain stipulations for the management of historic properties affected by the Project. This PA may be revised during relicensing.

4.9.7 REFERENCES

Federal Energy Regulatory Commission (FERC). 1995. Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, the Georgia State Historic Preservation Officer, and the South Carolina State Historic

Preservation Officer, for Managing Historic Properties that may be Affected by a License Issuing to South Carolina Electric & Gas Company for the Continued Operation of the Stevens Creek Hydroelectric Power Project in Georgia and South Carolina. October 1995.

Native Languages of the Americas (NLA). 2016. Native Languages of the Americas: Preserving and promoting American Indian languages. [Online] URL: http://www.native-languages.org/ Accessed February 12, 2019.

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4.10 SOCIOECONOMIC RESOURCES [§ 5.6 (D)(3)(XI)]

4.10.1 GENERAL LAND USE PATTERNS

The Project area includes lands within Edgefield and McCormick counties, South Carolina and Columbia County, Georgia. Lands within the Project vicinity, both in Georgia and South Carolina, are primarily privately owned, with rural residential developments scattered throughout. A majority of the Project area is located within the Sumter National Forest. Land within the Sumter National Forest is managed for timber and also provides public recreation. There are also some residential areas within the Sumter National Forest that are in close proximity to the Project reservoir. The primary land use in the Project vicinity is timber harvesting. Agriculture is limited because the area is so heavily wooded.

The cities of Augusta, Georgia, and North Augusta, South Carolina, are located approximately six miles south of the Stevens Creek Dam. Suburban development associated with these cities extends north toward the Project area, especially on the Georgia side of the reservoir; however, the reservoir shoreline remains relatively undeveloped. The reservoir can be accessed by gravel USFS roads, private roads, other local rural roads, and Highway 28, which is the only roadway that crosses the reservoir. Upstream of the Project are three USACE dams and reservoirs, which all provide public recreation opportunities.

DESC owns approximately 95 acres of land within the Project boundary and public access is restricted. DESC owns flowage rights on the remainder of land within the Project area. DESC maintains a buffer of trees along the shoreline and encourages other reservoir landowners to do the same (FERC 1995).

4.10.2 POPULATION PATTERNS

As of the July 2017 census, 26,978 people were living in Edgefield County, South Carolina. This represents a 1.1 percent decrease from the population estimate at the April 2010 census (U.S. Census 2018b). The population of McCormick County, South Carolina was estimated to be 9,545 in the July 2017 census, representing a 6.7 percent decrease from the April 2010 population estimate (U.S. Census 2018d). The population of South Carolina increased by 8.6 percent during this period, from 4,625,364 in April 2010 to 5,024,369 in July 2017 (U.S. Census 2018e).

Table 4-19 provides a summary of population patterns in Edgefield County and McCormick County as compared to those of the state of South Carolina.

TABLE 4-18 POPULATION PATTERNS IN EDGEFIELD AND MCCORMICK COUNTIES, SOUTH CAROLINA

	EDGEFIELD COUNTY	MCCORMICK COUNTY	SOUTH CAROLINA
Population			
Population (2010)	26,985	10,233	4,625,364
Population (2017)	26,978	9,545	5,024,369
Population Change (2010 to 2017)	-1.1%	-6.7%	8.6%
Geography			
Land Area in square miles (sq mi) (2010)	500.41	359.13	30,060.70
Population Density (people/sq mi) (2010)	53.0	28.5	153.9
Gender			
Female	46.3%	46.0%	51.5%
Male	53.7%	54.0%	48.5%
Age			
Persons under 5 years old	4.1%	3.0%	5.8%
Persons under 18 years old	18.5%	12.1%	22.0%
Persons 65 years old and over	18.1%	33.2%	17.2%
Race			
Caucasian	61.5%	51.7%	68.5%
Black	35.9%	46.4%	27.3%
American Indian and Alaska Native	0.5%	0.1%	0.5%
Asian	0.5%	0.5%	1.7%
Native Hawaiian and Other Pacific Islander	0.1%	0.1%	0.1%
Hispanic or Latino	5.9%	1.5%	5.7%
Two or More Races	1.5%	1.2%	1.9%

Sources: U.S. Census 2018b; 2018d; 2018e

The population of Columbia County, Georgia was estimated at 151,579 at the July 2017 census, representing a 22.2 percent increase from the April 2010 population estimate (U.S. Census 2018a). The population of Georgia increased from approximately 9,687,653 in 2010 to 10,429,379 in 2017, or by 7.6 percent (U.S. Census 2018c). Table 4-20 provides a summary of population patterns in Columbia County as compared to those of the state of Georgia.

TABLE 4-19 POPULATION PATTERNS IN COLUMBIA COUNTY, GEORGIA

	COLUMBIA COUNTY	GEORGIA
Population		
Population (2010)	124,053	9,687,653
Population (2017)	151,579	10,429,379
Population Change (2010 to 2017)	22.2%	7.6%
Geography		
Land Area in square miles (sq mi) (2010)	290.09	57,513.49
Population Density (people/sq mi) (2010)	427.6	168.4
Gender		
Female	51.1%	51.3%
Male	48.9%	48.7%
Age		
Persons under 5 years old	6.4%	6.3%
Persons under 18 years old	25.6%	24.1%
Persons 65 years old and over	13.0%	13.5%
Race		
Caucasian	74.0%	60.8%
Black	18.0%	32.2%
American Indian and Alaska Native	0.4%	0.5%
Asian	4.3%	4.2%
Native Hawaiian and Other Pacific Islander	0.2%	0.1%
Hispanic or Latino	6.7%	9.6%
Two or More Races	3.2%	2.1%

Sources: U.S. Census 2018a; 2018c

4.10.3 HOUSEHOLD/FAMILY DISTRIBUTION AND INCOME

The estimated number of households in Edgefield County was 9,054 for 2013 to 2017. These households had an average of 2.63 people. The median household income from 2013 to 2017, measured in 2017 dollars, was $47,500 (U.S. Census 2018b). McCormick County had an estimated 4,077 households for that period, with an average of 2.07 persons per household and a median household income of $40,622 (U.S. Census 2018d). South Carolina had an estimated 1,871,307 households with an average of 2.54 persons per household and a median household income of $48,781 (2017 dollars) during that time (U.S. Census 2018e).

In Columbia County, the estimated number of households was 45,823 during 2013-2017; the average persons per household was 3.13 and the median household income was estimated at $74,162 (in 2017 dollars) (U.S. Census 2018a). Georgia had an estimated 3,663,104 households

during this period. The average number of persons per household was 2.71 and the median household income was $52,977 (in 2017 dollars) (U.S. Census 2018c).

4.10.4 PROJECT VICINITY EMPLOYMENT SOURCES

Edgefield County's economy includes sectors that DataUSA (n.d.b.) classifies as agriculture, forestry, fishing, and hunting; utilities; and manufacturing. These sectors employ respectively 4.53, 2.18, and 1.71 times more people than is typical of a county of its size. The largest industries in the county are manufacturing, healthcare and social assistance, and retail (DataUSA n.d.b).

McCormick County's economy includes manufacturing, utilities, and public administration, which have 2.1, 1.76, and 1.73 times more employees than is typical for a county of its size. The county's largest industries are manufacturing, healthcare and social assistance, and public administration (DataUSA n.d.d).

Columbia County's economy includes utilities, public administration, and healthcare and social assistance, which each employ 2.7, 1.68, and 1.24 times more employees than would be expected in this size county. The largest industries in the county are healthcare and social assistance, retail, and manufacturing (DataUSA n.d.a).

4.10.5 THE REGIONAL ECONOMY

The state of South Carolina's economy includes a variety of industries, including tire manufacturing, fabric mills, textile and fabric finishing and coating mills. However, the state's largest industries are classified as restaurants and food services, elementary and secondary schools, and construction (DataUSA, n.d.e.).

Georgia shares many of the same industries as South Carolina, and includes many other specialties such as carpet and rug mills; fiber, yarn and thread mills; and fabric mills. Similar to South Carolina, the state of Georgia's largest industries are restaurants and food services, elementary and secondary schools, and construction (DataUSA n.d.c).

4.10.6 POTENTIAL ADVERSE EFFECTS AND ISSUES

Continued Project operation may not significantly affect the local economy regarding job creation; however, the Project provides renewable, low-cost energy, which benefits the public.

DESC believes that sufficient socioeconomic data are available for the areas surrounding the Project and therefore does not propose studies or protection, mitigation, or enhancement measures regarding this resource area.

4.10.7 REFERENCES

DataUSA. n.d.a. "Columbia County, GA." Online URL: https://datausa.io/profile/geo/columbia-county-ga/#economy. Accessed January 7, 2019.

DataUSA. n.d.b. "Edgefield County, SC." [Online] URL: https://datausa.io/profile/geo/edgefield-county-sc/. Accessed January 7, 2019.

DataUSA. n.d.c. "Georgia." Online URL: https://datausa.io/profile/geo/georgia/#economy. Accessed January 9, 2019.

DataUSA. n.d.d. "McCormick County, SC." [Online] URL: https://datausa.io/profile/geo/mccormick-county-sc/. Accessed January 7, 2019.

DataUSA. n.d.e. "South Carolina." Online URL: https://datausa.io/profile/geo/south-carolina/#economy. Accessed January 9, 2019.

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United States Census Bureau (U.S. Census). 2018b. "QuickFacts: Edgefield County, South Carolina." Online URL: https://www.census.gov/quickfacts/edgefieldcountysouthcarolina. Accessed January 7, 2019.

United States Census Bureau (U.S. Census.) 2018c. "QuickFacts: Georgia." Online URL: https://www.census.gov/quickfacts/ga. Accessed January 7, 2019

United States Census Bureau (U.S. Census). 2018d. "QuickFacts: McCormick County, South Carolina." [Online] URL: https://www.census.gov/quickfacts/fact/table/mccormickcountysouthcarolina/POP060210 Accessed January 7, 2019.

United States Census Bureau (U.S. Census). 2018e. "QuickFacts: South Carolina." [Online] URL: https://www.census.gov/quickfacts/sc. Accessed January 7, 2019.

4.11 TRIBAL RESOURCES [§ 5.6 (D)(3)(XII)]

DESC is not proposing any new construction at the Project, and is not proposing any changes to Project operations, at this time. Existing Project construction and operation does not affect any tribal cultural or economic interests. Formal management activities specific to tribal resources are included in the existing Project HPMP. The HPMP stipulates that DESC must consult with appropriate tribes prior to initiating any proposed action. In addition, if at any time during the course of Project operations or the implementation of Project-related action, DESC encounters human remains within the Project's APE, DESC must stop work immediately and contact the tribes to develop a plan for handling the remains.

DESC will initiate formal Section 106 consultation with the South Carolina SHPO, the Georgia SHPO and the THPOs after FERC authorization in accordance with CFR § 5.5(e).

4.12 RIVER BASIN DESCRIPTION [§ 5.6 (D)(3)(XIII)]

The Savannah River is one of the largest rivers in the southeastern United States, with a drainage area of more than 10,000 square miles (Entrix 2002). The Savannah River begins at the confluence of the Seneca and Tugaloo rivers in northern Georgia, flowing 300 miles southeasterly through the Piedmont and Coastal Plain physiographic provinces before entering the Atlantic Ocean near Savannah, Georgia. The headwaters of the Savannah River Basin originate in the Blue Ridge Mountains. The Project is within the Middle Savannah River Valley, near the upper end of the Fall Line, a 20-mile-wide geologic boundary that divides the Piedmont and Coastal Plain physiographic provinces; the Fall Line in Georgia is the first location inland from the Atlantic Ocean where sets of rock rapids occur in the Savannah River. The Project is approximately eight RMs upstream of Augusta, Georgia, and 209 RMs from the Atlantic Ocean. The Savannah River forms most of the border between Georgia and South Carolina (Figure 4-23).

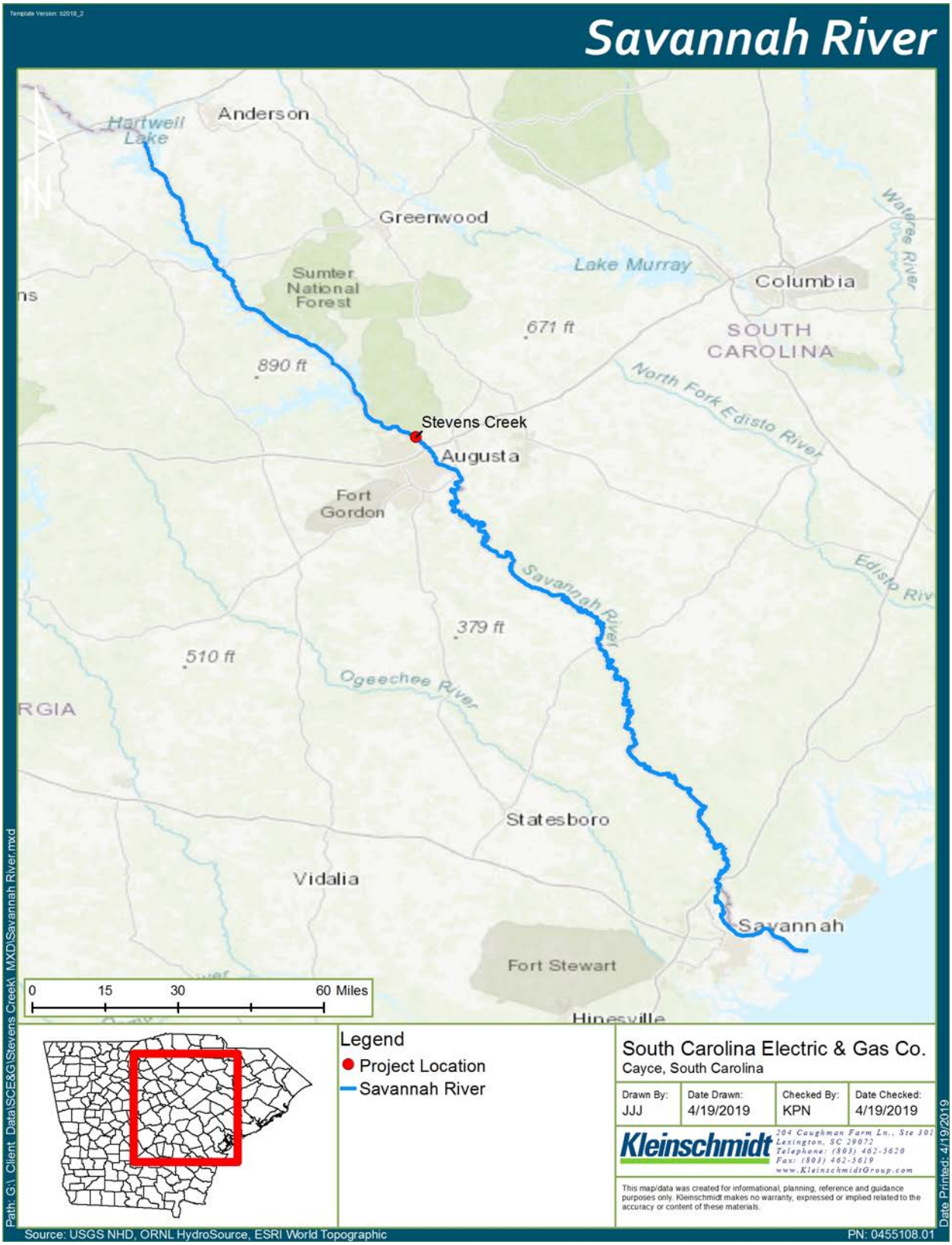

FIGURE 4-23 PROJECT LOCATION ON THE SAVANNAH RIVER

4.12.1 AREA OF RIVER BASIN AND SUB-BASIN AND LENGTH OF STREAM REACHES

The Project extends upstream about 13 miles along the Savannah River to the tailrace of the Thurmond Dam, and 12 miles upstream into Stevens Creek (FERC 1995). The drainage area at the Project is approximately 7,173 square miles (FERC 1995).

4.12.2 MAJOR LAND AND WATER USE IN THE PROJECT AREA

4.12.2.1 LAND USE

The Savannah River Basin is predominantly rural with widely spaced population centers. Augusta, Georgia, with a population of approximately 200,000, is the main urban center near the Project. The Project area includes public and private lands, such as national forest, private timber lands, rural residential developments,and some agriculture lands (FERC 1995) (see Figure 4-16 in Section 4.7). Land on the Georgia side of the Project area is privately owned with intermittent rural residential development. Most of the land in South Carolina in associated with the Sumter National Forest, which is managed for recreation and timber. Agricultural use of the land is limited due to the amount of forested uplands that persist. DESC owns approximately 95 acres of land within the Project boundary. DESC retains flowage easements for the remainder of land within the Project boundary.

4.12.2.2 WATER USE

DESC operates the Project to generate hydropower and re-regulate flows from USACE dams to downstream water users. The USACE is authorized by Congress to manage the Hartwell, Richard B. Russel, and J. Strom Thurmond Hydroelectric projects for water supply, water quality, hydropower production, flood risk management (originally called flood control), downstream navigation, recreation, and fish and wildlife management.

The Augusta Canal, a 13-mile-long historic and functional canal, is fed by the Savannah River and was designed to harness water power at the fall line to drive mills, provide transportation of goods, and provide a municipal water supply. It is the only canal in the United States in continuous use for its original purposes of providing power, transport, and municipal water. Today, the Augusta Canal provides drinking water to the city of Augusta, recreational and tourism opportunities (e.g., guided tours), and hydropower. Average annual river flow diverted to the Augusta Canal ranges from 2,000 to 3,000 cfs (USGS 2018).

Municipalities and industries have water withdrawals and discharge treated waste water into the Savannah River in compliance with state permitting requirements. Entities near the Project withdrawing from or discharging to the Savannah River include the cities of Augusta and North Augusta, Columbia Water and Sewer, and Edgefield Water and Sewer. Large industries that use the river include Kimberly-Clark in Beach Island, South Carolina, the Vogtle nuclear power plant near Waynesboro, Georgia, and the U.S. Department of Energy's Savannah River Site in Aiken, South Carolina. The Columbia County Water System, Georgia, is currently permitted to withdrawal 45.90 million gallons/day from the Stevens Creek Reservoir (GAEPD 2017).

4.12.3 DAMS AND DIVERSION STRUCTURES IN THE BASIN

The USACE operates three hydropower projects upstream of the Project: Hartwell, Richard B. Russel, and J. Strom Thurmond (Figure 4-24). The three reservoirs form a chain along the Georgia-South Carolina border for a length of 120 miles. Thurmond Dam, located at RM 220.9, is the most downstream of these projects and is operated primarily for peaking hydroelectric production and flood control. The Thurmond Dam is approximately 13 RMs upstream of the Project. There are also two dams and smaller reservoirs downstream of the Project: the Augusta Diversion Dam and the NSBLD. The Augusta Diversion Dam is one-mile downstream of the Project and the NSBLD is approximately 20 RMs downstream of the Project (Figure 4-24). The upper portion of the Savannah River is highly regulated by the three USACE hydropower projects.

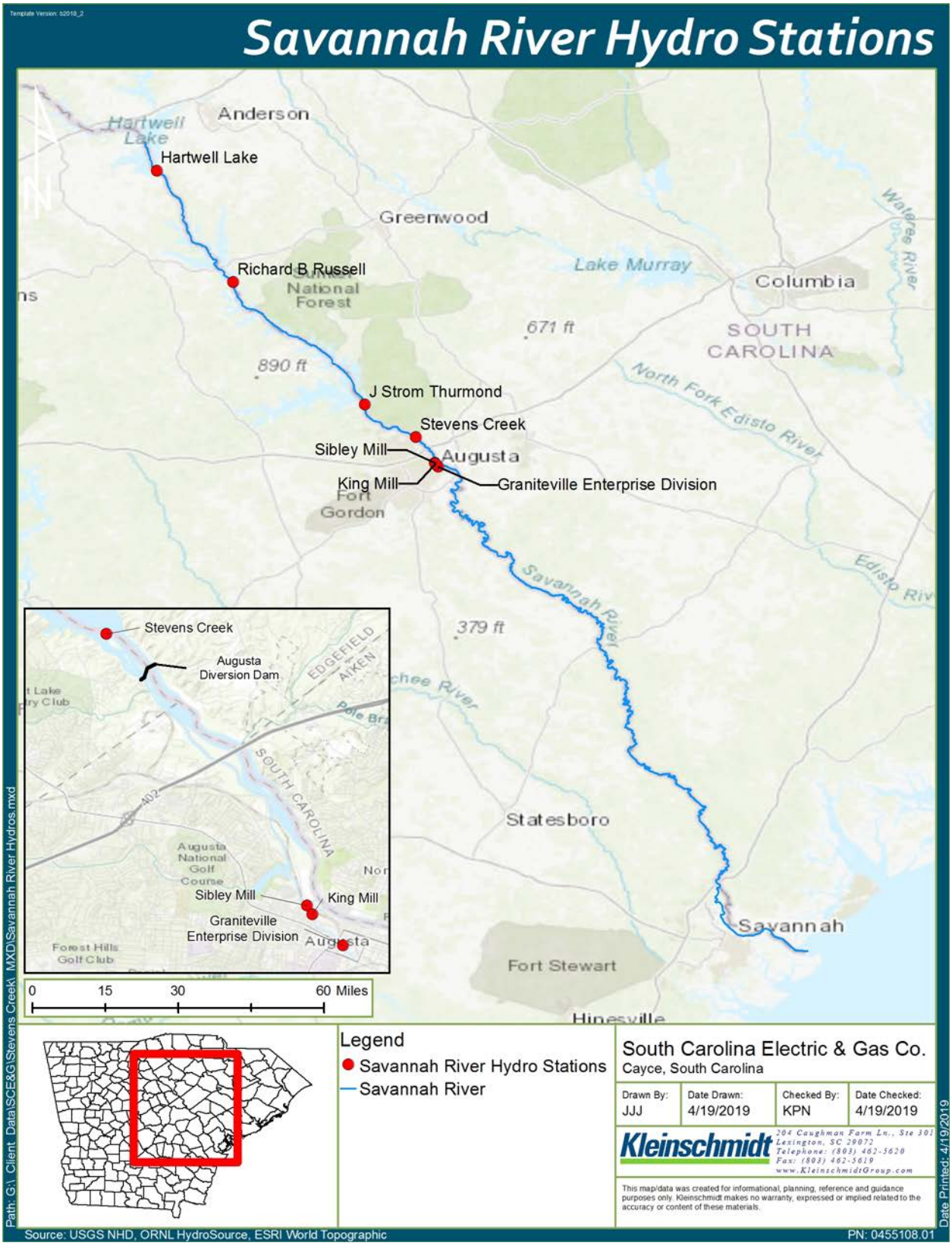

FIGURE 4-24 HYDROELECTRIC PROJECTS ON THE SAVANNAH RIVER

4.12.4 TRIBUTARY RIVERS AND STREAMS

Stevens Creek is the only major tributary of the Savannah River that is within the Project boundary. Stevens Creek discharges into the Savannah River just upstream of the Stevens Creek Dam. The Project boundary encompasses the lowermost 12 RMs of Stevens Creek. Other smaller, feeder tributaries may occur in the Project area.

4.12.5 REFERENCES

Entrix. 2002. Resource Study Report – Savannah River Instream Flow Study. Augusta Canal Hydropower Project (FERC No. 11810). Prepared for the City of Augusta, Georgia.

Federal Energy Regulatory Commission (FERC). 1995. Final environmental assessment for hydropower license. Stevens Creek Hydroelectric Project. FERC Project 2535.

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U.S. Geological Service (USGS. 2018. USGS Surface-Water Annual Statistics for the Nation. USGS 2196485 Augusta Canal Near Augusta Georgia. Available Online: https://nwis.waterdata.usgs.gov/nwis/inventory/?site_no=02196485. Accessed November 30, 2018.

5.0 PRELIMINARY ISSUES AND STUDIES LIST FOR EACH RESOURCE AREA [§ 5.6 (d)(4)]

PLACEHOLDER – TO BE FILLED IN FOLLOWING STAKEHOLDER CONSULTATION

5.1 ISSUES PERTAINING TO THE IDENTIFIED RESOURCES

5.1.1 GEOLOGY AND SOILS

5.1.2 WATER RESOURCES

5.1.3 FISH AND AQUATIC RESOURCES

5.1.4 WILDLIFE AND BOTANICAL RESOURCES

5.1.5 RARE, THREATENED AND ENDANGERED RESOURCES

5.1.6 FLOODPLAINS, WETLANDS, RIPARIAN AND LITTORAL HABITAT RESOURCES

5.1.7 RECREATION AND LAND USE

5.1.8 AESTHETIC RESOURCES

5.1.9 CULTURAL AND TRIBAL RESOURCES

5.1.10 SOCIOECONOMIC RESOURCES

5.2 POTENTIAL STUDIES AND INFORMATION GATHERING REQUIREMENTS ASSOCIATED WITH THE IDENTIFIED ISSUES

5.2.1 OPERATIONS

5.2.2 GEOLOGY AND SOILS

5.2.3 WATER RESOURCES

5.2.4 FISH AND AQUATIC RESOURCES

5.2.5 WILDLIFE AND BOTANICAL RESOURCES

5.2.6 RARE, THREATENED AND ENDANGERED RESOURCES

5.2.7 FLOODPLAINS, WETLANDS, LITTORAL AND RIPARIAN RESOURCES

5.2.8 RECREATION AND LAND USE

5.2.9 AESTHETIC RESOURCES

5.2.10 CULTURAL AND TRIBAL RESOURCES

5.2.11 SOCIOECONOMIC RESOURCES

5.3 RELEVANT QUALIFYING FEDERAL AND STATE OR TRIBAL COMPREHENSIVE WATERWAY PLANS

5.3.1 REFERENCES

6.0 SUMMARY OF CONTACTS [§ 5.6 (d)(5)]

7.0 PURPA BENEFITS [§ 5.6 (e)]

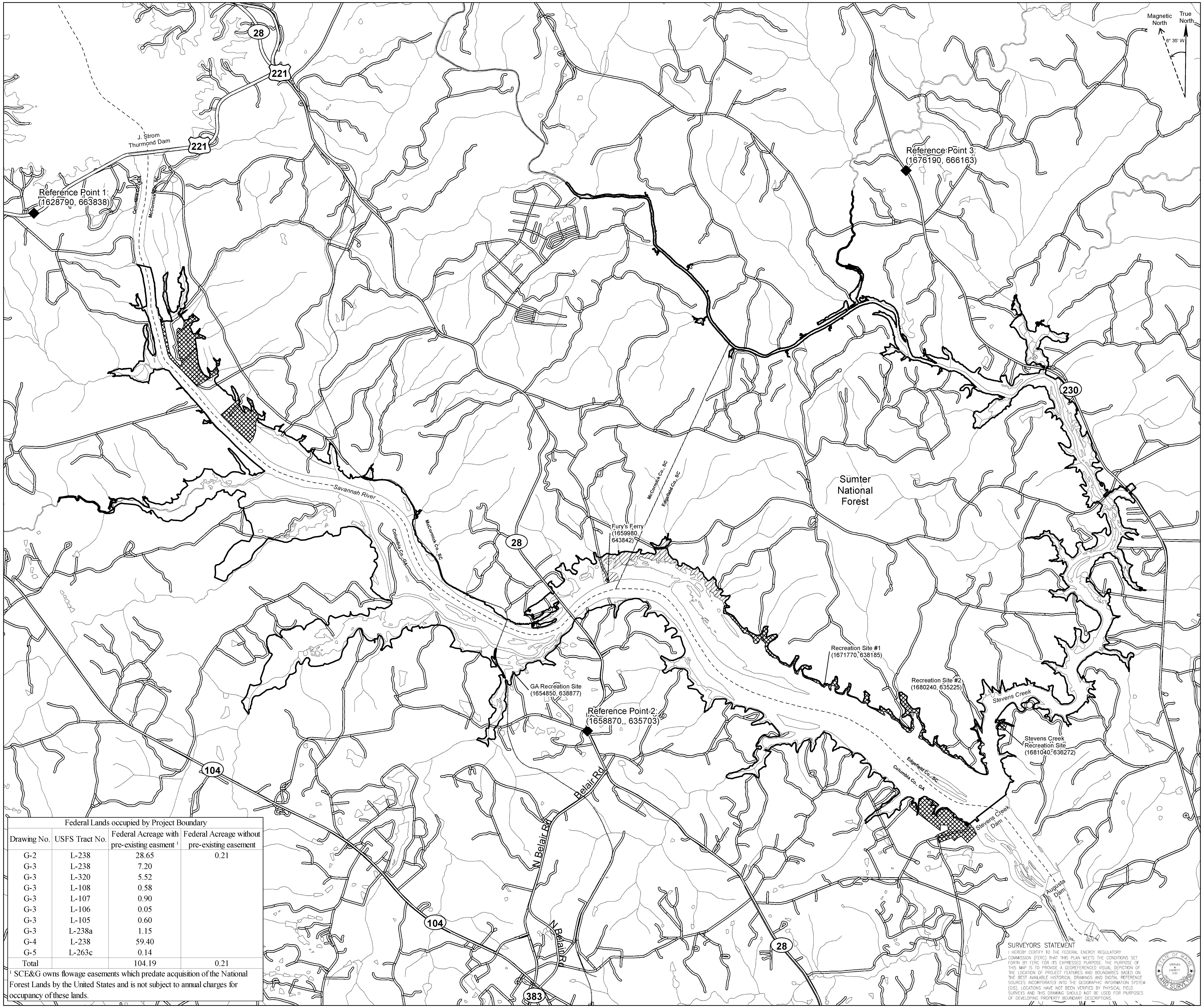
The Applicant is not seeking benefits under section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA).

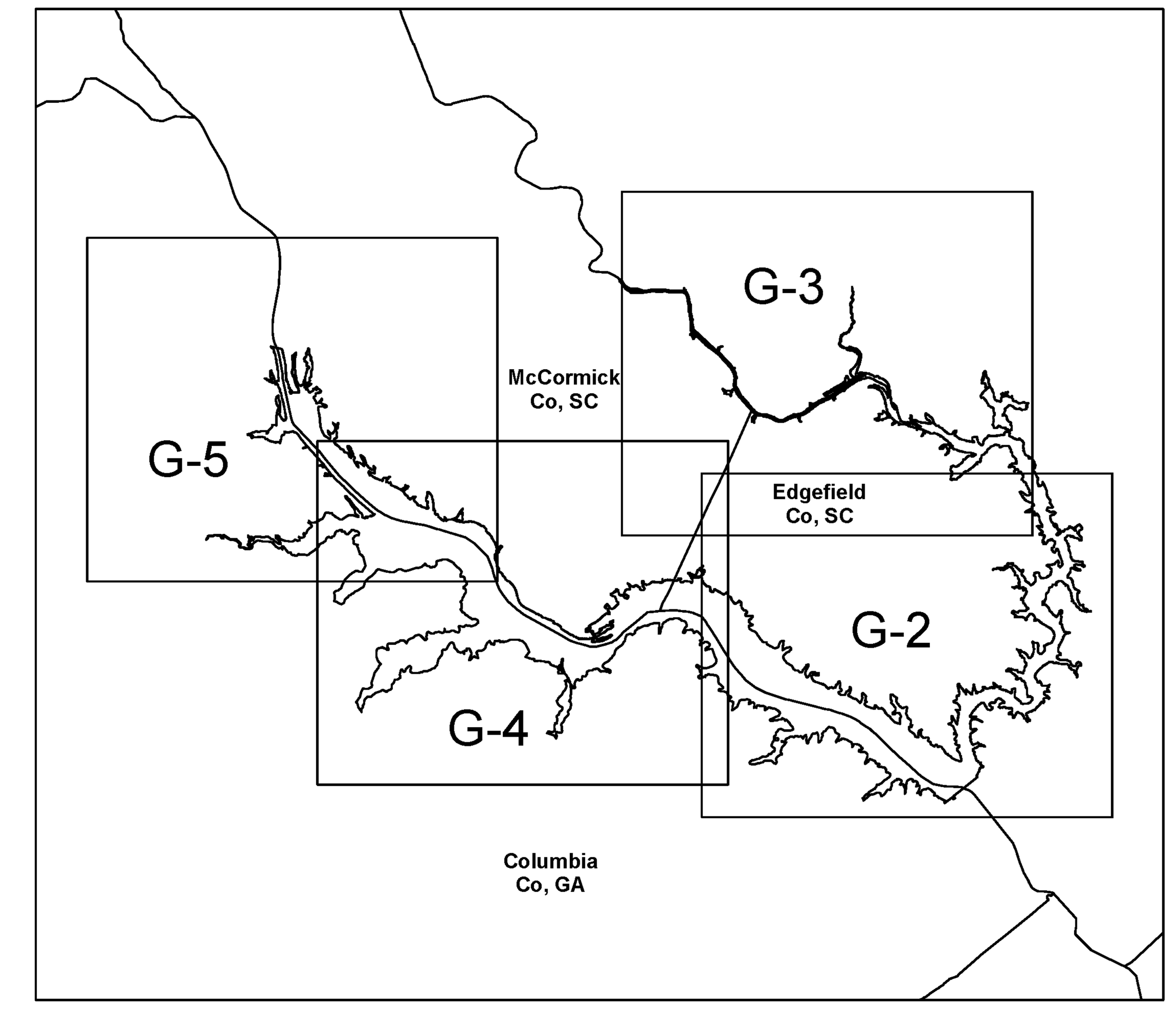
APPENDIX A

STAKEHOLDER CONSULTATION RECORD

APPENDIX B

EXHIBIT G PROJECT BOUNDARY MAPS





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Federal Lands occupied by Project Boundary			
Drawing No.	USFS Tract No.	Federal Acreage with pre-existing easment [1]	Federal Acreage without pre-existing easement
G-2	L-238	28.65	0.21
G-3	L-238	7.20	
G-3	L-320	5.52	
G-3	L-108	0.58	
G-3	L-107	0.90	
G-3	L-106	0.05	
G-3	L-105	0.60	
G-3	L-238a	1.15	
G-4	L-238	59.40	
G-5	L-263c	0.14	
Total		104.19	0.21

[1] SCE&G owns flowage easements which predate acquisition of the National Forest Lands by the United States and is not subject to annual charges for occupancy of these lands.

SURVEYORS STATEMENT

I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FORTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS AND DIGITAL REFERENCE SOURCES INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL FIELD SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR PURPOSES OF DEVELOPING PROPERTY BOUNDARY DESCRIPTIONS.

STATE OF MAINE
STEPHEN W. EVERETT 2161
PROFESSIONAL LAND SURVEYOR

- Project Boundary Line
- Property owned in fee by SCE&G
- USFS Land within PBL (without pre-existing easement)
- USFS Land Within PBL (with pre-existing easement)

Note:

1. SCE&G owns flowage easements which predate acquisition of the National Forest Lands by the United States and is not subject to annual charges for occupancy of these lands.
2. SCE&G's property rights within the Stevens Creek Project Boundary consist only of flowage rights except for the project structures and the properties designated as being owned in fee by SCE&G.

Coordinate System: NAD 1983 NSRS2007 StatePlane South Carolina FIPS 3900 Ft Intl
All elevations are in NAV88.

EXHIBIT G

Exhibit G-1

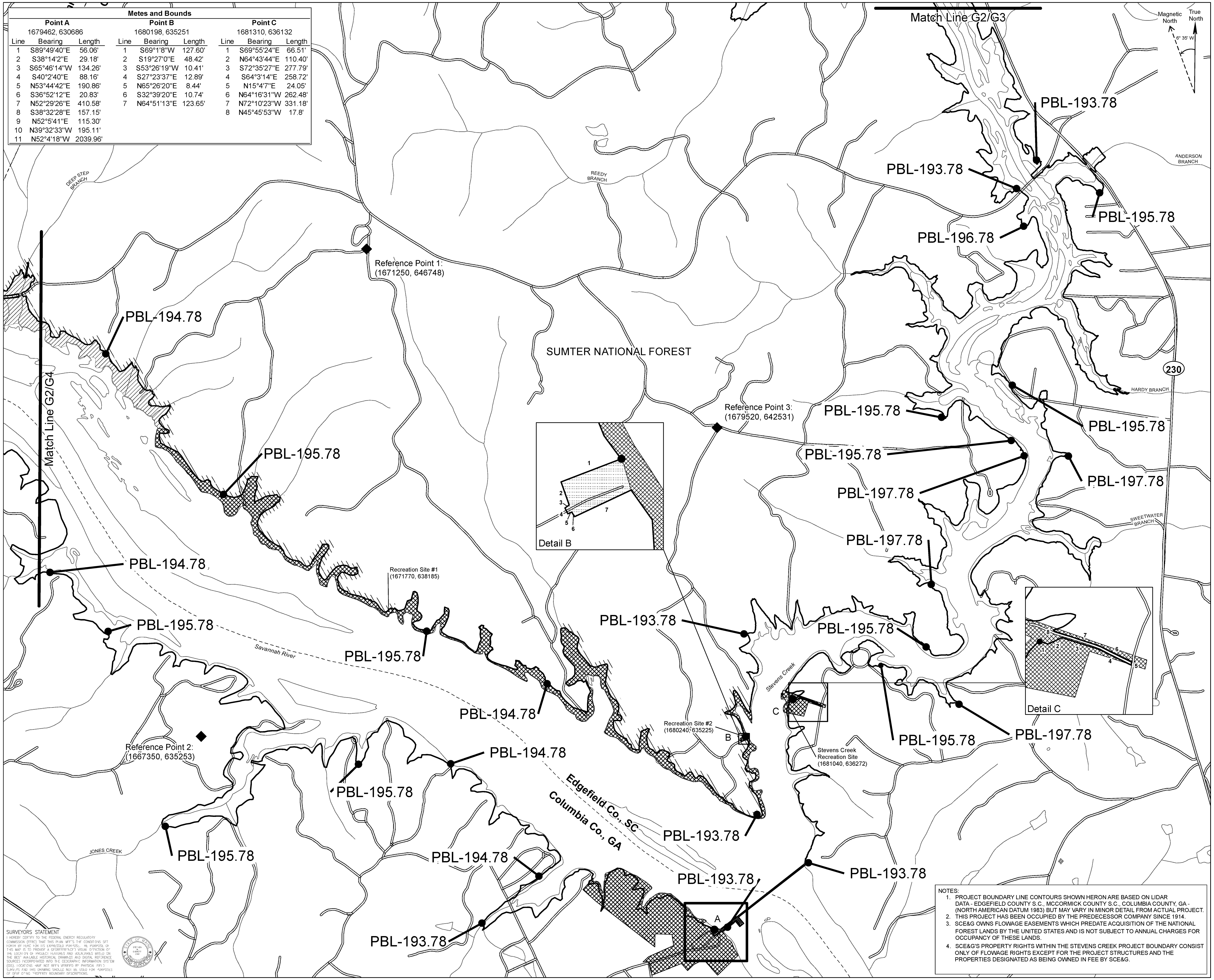
General Map of Project Area

South Carolina Electric & Gas Company

Stevens Creek Hydroelectric Project
FERC Project No. 2535

1 " = 2,370 '

0 1,850 3,700 7,400 11,100 14,800 Feet



Metes and Bounds								
Point A			Point B			Point C		
1679462, 630686			1680198, 635251			1681310, 636132		
Line	Bearing	Length	Line	Bearing	Length	Line	Bearing	Length
1	S89°49'40"E	56.06'	1	S69°1'8"W	127.60'	1	S69°55'24"E	66.51'
2	S38°14'2"E	29.18'	2	S19°27'0"E	48.42'	2	N64°43'44"E	110.40'
3	S65°46'14"W	134.26'	3	S53°26'19"W	10.41'	3	S72°35'27"E	277.79'
4	S40°2'40"E	88.16'	4	S27°23'37"E	12.89'	4	S64°3'14"E	258.72'
5	N53°44'42"E	190.86'	5	N65°26'20"E	8.44'	5	N15°4'7"E	24.05'
6	S36°52'12"E	20.83'	6	S32°39'20"E	10.74'	6	N64°16'31"W	262.48'
7	N52°29'26"E	410.58'	7	N64°51'13"E	123.65'	7	N72°10'23"W	331.18'
8	S38°32'28"E	157.15'				8	N45°45'53"W	17.8'
9	N52°5'41"E	115.30'						
10	N39°32'33"W	195.11'						
11	N52°4'18"W	2039.96'						

NOTES:
1. PROJECT BOUNDARY LINE CONTOURS SHOWN HERON ARE BASED ON LIDAR DATA - EDGEFIELD COUNTY S.C., MCCORMICK COUNTY S.C., COLUMBIA COUNTY, GA - (NORTH AMERICAN DATUM 1983) BUT MAY VARY IN MINOR DETAIL FROM ACTUAL PROJECT.
2. THIS PROJECT HAS BEEN OCCUPIED BY THE PREDECESSOR COMPANY SINCE 1914.
3. SCE&G OWNS FLOWAGE EASEMENTS WHICH PREDATE ACQUISITION OF THE NATIONAL FOREST LANDS BY THE UNITED STATES AND IS NOT SUBJECT TO ANNUAL CHARGES FOR OCCUPANCY OF THESE LANDS.
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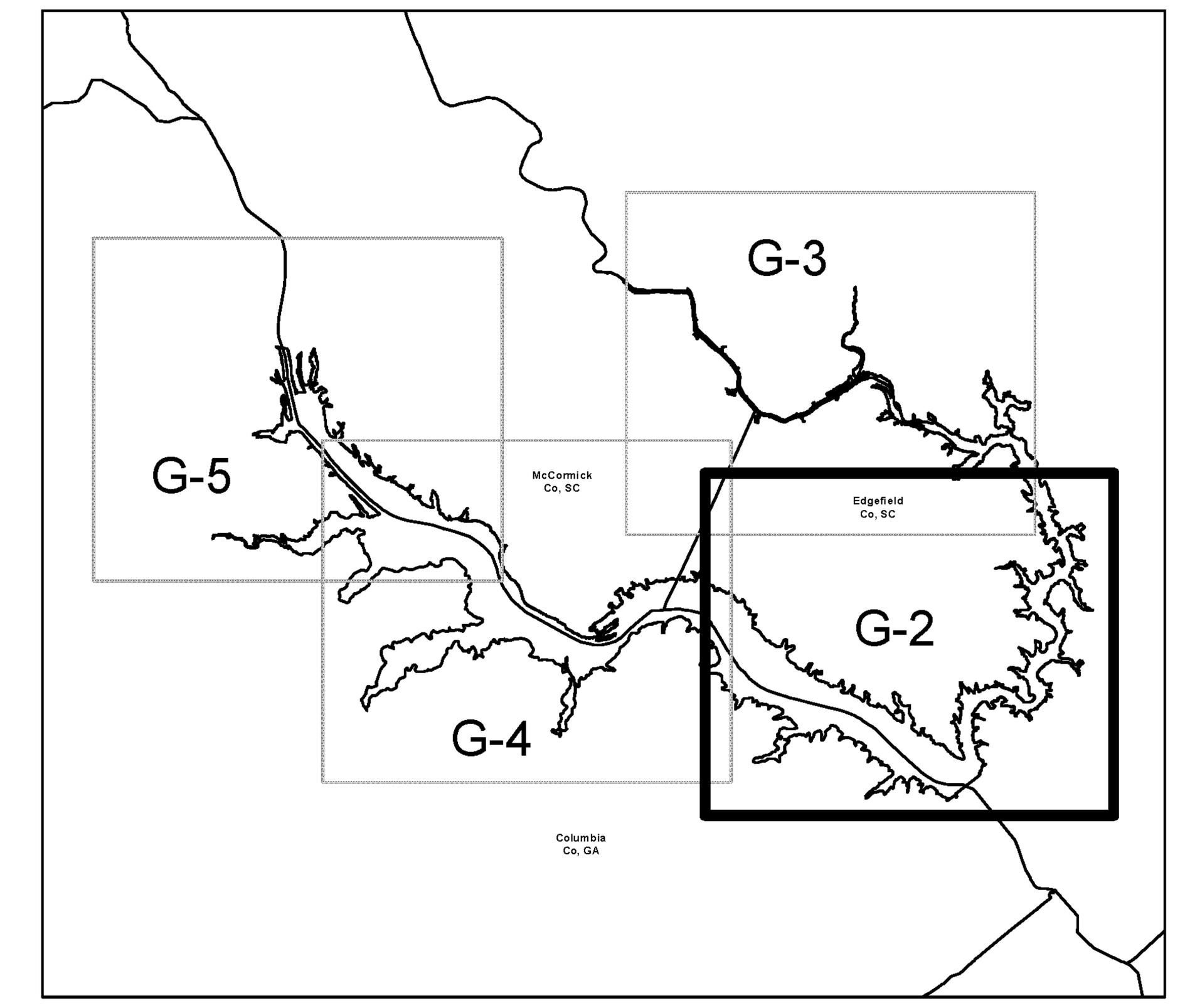
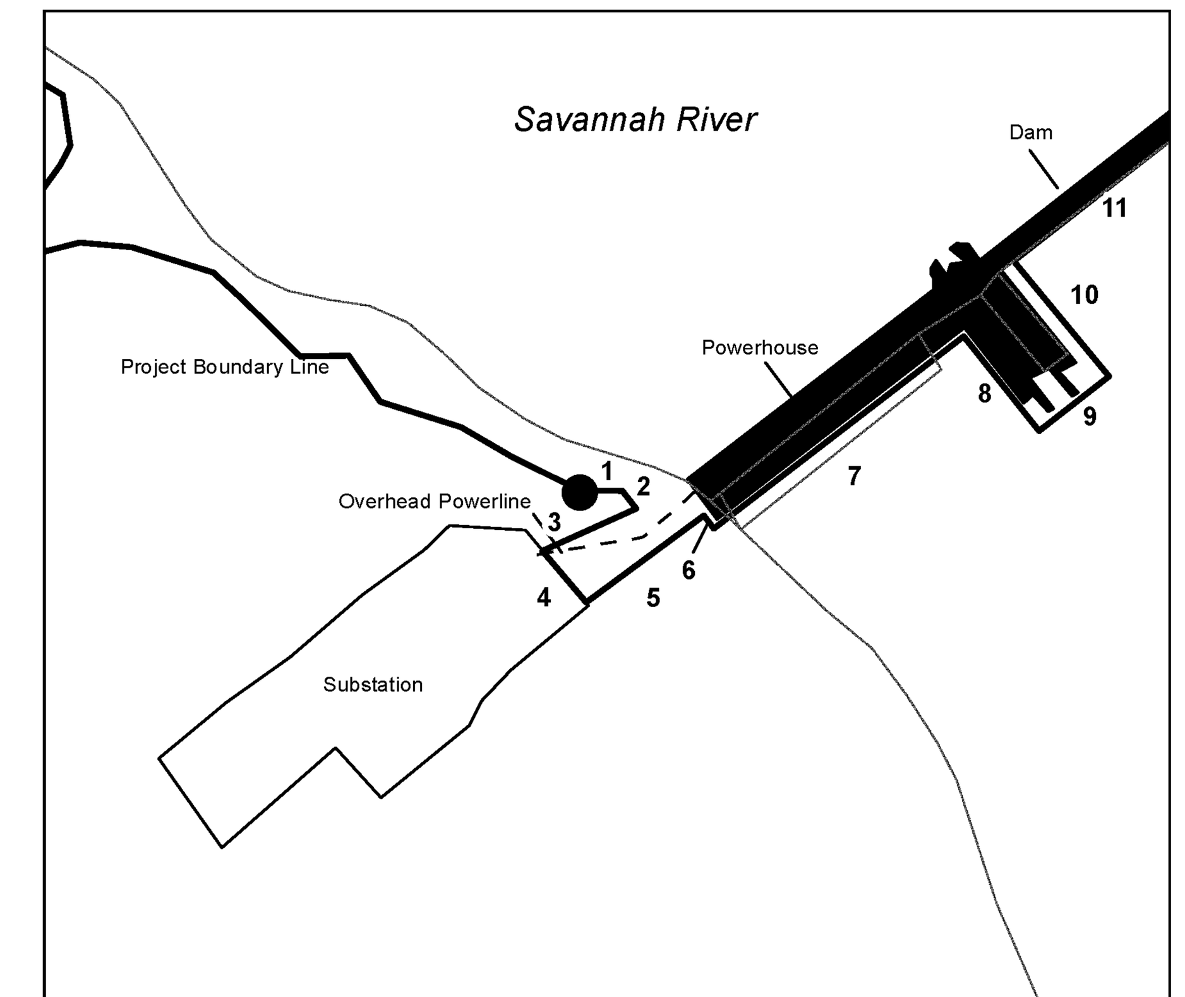




Detail A

Legend:
- Project Boundary Line
- Property owned in fee by SCE&G
- USFS Land within PBL (without pre-existing easement)
- USFS Land Within PBL (with pre-existing easement)
- USFS Land Adjacent to PBL

Coordinate System: NAD 1983 NSRS2007 StatePlane South Carolina FIPS 3900 Ft Intl
All elevations are in NAVD88.

EXHIBIT G

Exhibit G-2

Detailed Map of Project Area

South Carolina Electric & Gas Company

Stevens Creek Hydroelectric Project

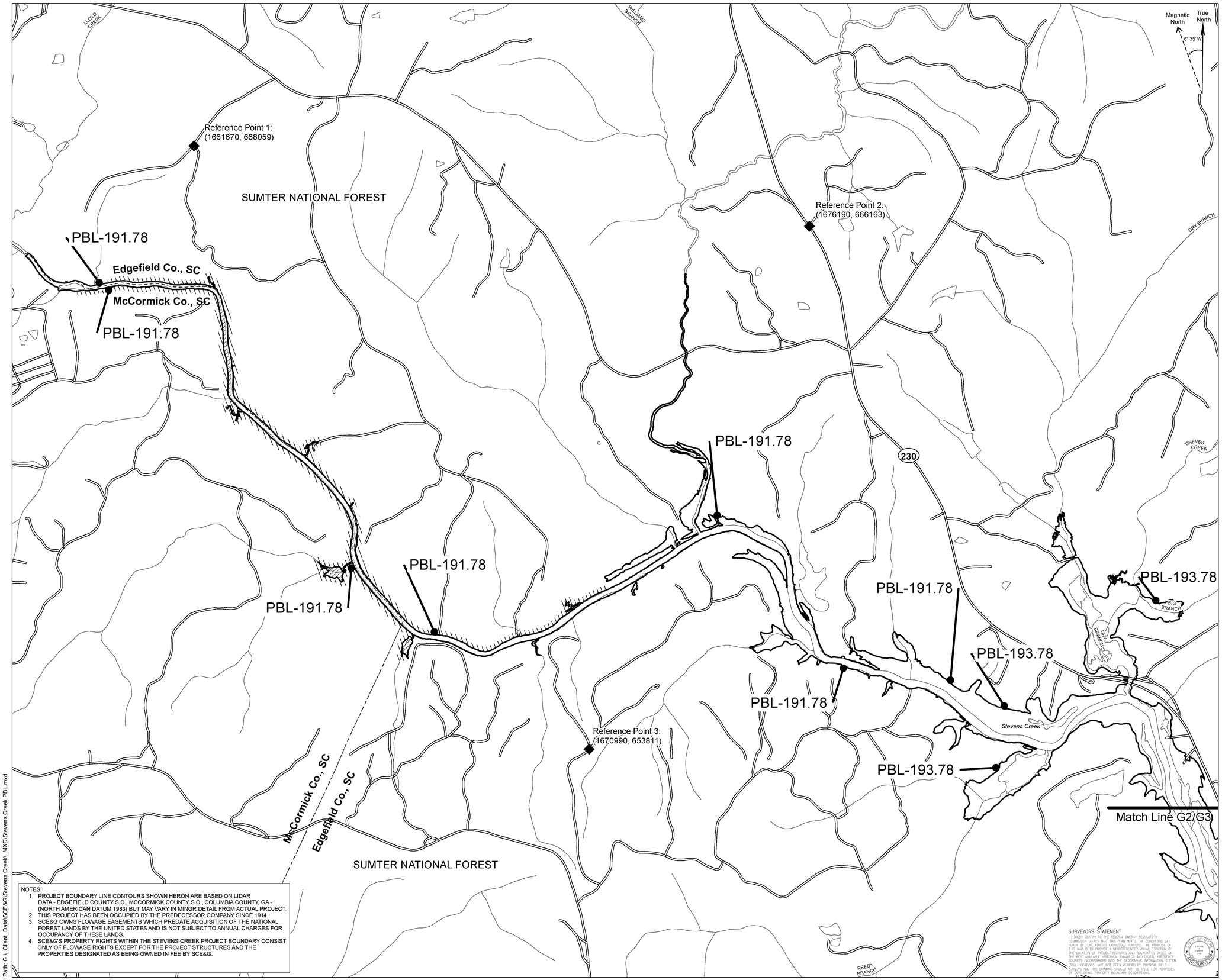
FERC Project No. 2535

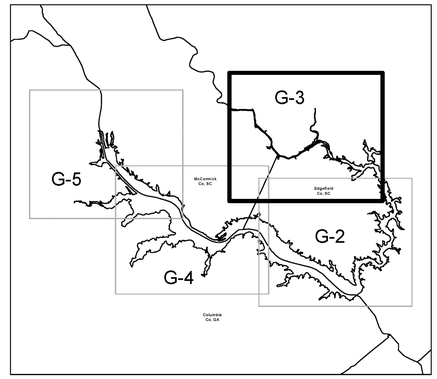
1 " = 1,000 '

0 625 1,250 2,500 3,750 5,000 Feet

EXHIBIT G

P-2535-24





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SURVEYORS STATEMENT

I HEREBY CERTIFY TO THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) THAT THIS PLAN MEETS THE CONDITIONS SET FORTH BY FERC FOR ITS EXPRESSED PURPOSE. THE PURPOSE OF THIS MAP IS TO PROVIDE A GEOREFERENCED VISUAL DEPICTION OF THE LOCATION OF PROJECT FEATURES AND BOUNDARIES BASED ON THE BEST AVAILABLE HISTORICAL DRAWINGS AND DIGITAL REFERENCE SOURCES INCORPORATED INTO THE GEOGRAPHIC INFORMATION SYSTEM (GIS). LOCATIONS HAVE NOT BEEN VERIFIED BY PHYSICAL FIELD SURVEYS AND THIS DRAWING SHOULD NOT BE USED FOR ANALYSES OF DISPUTING PROPERTY BOUNDARY DESCRIPTIONS.

Project Boundary Line
Property owned in fee by SCE&G
USFS Land within PBL (without pre-existing easement)
USFS Land Within PBL (with pre-existing easement)
USFS Land Adjacent to PBL

Coordinate System: NAD 1983 NSRS2007 StatePlane South Carolina FIPS 3900 Ft Intl
All elevations are in NAVD88.

EXHIBIT G

Exhibit G-3

Detailed Map of Project Area

South Carolina Electric & Gas Company

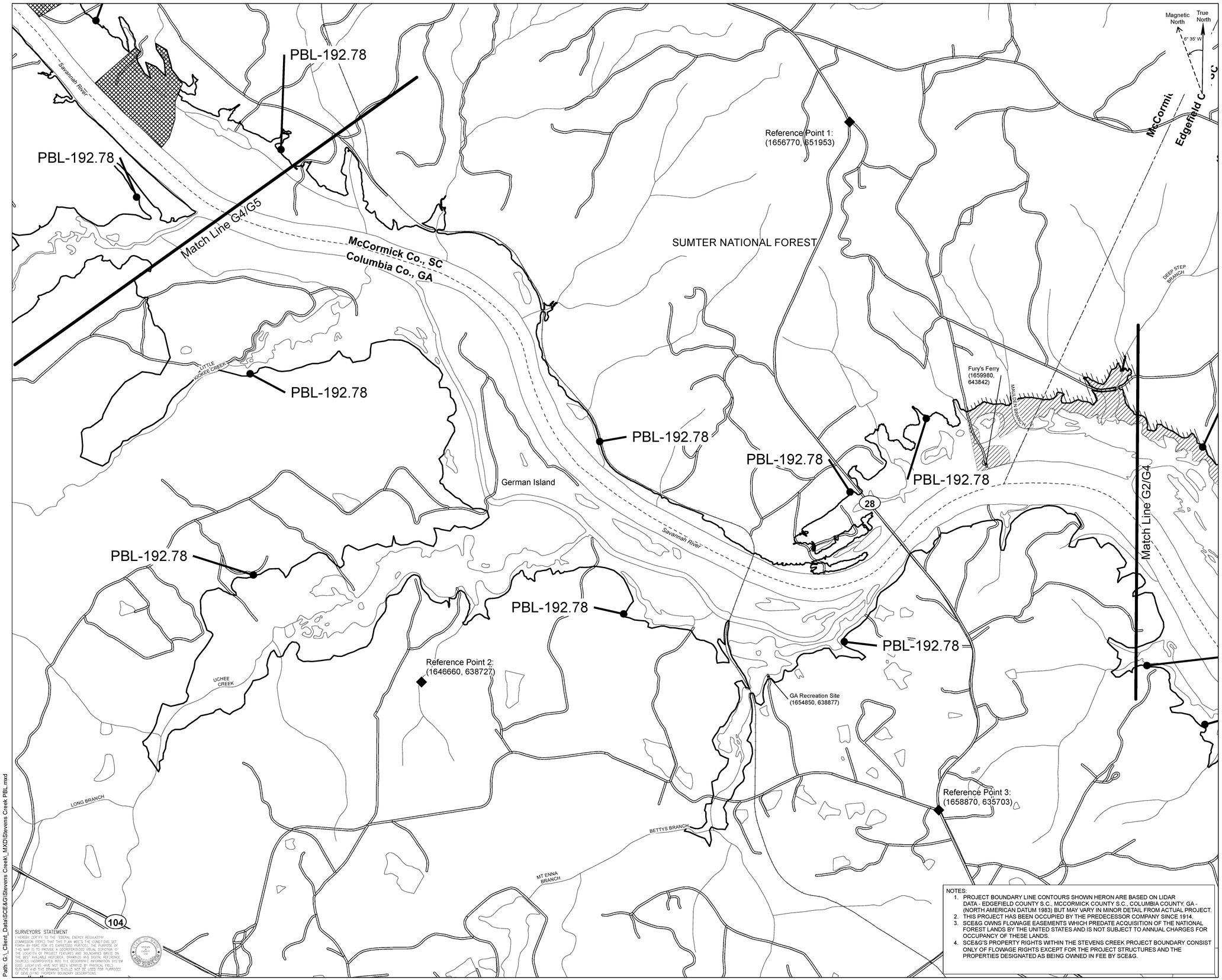
Stevens Creek Hydroelectric Project

FERC Project No. 2535

1 " = 1,000 '

0 625 1,250 2,500 3,750 5,000 Feet

Path: G:_Client_Data\SCE&G\Stevens CreeK_MXD\Stevens Creek PBL.mxd



Project Boundary Line

Property owned in fee by SCE&G

USFS Land within PBL (without pre-existing easement)

USFS Land Within PBL (with pre-existing easement)

USFS Land Adjacent to PBL

Coordinate System: NAD 1983 NSRS2007 StatePlane South Carolina FIPS 3900 Ft Intl
All elevations are in NAVD88.

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EXHIBIT G

Exhibit G-4

Detailed Map of Project Area

South Carolina Electric & Gas Company

Stevens Creek Hydroelectric Project

FERC Project No. 2535

1 " = 1,000 '

0 625 1,250 2,500 3,750 5,000 Feet

Path: G:_Client_Data\SCE&G\Stevens Creek_MXD\Stevens Creek PBL.mxd

J. Strom Thurmond Dam

NIXON BRANCH

COSBY BRANCH

Magnetic North

True North

6° 35' W

221

Reference Point 2:
(1628790, 663838)

Columbia Co., GA

McCormick Co., SC

DEEP STEP CREEK

28

RYAN BRANCH

PBL-192.78

PBL-192.78

SUMTER NATIONAL FOREST

BURNS BRANCH

LLOYD CREEK

PBL-192.78

Reference Point 3:
(1640090, 655289)

PBL-192.78

Savannah River

PBL-192.78

Reference Point 1:
(1622921, 651845)

PBL-192.78

Match Line G4/G5

McCormick Co., SC

Columbia Co., GA

LITTLE KIOKEE CREEK

PBL-192.78

SURVEYORS STATEMENT

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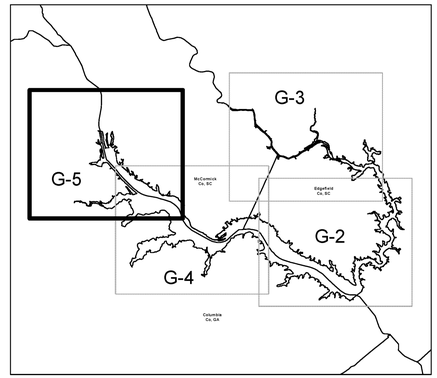

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USFS Land Within PBL (with pre-existing easement)

USFS Land Adjacent to PBL

Coordinate System: NAD 1983 NSRS2007 StatePlane South Carolina FIPS 3900 Ft Intl
All elevations are in NAVD88.

EXHIBIT G

Exhibit G-5

Detailed Map of Project Area

South Carolina Electric & Gas Company

Stevens Creek Hydroelectric Project

FERC Project No. 2535

1 " = 1,000 '

0 625 1,250 2,500 3,750 5,000 Feet

Path: G:_Client_Data\SCE&G\Stevens Creek_MXD\Stevens Creek PBL.mxd

APPENDIX C

SINGLE-LINE DRAWINGS

CONSIDERED CRITICAL ENERGY INFRASTRUCTURE INFORMATION AND NOT INCLUDED IN PUBLIC VERSIONS OF THIS DOCUMENT

APPENDIX D

CURRENT NET INVESTMENT

CONSIDERED PRIVILEGED INFORMATION AND NOT INCLUDED IN PUBLIC VERSIONS OF THIS DOCUMENT

APPENDIX E

CURRENT PROJECT LICENSE

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

South Carolina Electric & Gas Company

Project No. 2535-003
South Carolina/Georgia

ORDER ISSUING NEW LICENSE
(Major Project)

NOV 22 1995

South Carolina Electric & Gas Company (SCE&G or licensee) filed an application for a new license under Part I of the Federal Power Act (FPA) to continue to operate and maintain the 17.3 megawatt (MW) Stevens Creek Project. The project is located at the confluence of Stevens Creek and the Savannah River, in Edgefield and McCormick Counties, South Carolina; and Columbia County, Georgia. The project occupies 90 acres of United States Lands within the Sumter National Forest. 1/

BACKGROUND

Notice of the application was published on September 15, 1993. On November 4, 1993, the South Carolina Department of Natural Resources (South Carolina DNR) filed a motion to intervene in the proceedings. On November 5, 1993, the Department of the Interior (Interior) filed a motion to intervene in the proceedings. The Commission granted intervenor status to both South Carolina DNR and Interior on December 2, 1993. No agency, organization, or individual filed a motion to intervene in opposition to the project. All comments received have been fully considered in determining whether and under what conditions to issue this license. 2/

The Commission's staff issued a draft environmental

1/ The Savannah River is a navigable waterway of the United States as determined in United States v. Twin City Power Co. 350 U.S. 222. Projects on navigable waterways and occupying United States Lands are required to be licensed. On May 11, 1965 the Commission issued an order, 33 FPC 489, requiring South Carolina Electric & Gas Company to secure a license for the Stevens Creek Project.

2/ In addition to the intervenors, comments were received from the National Marine Fisheries Service, U.S. Forest Service (Forest Service), U.S. Army Corps of Engineers (Corps), Georgia Department of Natural Resources (Georgia DNR), and South Carolina Department of Antiquities and History.

assessment (EA) for this project on March 13, 1995. The final EA is attached to this license order. Staff also prepared a Safety and Design Assessment which is available in the Commission's public file for this project.

PROJECT DESCRIPTION

The existing project consists of a 33-foot-high dam with a spillway section with flashboards, a reservoir with a surface area of 2,400 acres, a powerhouse containing eight generating units with a total installed capacity of 17.3 MW, and two substation ties to the licensee's transmission system. The project functions as a reregulating plant to mitigate the down-stream effects of the wide-ranging discharges from the up-stream J. Strom Thurmond dam, which operates in a peaking mode. The J. Strom Thurmond project is owned and operated by the U.S. Army Corps of Engineers (Corps). A more detailed project description can be found in ordering paragraph B(2).

APPLICANT'S PLANS AND CAPABILITIES

In accordance with Sections 10 and 15 of the FPA, the staff evaluated SCE&G's record as a licensee for these areas: (1) conservation efforts; (2) ability to comply with the new license; (3) safe management, operation, and maintenance of the project; (4) ability to provide efficient and reliable electric service; (5) need for power; (6) transmission line improvements; (7) project modification; and (8) compliance record. I accept the staff's finding in each of these areas.

Here are the findings:

1. Section 10(a)(2)(C): Conservation Efforts

SCE&G encourages energy conservation through: (1) customer education, contact, and assistance, including Energy Info Centers, the Good Cents Home Program, the Home Energy Check Program, a company Speaker's Bureau, and news releases; (2) a varied rate structure such as time of use rates and interruptible rates; and (3) several programs to improve efficiency and promote energy conservation at its generating plants. SCE&G is making a good faith effort to conserve electric energy.

2. Section 15(a)(2)(A): Ability to Comply with the New License

SCE&G's license application shows SCE&G's ability to comply with the articles, terms, and conditions of any license issued and with other applicable provisions of the FPA.

SCE&G has or can acquire the resources and expertise necessary to carry out its plans and comply with all articles,

terms, and conditions of a new license.

3. Section 15(a)(2)(B): Safe Management, Operation, and Maintenance of the Project

The project is safe for continued use and operation under the Commission's continued oversight through its dam safety program administered in accordance with Part 12 of its regulations.

Under Part 12 of the Commission's regulation, SCE&G filed the Part 12 Safety Inspection Report on January 28, 1987. SCE&G also has an emergency action plan posted in the powerhouse which is reviewed and updated annually.

Instrumentation to monitor project stability consists of reference points to perform movement surveys along and down-stream of the spillway. Following each major flood, the licensee conducts measurements to monitor scouring.

SCE&G shows its regard for public safety by placing warning signs up-stream and down-stream of the powerhouse, a suspended buoy system in the reservoir up-stream of the intake and open spillway, lighted warning signs and flashing lights on the poles that support the reservoir's suspended buoy system, and floating buoys in the tailrace.

4. Section 15(a)(2)(C): Ability to Provide Efficient and Reliable Electric Service

The Stevens Creek plant has had only three significant forced outages from 1985 to 1990, and only one of these shut down the entire plant:

1. Unit No. 8 was forced off because of failure of leveling washers in thrust bearing C. The unit was off line from July 9, 1990, through August 31, 1990, for washer replacement.

2. On August 17, 1990, the entire plant was shut down from 8:30 a.m. to 6:30 p.m. due to an accident involving station service. Fifty of the 5-foot-high flashboards were knocked down to maintain the minimum flow discharge.

3. On March 6, 1990, the No. 3 main transformer blew up. The new transformer was put into service on April 9, 1990, (it had been on order at the time the old transformer was destroyed). Water was spilled during the outage to ensure minimum flow down-stream. On April 10, 1990, the No. 4 main transformer was taken out of service to install a new transformer. The new

transformer went into service on April 19, 1990.

The project derives maximum energy benefit from the river flow. SCE&G operates the project in an efficient and reliable manner.

5. Section 15(a)(2)(D): Need for Power

SCE&G operates the Stevens Creek Project in a reregulating mode. The project provides base load generating capacity. The Stevens Creek Project provides energy, as river flow permits, on a continuous basis, similar to large coal-fired generating facilities on SCE&G's system. This energy would have to be replaced from another source at a higher cost. According to SCE&G, the cost of producing electricity at the Stevens Creek Project is considerably less than the cost to produce electricity at its most efficient steam plants. Any replacement of capacity and energy would drive the applicant's costs up and would be reflected in higher rates to its retail and wholesale customers.

SCE&G's projections of its system supply and demand indicate that over the period from 1991 through 2010 peak demand will grow from 3,232 MW to 4,863 MW (50.5 percent) while generating capacity will grow from 3,890 MW to 5,535 MW (42.3 percent). Thus, even with Stevens Creek and all other planned facilities in operation, demand will increase faster than capacity as reserve margins decrease.

Similarly, the North American Electric Reliability Council projects demand will increase in the region slightly faster than capacity during the period 1992 through 2002. Their publication "Electric Supply and Demand 1993 through 2002" (August 1993) predicts the average annual growth rate for load will be 2.3 percent while capacity will grow at 2.1 percent. Therefore, the power from the project is needed.

6. Section 15(a)(2)(E): Transmission Line Improvements

SCE&G does not plan to change the transmission network affected by the project operation. Licensing of the project would have no significant effect on the existing or planned transmission system.

7. Section 15(a)(2)(F): Project Modifications

SCE&G is not planning any future development of the project. In a 1990 study of potential redevelopment alternatives for Stevens Creek, performed by Southern Electric International, it was concluded that it is not economically feasible to increase capacity at the Stevens Creek plant either by upgrading existing units or by adding one or two new units in the plant's empty bays.

8. Section 15(a)(3)(A) and (B): Compliance Record

SCE&G's overall record of making timely filings and compliance with its license has been satisfactory.

WATER QUALITY CERTIFICATION

Section 401(a)(1) of the Clean Water Act (CWA) requires that an applicant for a federal license or permit for any activity that may result in a discharge into navigable waters of the United States provide to the licensing or permitting agency a certification from the state in which the discharge originates that such discharge will comply with certain sections of the CWA. Section 401(d) of the CWA provides that state certifications shall set forth conditions necessary to ensure that applicants comply with specific portions of the CWA and with appropriate requirements of state law. Section 4.38(f)(7)(ii) of the Commission's regulations stipulates that if a state fails to act on a request for certification within 1 year, the certification requirement is waived.

Water is discharged through the powerhouse on the Georgia shore of the Savannah River; thus, since the point of discharge is in the State of Georgia, the State of Georgia has authority under Section 401 of the CWA to issue water quality certification. On July 15, 1991, SCE&G applied to the Georgia DNR for water quality certification in a cover letter accompanying the draft license application. The Georgia DNR received the request for water quality certification before August 14, 1991, as evidenced by a telephone conversation record of that date in which Georgia DNR acknowledged receipt of the draft license application. Because the Georgia DNR did not deny or grant certification by one year after the date of receipt of the request, I deem the agency to have waived certification for this project pursuant to the Commission's regulations.

COASTAL ZONE MANAGEMENT ACT

Under Section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

South Carolina has a federally-approved coastal zone management program administered by the South Carolina DNR Office of Coastal Resource Management. The area of jurisdiction for the South Carolina coastal zone management program includes the eight coastal counties of South Carolina but not the counties in which the project is located. Therefore, the South Carolina program

has no regulatory authority to provide review or comment on the Stevens Creek Project. Georgia does not have a federally-approved coastal zone management program. Although Georgia legislation protects coastal marshlands, beaches, and tidally-influenced areas within the state, the Stevens Creek Project does not fall within any of these areas and, therefore, Georgia coastal protection laws are not applicable.

SECTION 18 OF THE FPA

Section 18 of the FPA authorizes the Secretary of the Interior or the Secretary of Commerce to prescribe fishways at Commission-licensed projects. 3/

In their letters dated October 28, 1994, Interior and the Department of Commerce's National Marine Fisheries Service (NMFS) prescribed the construction, operation, and maintenance of fishways for the Stevens Creek Project pursuant to Section 18 of the FPA to enable the safe, timely, and unimpeded movement of anadromous and riverine fish species for spawning, rearing, feeding, dispersion, and seasonal utilization of habitat. The prescription is in accordance with the goals of the preliminary interagency management plan for anadromous fish in the Savannah River, which focuses primarily on American shad. 4/

Interior and NMFS require the licensee to design the fishways in cooperation and consultation with the U.S. Fish and Wildlife Service (Fish & Wildlife Service) and other appropriate resource agencies. After coordination with the Fish & Wildlife Service, Interior requires that the licensee submit detailed engineering plans to the Fish & Wildlife Service for review. However, Interior and NMFS do not require construction and operation of the fishway unless fish passage facilities are in

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3/ Section 18 of the FPA states "The Commission shall require the construction, maintenance, and operation by a licensee at its own expense of . . . such fishways as may be prescribed by the Secretary of Commerce or the Secretary of the Interior as appropriate."

4/ *Elements of Consensus on American Shad Management in the Stretch of Savannah River Between Strom Thurmond (Clarks Hill) Dam and Augusta.* U.S. Fish and Wildlife Service. 1994.

place at the Augusta diversion dam down-stream of the project. 5/

The fishway prescription would require that up-stream passage facilities consist of a refurbished navigation lock at the Stevens Creek dam, which the licensee will operate using attraction flows or other fish attraction mechanisms to provide a minimum of 30 lockages during the shad migration season. Interior and NMFS require that SCE&G perform, in coordination with the Fish & Wildlife Service, studies or monitoring efforts necessary to ensure successful up-stream passage through the lock. Based on high turbine passage survival rates observed during project studies, the Fish & Wildlife Service does not believe that specific measures for safe down-stream fish passage are needed at this time.

I agree that the above recommendations for a refurbished navigation lock, attraction flows, monitoring, and consultation with the Fish & Wildlife Service are appropriate fishway prescriptions under Section 18. Article 408 of this license requires such measures.

SCE&G proposed that they install up-stream fish passage only after successful up-stream passage of fish can be demonstrated, rather than immediately after up-stream fish passage facilities are installed at the Augusta diversion dam. I agree with the SCE&G request, which does not modify the Interior/NMFS prescription. Therefore, Article 408 of this license requires SCE&G to provide up-stream fish passage facilities within two years after installation of such facilities at the Augusta diversion dam unless SCE&G can effectively document that the facilities at the Augusta diversion dam are not successfully passing anadromous fish species up-stream to the Stevens Creek dam.

Interior and NMFS also request reservation of the right to amend their prescription to include an alternative down-stream passage mechanism, should future documentation of down-stream passage problems (i.e., much higher mortality rates than anticipated) occur. Article 408 of this license reserves authority to the Commission to require the licensee to construct, operate, and maintain such fishways, or comply with such reasonable modifications to existing fishways, as may be prescribed by the Secretary of Commerce or the Secretary of the Interior pursuant to Section 18 of the FPA.

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

5/ The application of the city of Augusta for the Augusta Canal Project No. 5772 was dismissed on January 28, 1994. The dismissal is currently pending on rehearing.

Section 10(j) of the FPA requires the inclusion, in each license issued, of conditions for the protection, mitigation, and enhancement of fish and wildlife based on recommendations from federal and state fish and wildlife agencies, unless the Commission believes that the recommendations are inconsistent with the FPA or other applicable law.

I have adopted all agency Section 10(j) fish and wildlife recommendations. I conclude that the fish and wildlife measures required in this license comply with the requirements of Section 10(j) of the FPA. All agency recommendations that staff determined to be outside the scope of Section 10(j) have been adopted under either Section 10(a) or Section 18, with two exceptions. First, South Carolina DNR recommended that SCE&G complete all recreation enhancements within 1 year of license issuance. Article 413 of this license requires completion of all recreation enhancements within 18 months of license issuance. Second, South Carolina DNR, in requesting compensatory mitigation, requested that SCE&G provide the annual fish enhancement payments to South Carolina DNR. However, the mitigation is being required under a federal license for the project and must remain subject to the Commission's regulatory oversight (see Ohio Power Corporation, 71 FERC ¶ 61,095 (1995)). SCE&G will cooperate with the South Carolina DNR and Georgia DNR to develop a fish enhancement plan containing the mitigation measures that will be funded with the payments. The Commission shall retain its authority to determine how the funds are spent and what measures are undertaken.

Interior and South Carolina DNR, in their comments on the draft EA dated April 5, 1995 and May 10, 1995, respectively, disagreed with staff's conclusion that staff had adopted all Section 10(j) comments. Specifically, the agencies disagreed with the staff recommendation in the draft EA to require an absolute minimum flow of 3,600 cfs from the Stevens Creek dam. In a teleconference held on June 22, 1995, which included representatives of Interior, South Carolina DNR, Corps, and SCE&G, all parties agreed that it would be inappropriate at this time to establish an absolute numeric minimum flow. The parties agreed that any such requirements be established through the operating plan. Article 403 requires SCE&G to develop an operating plan in cooperation with the agencies and file the plan for Commission approval. Interior and South Carolina DNR now agree that staff has adopted all Section 10(j) comments.

COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(1), federal and state agencies filed 25 plans

that address various resources in Georgia and South Carolina. Of these, we identified 8 plans relevant to the project. 6/ No conflicts were found.

COMPREHENSIVE DEVELOPMENT

Sections 4(e) and 10(a)(1) of the FPA, 16 U.S.C. §§ 797(e) and 803(a)(1), require the Commission, in acting on applications for license, to give equal consideration to the power and development purposes and to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreation opportunities, and the preservation of other aspects of environmental quality. In deciding whether, and under what conditions, a hydropower license should be issued the Commission must consider the various economic and environmental tradeoffs involved in the decision. The decision to license this project, and the terms and conditions included herein, reflect such consideration. For the reasons discussed below and in sections V and VI of the EA, I conclude that the Stevens Creek Project does not conflict with any planned or authorized development and is best adapted to comprehensive development of the waterway for beneficial public uses.

Recommended Alternative

The final EA analyzes the effects of SCE&G's proposed Stevens Creek Project, the project with staff's recommended environmental measures, and the no action alternative. I have selected issuing a new license with staff's recommended measures as the preferred alternative because, overall, these measures

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6/ Georgia Department of Natural Resource, Environmental Protection Division, 1986, *Water availability and use—Savannah River Basin.;* Savannah District Corps of Engineers, 1985, *Water resources development by the U.S. Army Corps of Engineers in Georgia.;* State of Georgia, Office of the Governor, 1987, *Water resources management strategy-summary document.;* Fish and Wildlife Service, 1994, *Elements of consensus on American shad management in the stretch of Savannah River between Strom Thurmond (Clarks Hill) Dam and Augusta.;* Forest Service, 1985, *Sumter National Forest land and resource management plan.;* South Carolina Department of Parks, Recreation, and Tourism, Division of Engineering and Planning, 1985, *South Carolina's comprehensive outdoor recreation plan.;* South Carolina Water Resources Commission, National Park Service, 1988, *South Carolina rivers assessment.;* South Carolina Wildlife and Marine Resources Department, Division of Wildlife and Freshwater Fisheries, 1989, *South Carolina instream flow studies: a status report.*

along with the standard articles would protect or enhance environmental resources. Also, the electricity generated from the project would continue to offset the use of fossil-fueled, electrical generating plants, conserve non-renewable energy resources, and reduce atmospheric pollution.

The measures included in this license require the licensee to:

- Develop a plan to control erosion, slope instability, and sedimentation during construction of the proposed recreation enhancements and any other land-disturbing or land-clearing activities. SCE&G must also inspect the reservoir shoreline annually for erosion and report its findings to the Commission every 3 years.

- Operate the project to reregulate releases from the up-stream J. Strom Thurmond dam. SCE&G shall contact the J. Strom Thurmond dam operators to obtain the predicted operating schedule for the J. Strom Thurmond dam and release all flow discharged to it from the J. Strom Thurmond dam on a weekly basis. SCE&G shall operate the project with the goal of attaining full pool by the end of the J. Strom Thurmond dam's production week to provide, to the extent practicable, a continuous weekend release. SCE&G must also minimize pool fluctuations to the extent practicable and maintain the reservoir between 183.0 and 187.5 feet NGVD.

- Develop an operating plan to address planned storage and operating scenarios for the up-stream J. Strom Thurmond and down-stream Augusta diversion dams. Also develop stage-discharge relationships for two existing level gages on the Savannah River and telemetry at one gage. The plan shall be updated in the future as necessary to reflect changes in operation of the dams. The operating plan shall be developed in cooperation with the Corps, Interior, South Carolina DNR, and Georgia DNR.

- Cooperate with the Corps and other agencies to address and enhance basinwide water quality, namely low dissolved oxygen (DO), identified through agency water quality monitoring. SCE&G shall begin participating in a cooperative planning process within 6 months of license issuance and document this to the Commission.

- Continue the existing water quality monitoring program to monitor DO conditions in the project reservoir and tailrace.

- Obtain water quality data from the Corps water quality

monitoring station in the tailrace of the J. Strom Thurmond dam that coincides with the frequency and timing of data collected at SCE&G's other six water quality monitoring stations and include these data in its annual submission to the Commission.

- Develop an enhancement plan related to fish entrainment mortality. The plan must include setting aside annual payments in the amount of $4,700 (1995 dollars) adjusted annually to reflect changes in the Consumer Price Index, to finance specific resource-based enhancements that will be developed and implemented by SCE&G in coordination with Interior, South Carolina DNR, and Georgia DNR. These enhancements must be located in the Savannah River basin.

- Develop an aquatic plant management plan to include: (1) posting plant information signs provided by South Carolina DNR at existing and proposed boat ramps; (2) monitoring aquatic plant distribution; (3) an evaluation of herbicide application and mechanical removal in selected areas; and (4) proper disposal of plant material removed from trash racks to minimize down-stream dispersal.

- Maintain a buffer area of trees on SCE&G-owned land around the reservoir to minimize soil erosion and maintain aesthetic quality.

- Protect archaeologic and historic sites within the project area by developing and implementing a cultural resources management plan, pursuant to a programmatic agreement between SCE&G, Advisory Council on Historic Preservation, U.S. Forest Service, South Carolina and Georgia State Historic Preservation Officers, South Carolina Institute of Archaeology and Anthropoloy.

- Provide barrier-free facilities (picnic table and restroom) at the existing Stevens Creek recreation site.

- Provide three picnic tables, including one barrier-free picnic table, a barrier-free restroom, a barrier-free fishing pier with a floating boat dock, a paved walkway, and a shoreline trail at the Forest Service's Fury's Ferry recreation site within the Sumter National Forest.

- Provide recreation facilities at two additional sites within the Sumter National Forest:

  (1) develop an unpaved boat launch, parking, and

signage at Proposed Site No. 1, on the Savannah River about 2 miles up-stream of the Stevens Creek dam; and

(2) develop an unpaved boat launch, parking, signage, and shoreline fishing stations at Proposed Site No. 2, on Stevens Creek about three-fourths of a mile up-stream of the Stevens Creek dam.

- Provide a tailwater fishing platform and parking below the dam on the Georgia side of the river.

- Install a gate and safety sign to prevent public access to a previously-proposed recreation site on the Savannah River about 1 mile up-stream of the Stevens Creek dam. SCE&G and the Forest Service now consider this site inappropriate for recreation development and propose access restriction to enhance public safety.

- Develop a recreation plan for the project to include a schedule for implementing the proposed recreation enhancements within 18 months of license issuance and a recreation site maintenance plan.

- File recreation plan updates every six years. The plan updates should include: (1) estimated use of the recreation sites and the reservoir; (2) an evaluation of adequacy of recreation facilities within the project; and (3) an evaluation of the feasibility of providing a recreation site on the Georgia side of the reservoir.

- Submit to the Fish & Wildlife Service, after coordination with the Fish & Wildlife Service, detailed engineering plans for the operation, maintenance and monitoring of the fishway. The actual construction and operation of the Fish & Wildlife Service-approved final design are not being required until such time as fish passage facilities are in place and functioning successfully at the Augusta diversion dam. Interior and the National Marine Fisheries Service do not envision the need for down-stream fish passage, but reserve the right to amend their prescription in the future should down-stream passage or other alternative passage mechanisms prove necessary.

Developmental and Nondevelopmental Uses of the Waterway

In determining whether a proposed project will be best adapted to a comprehensive plan for developing a waterway for beneficial public purposes pursuant to Section 10(a)(1) of the FPA, 16 U.S.C. § 803(a)(1), the Commission considers a number of

public interest factors, including the projected economic benefits of project power. In making these determinations, I considered the project both with the applicant's mitigative proposals and with staff's mitigative proposals.

Under the Commission's new approach to evaluating the economics of a project, as recently articulated in Mead Corporation, Publishing Paper Division, 72 FERC ¶ 61,027 (1995), a proposed project is economically beneficial so long as its projected cost is less than the current cost of alternative energy to any utility in the region that can be served by the project. To determine whether the project is economically beneficial staff compared the cost of energy from the licensee's proposal to the most economical source of new power which is a combined cycle combustion turbine. The Stevens Creek Project produces about 94.3 Gigawatthours (GWh) per year. Based on current economic conditions, without future escalation or inflation, the project if licensed as SCE&G proposes would have an annual cost of about $1,595,000 (17 mill/kwh) less than currently available alternative equivalent power (which costs about 33 mills/kwh). When licensed in accordance with the conditions adopted herein, the project would still produce about 94.3 GWh of energy annually, at an annual cost about $1,537,000 (16 mills/kwh) less than currently available alternative power.

I conclude, as discussed herein, that it is in the public interest to license the project.

LICENSE TERM

Section 15 of the FPA specifies that any license issued shall be for a term that the Commission determines to be in the pubic interest but is not less than 30 years or more than 50 years. The Commission's policy, which establishes 30-year terms for projects that propose little or no redevelopment, new construction, new capacity, or enhancement; 40-year terms for projects that propose moderate redevelopment, new construction, new capacity, or enhancement; and 50-year terms for projects that propose extensive redevelopment, new construction, new capacity, or enhancement; is consistent with the FPA as modified by the Electric Consumers Protection Act.

SCE&G proposes no new construction nor does this license require enhancement measures that would justify a longer term. Accordingly, the license for the Stevens Creek project will be for a term of 30 years.

SUMMARY OF FINDINGS

A Final EA was issued for this project. Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on

the environment are contained in the Final EA attached to this order. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if operated and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment.

Based upon a review of the agency and public comments filed on the project, and on staff's independent analysis pursuant to Sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, I conclude that issuing a license for the Stevens Creek Project, with the required enhancement measures, up-stream fish passage, and other special license conditions, would not conflict with any planned or authorized development, and would be best adapted to a plan for comprehensive development of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to South Carolina Electric & Gas Company, for a period of 30 years, effective the first day of the month in which this order is issued, to construct, operate and maintain the Stevens Creek Hydroelectric Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, shown by Exhibit G, filed on December 30, 1991:

Exhibit	FERC No. 2535-	Showing
G	15	Project Area
G	16	Project Area
G	17	Project Area
G	18	Project Area
G	19	Project Area

(2) Project works consisting of a (1) 2,000-foot spillway composed of a (a) cyclopean concrete gravity section, ogee crest, with a top elevation of 183.54 (1929 National Geodetic Vertical Datum [NGVD], 169.0 Plant Datum), (b) 1,000 feet of 5-foot-high flashboards from the lock to the center of the spillway, (c) 1,000 feet of 4-foot-high flashboards from the center of the spillway to the South Carolina abutment; (2) nonoverflow portions, located at the abutments with top elevations of 198.54 (1929 NGVD, 184.0

Plant Datum); (3) a concrete gravity lock 90 feet wide by 165 feet 6 inches long located between the powerhouse and spillway section; (4) a reservoir with a surface area of about 2,400 acres (gross capacity is 23,700 acre-feet and usable storage is about 8,600 acre-feet); (5) a 390-foot-long powerhouse, integral with the dam, consisting of (a) a reinforced concrete substructure, (b) a steel-framed brick superstructure, and containing (a) five I.P. Morris Francis vertical shaft single runner turbines, each rated at 3,125 horsepower (hp) and 75 revolutions per minute (rpm), (b) three S. Morgan Smith Francis vertical shaft single runner turbines, each rated at 3,125 hp and 75 rpm, (c) eight vertical shaft Westinghouse generators, each rated at 2,700 kilovolt-ampere (kVA), 2,300 volts, 60 cycle, 3 phase and 75 rpm, (d) two vertical shaft turbine-driven exciters rated at 300 kilowatts (kW), 250 volts, 1,200 amps, and 200 rpm, with static excitation systems for units 5-8, (e) governors on Units 1, 2, 4, and 5, ball-head type, gear driven from the main turbine shaft, (f) a governor on Unit 6, ball-head type, v-belt driven from the main turbine shaft, and (g) governors on Units 3, 7, and 8, Woodward Type UG-8 hydraulic governors; (6) a transmission system containing (a) two 5,000-kVA, 2,500V/46,000V transformers, (b) two 5,600-kVA, 2,300V/46,000V transformers, and (c) two 46-kV ties to a 46/115-kV substation; and (7) appurtenant facilities.

The project works generally described above are more specifically shown and described by those portions of Exhibits A and F shown below:

Exhibit A--The following sections of exhibit A filed December 30, 1991:

Section 1, page A-1, entitled "Project Structures"; Section 2, page A-2, entitled "Project Impoundment"; Section 3, page A-2, "Project Generating Equipment"; Section 4, page A-3, "Project Transmission Equipment"; and Section 5, page A-3, "Miscellaneous Equipment".

Exhibit F--The following exhibit F drawings filed December 30, 1991:

Exhibit	FERC No. 2535-	Showing
F	13	Plan, elevation—dam, powerhouse
F	14	Plan, elevation—powerhouse

(3) All structures, fixtures, equipment, or facilities used to operate or maintain the project and located within the project boundary; all portable property that may be employed

in connection with the project and located within or outside the project boundary; and all riparian or other rights necessary or appropriate in the operation or maintenance of the project.

(C) The exhibits A, F, and G described above are approved and made part of the license.

(D) This license is subject to the articles set forth in Form L-5 (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting Navigable Waters and Lands of the United States" and the following additional articles:

Article 201. The licensee shall pay the United States an annual charge, effective the first day of the month in which this license is issued:

For the purposes of reimbursing the United States for the Commission's administrative costs, pursuant to Part I of the Federal Power Act, a reasonable amount as determined in accordance with the Commission's regulations in effect from time to time. The authorized installed capacity for that purpose is 17,280 kW. Under the regulations currently in effect, projects with authorized installed capacity of less than or equal to 1,500 kW will not be assessed an annual charge.

Article 202. Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such

ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus 4 percentage points (400 basis points).

Article 203. If the licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

Article 401. The licensee shall file erosion and sedimentation control plans at least 90 days before the start of any scheduled land-disturbing or land-clearing activities. The erosion control plans shall include measures to control dust and erosion, to stabilize slopes, and to minimize the quantity of sediment and other potential air or water pollutants likely to result from site access, project construction, spoil-disposal, and project operation.

The erosion control plan(s), at a minimum, shall include:

(1) a description of the actual site conditions;

(2) measures proposed to control erosion, to prevent slope instability, and to minimize the quantity of sediment resulting from project construction and operation;

(3) detailed descriptions, functional design drawings, and specific topographic locations of all control measures; and

(4) a specific implementation schedule and details for monitoring and maintenance programs for project construction and operation.

The licensee shall prepare the plan after consultation with the Department of Interior, Forest Service, Georgia Department of Natural Resources (Georgia DNR), and South Carolina Department of Natural Resources (South Carolina DNR). The licensee shall include with the plan documentation of consultation and copies of comments and recommendations made during plan preparation, and specific descriptions of how the agencies' comments are accomodated by the plan. The licensee

shall allow a minimum of 30 days for the agencies to comment and make final recommendations before filing the plan with the Commission. If the licensee does not adopt an agency's recommendation, the filing shall state the licensee's reasons, including those that are based on geological, soil, and groundwater conditions at the site.

The plans shall incorporate applicable Best Management Practices. The Commission may require changes to the plan. No land-disturbing or land-clearing activities shall begin until the Commission notifies the licensee that the plan complies with the requirements of this article. Upon Commission approval, the licensee shall implement the action items identified in the operating plan, including any changes required by the Commission.

The licensee shall also inspect the reservoir shoreline for erosion annually and report the results to the Commission every three years on January 1. If specific areas of shoreline erosion are identified, the licensee shall cooperate with the Forest Service, Georgia DNR, and South Carolina DNR, as appropriate, to address adverse effects such as unstable slopes or suspended sediments.

Article 402. The licensee shall operate the Stevens Creek Project to reregulate releases from the up-stream U.S. Army Corps of Engineers' J. Strom Thurmond dam. The licensee shall contact the J. Strom Thurmond dam operators to obtain the predicted operating schedule for the J. Strom Thurmond dam. The Stevens Creek Project shall release all flow discharged to it from the J. Strom Thurmond dam on a weekly basis. The licensee shall operate the Stevens Creek Project with the goal of attaining full pool by the end of the J. Strom Thurmond dam's production week to provide, to the extent practicable, a continuous weekend release. The licensee shall operate the project to minimize pool fluctuations to the extent practicable while discharging flow in response to daily and weekly projections from the J. Strom Thurmond dam. The reservoir shall be maintained between 183.0 and 187.5 feet National Geodetic Vertical Datum.

Article 403. The licensee shall file with the Commission, for approval, an operating plan for the Stevens Creek project. Within one month after license issuance, the licensee shall schedule a meeting with the U.S. Army Corps of Engineers (Corps), Department of the Interior, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, and city of Augusta (or current licensee of the Augusta diversion dam) to begin development of the operating plan. The plan shall be submitted to the Commission for approval within six months of the first meeting between the licensee and the above-mentioned agencies. The plan shall conform to the basic framework described in this license. The plan shall be updated every five years to accommodate changing operations at up-stream or down-

stream dams.

The licensee shall include with the plan documentation of the cooperative effort between the licensee and the agencies, copies of agency comments and recommendations made during plan preparation, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and make final recommendations before filing the plan with the Commission. If agreement is not reached among the licensee and the agencies as to the elements of the plan, the licensee shall submit all data and documentation developed to date, describing in detail the various parties' positions, to the Commission for resolution.

The intent of the operating plan will be to develop minimum flow, or flows, for the Stevens Creek Project under various operating conditions, improve operational efficiency, leading to minimization of reservoir fluctuation and more uniform flows in the river down-stream of the Stevens Creek project. The plan shall address planned storage and flow releases under different J. Strom Thurmond operating scenarios. The plan shall place particular emphasis on minimizing reservoir fluctuations from March through June, which encompasses the spawning periods of the majority of important game fish.

The plan shall include operating procedures for emergency plant shutdowns, procedures to follow when the flashboards trip, notification of down-stream users when the minimum flow cannot be provided, provisions to address potential future minimum release requirements at the Augusta diversion dam, and operating rules that correspond to the anticipated range of average daily flows from the J. Strom Thurmond dam.

Within six months after license issuance, the licensee shall prepare a formal cooperative agreement with the Corps that addresses notification procedures to alleviate problems due to flashboard tripping when high flows are unexpectedly released from the J. Strom Thurmond dam.

If the Stevens Creek Project deviates from the minimum flow developed in the operating plan, the licensee shall document the event and provide an explanation in a memorandum to the Commission within ten days. If the occurrence is beyond the licensee's control, it shall not be considered a non-compliance event.

To demonstrate operational compliance, the licensee shall submit annual reports to the Commission with operating data including daily generation data, daily flows released through the turbine and spilled over the dam, daily flow data from the below-dam USGS gage, J. Strom Thurmond's projected daily average releases and any memorandums submitted to the Commission during

the year explaining deviations from the continuous minimum flow. The licensee shall provide actual hourly releases from the J. Strom Thurmond dam and hourly generation data and hourly flows released through the turbines and released over the dam at the Stevens Creek Project to the Commission or agencies within 30 days upon request. Hourly data shall be retained on file for a period of no less than five years.

To accurately quantify and reregulate the flows from the Stevens Creek project, the operating plan shall include development of stage-discharge relationships for existing U.S. Geological Survey (USGS) water level gages located in the tailrace of the J. Strom Thurmond dam (USGS No. 02194501) and 200 feet downstream of the Stevens Creek dam (USGS No. 021964831). The gaging plan shall be prepared in cooperation with the USGS and the Corps. If these two monitoring locations prove to be unsuitable for long-term flow gaging purposes, the plan shall establish other monitoring locations in consultation with USGS or document in a report to the Commission why no suitable locations could be found. The licensee shall also provide funding to install and maintain telemetry at Gage No. 02194501 in the tailrace of the J. Strom Thurmond dam.

The Commission reserves the right to require changes to the operating plan. Upon Commission approval, the licensee shall implement the action items identified in the operating plan, including any changes required by the Commission.

Article 404. The licensee shall participate in a cooperative planning process for enhancing dissolved oxygen in the Stevens Creek reservoir and downstream of the Stevens Creek dam. The planning process shall include representatives of the Corps of Engineers (Corps), Department of the Interior, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, Environmental Protection Agency, and other interested parties. The licensee shall convene or participate in a meeting with the above-mentioned agencies within six months after license issuance and document this to the Commission. Subsequently, the licensee shall continue to participate in a cooperative planning process. A goal of the process shall be to improve dissolved oxygen concentrations downstream of J. Strom Thurmond dam. The process shall build on the information developed for this license renewal and on the results of the Corps' investigation of dissolved oxygen enhancement options at up-stream reservoirs. The planning process shall focus on achieving a consensus on how to develop, fund, implement, and maintain a plan for seasonal improvement of dissolved oxygen downstream of J. Strom Thurmond dam.

The licensee shall submit annual status reports to the Commission by January 1 describing the dissolved oxygen enhancement planning, including meetings held, participants, and

decisions or progress made. The status reports shall also contain a summary of the water quality monitoring data described in Article 405.

Article 405. Within six months after license issuance, the licensee shall file with the Commission, for approval, a water quality monitoring plan. The plan shall be prepared in consultation with the Department of the Interior (Interior), Georgia Department of Natural Resources (Georgia DNR), South Carolina Department of Natural Resources (South Carolina DNR), and the Environmental Protection Agency (EPA). The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The licensee shall continue the existing water quality monitoring program begun by U.S. Geological Survey in 1990. The monitoring shall occur at the one existing site in the Stevens Creek tailrace and the five existing sites in the Stevens Creek reservoir:

- Savannah River below the Highway 28 bridge
- Forebay of the powerhouse
- Stevens Creek at the existing Stevens Creek recreation site
- Stevens Creek at the County Road 53 bridge
- Savannah River just up-stream of the Columbia County pollution control plant outfall.

The water quality monitoring shall include obtaining data from the Army Corps of Engineer's (Corps') water quality monitoring station installed below the J. Strom Thurmond dam in order to assess water quality as water enters the Stevens Creek reservoir. Data shall be obtained from the Corps to coincide with the collection of data from the other water quality monitoring stations.

The licensee shall collect data on pH, temperature, dissolved oxygen, and conductivity on a monthly basis from the seven monitoring stations. Monitoring results should be presented to the Commission annually and provided to the Corps, EPA, Interior, Georgia DNR, and South Carolina DNR to assist in

development of the most appropriate enhancements to improve dissolved oxygen conditions in the Savannah River within the Stevens Creek reservoir and directly down-stream of the Stevens Creek dam. The monitoring results shall be included in the annual status reports required in Article 404.

The licensee shall continue the monitoring effort while the cooperative planning effort to enhance the dissolved oxygen level in the Stevens Creek reservoir described in Article 404 is underway. After a plan for enhancing seasonal dissolved oxygen levels is agreed upon, the licensee shall consult with Interior, EPA, Georgia DNR, and South Carolina DNR to update the water quality monitoring plan based on the selected dissolved oxygen enhancement plan. When dissolved oxygen enhancement measures are in place and the monitoring data show that state dissolved oxygen standards are consistently being met in the Stevens Creek reservoir and down-stream of the dam, the licensee may petition the Commission to reduce the frequency of water quality monitoring.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the action items identified in the plan, including any changes required by the Commission.

Article 406. By January 1 of each year, the licensee shall provide the replacement value of $4,700 (1995 dollars) annually on January 1 to fund resource-based activities in the Savannah River basin. To ensure that future payments accurately reflect the effects of inflation, the required annual payment should be adjusted to reflect changes in the Consumer Price Index. If subsequent analyses indicate that project-related entrainment is significantly less than or greater than determined in the relicensing process, the licensee shall, following consultation with the South Carolina Department of Natural Resources, Georgia Department of Natural Resources, and the Department of the Interior, file recommendations for modification of the compensation requirement for Commission approval. The filing shall include the comments of these agencies on the licensee's recommendations.

Article 407. Within six months after license issuance, and every 10 years thereafter, the licensee shall file a resource enhancement plan and implementation schedule for Commission approval using the funds described in Article 406. The plan shall describe specific enhancement activities to be undertaken and contain provisions to monitor the success of these measures. The licensee shall include with the plan documentation of consultation with the South Carolina Department of Natural Resources, Georgia Department of Natural Resources, and Department of the Interior, copies of agency comments and recommendations made during plan preparation, and specific

descriptions of how the agencies' are accomodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment on the plan and make final recommendations before filing the plan with the Commission. if tne licesee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission. The licensee shall finance the enhancement measures annually, until or unless the Commission determines otherwise. Any enhancement activities may include, but are not limited to, fish stocking, habitat improvement projects, and dissolved oxygen improvement.

Article 408. The licensee shall provide for the construction, maintenance, and operation of up-stream fish passage facilities at its own expense as prescribed by the Secretary of the Interior and Secretary of Commerce.

Up-stream fish passage facilities shall consist of a refurbished navigation lock at the Stevens Creek dam, which shall be operated using attraction flows or other fish attraction mechanisms to provide a minimum of 30 lockages during the American shad migration season. The up-stream fish passage facilities must be designed in cooperation and consultation with the U.S. Fish and Wildlife Service (Fish and Wildlife Service), Georgia Department of Natural Resources (Georgia DNR), and South Carolina Department of Natural Resources (South Carolina DNR). The licensee shall complete design of up-stream fish passage facilities at the Stevens Creek project if and when up-stream fish passage facilities are installed at the Augusta diversion dam down-stream of the Stevens Creek project.

Actual construction and operation of the Fish & Wildlife Service-approved final design will be required within two years after fish passage facilities are in place at the Augusta diversion dam, unless the licensee can effectively document that up-stream fish passage facilities at the Augusta diversion dam are not successfully passing anadromous fish species upstream to the Stevens Creek dam. In such case, the licensee shall provide up-stream fish passage facilities within two years after fish passage facilities are successfully operating at the Augusta diversion dam.

The Commission reserves the authority to require the construction, maintenance, and operation of downstream fish passage facilities, or the modification of up-stream fish passage facilities, by the licensee at its own expense as may be prescribed by the Secretary of the Interior or the Secretary of Commerce.

Article 409. Within six months after license issuance, the

licensee shall file with the Commission, for approval, an aquatic plant management plan. This plan shall be prepared in consultation with the Department of the Interior, Georgia Department of Natural Resources, South Carolina Department of Natural Resources. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The intent of the plan shall be to control nuisance aquatic weeds which are present in the reservoir, namely Eurasian watermilfoil and Brazilian elodea. The plan shall include the following measures:

(1) posting of signs at boat ramps requesting boaters to remove aquatic plants from boats and trailers

(2) evaluation of herbicide application and mechanical removal in selected areas of the Stevens Creek reservoir to facilitate recreational boating and limit the spread of aquatic plants, including consideration of the potential effects of herbicide application on down-stream populations of the protected rocky shoals spider-lily

(3) monitoring of aquatic plant distribution and plant accumulation at the intakes

(4) composting of all aquatic plants removed from the trash racks to minimize down-stream distribution of these species.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 410. The licensee shall maintain a 50-foot shoreline buffer of trees on licensee-owned land on the Stevens Creek reservoir to minimize soil erosion and maintain aesthetic quality.

Article 411. Before the commencement of any construction or development of any project works or other facilities at the project, the licensee shall consult and cooperate with the Georgia and South Carolina State Historic Preservation Officers (SHPOs) to determine the need for, and extent of, any archaeological or historic resource surveys and any mitigation measures that may be necessary. The licensee shall provide funds

in a reasonable amount for such activity. If any previously unrecorded archaeological or historic sites are discovered during the course of construction, construction activity in the vicinity shall be halted, a qualified archaeologist shall be consulted to determine the significance of the sites, and the licensee shall consult with the Georgia and South Carolina SHPOs to develop a mitigation plan for the protection of significant archaeological or historic resources. If the licensee and the SHPOs cannot agree on the amount of money to be expended on archaeological or historic work related to the project, the Commission reserves the right to require the licensee to conduct, at its own expense, any such work found necessary.

Article 412. The licensee shall implement the provisions of the Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, the Forest Service, the South Carolina State Historic Preservation Officer, the Georgia State Historic Preservation Officer, the South Carolina Institute of Archaeology and Anthropology, and the licensee for managing historic properties that may be affected by the new license for the Stevens Creek project. The Commission reserves the authority to place such additional requirements upon this license as may be necessary to ensure the Commission's compliance with the National Historic Preservation Act and 36 CFR Part 800, at any time during the term of this license, in the event the Programmatic Agreement is terminated.

Article 413. The licensee shall, within six months after license issuance, submit a recreation plan to the Commission for review.

The licensee shall prepare the plan after consultation with the Forest Service, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, Columbia, Edgefield, and McCormick counties, law enforcement officials, and agencies having land management or planning/zoning authority in the area. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 60 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The licensee shall implement the plan upon Commission approval. The Commission reserves the right to require changes to the recreation plan, which shall reflect the following recreation enhancements:

(1) Existing Stevens Creek recreation site. The licensee shall provide the following enhancements in addition to the existing facilities:

a. one barrier-free picnic table

b. one barrier-free restroom

c. a paved access road, parking for 20 vehicles, and turn-around area

d. one barrier-free parking space

(2) Existing Fury's Ferry recreation site. The licensee shall provide the following enhancements in addition to the existing facilities:

a. three picnic tables, one of which is barrier-free

b. paved walkways and a shoreline trail

c. one stationary barrier-free fishing pier with a floating boat dock

d. one barrier-free rest room

e. gravel parking for 20 vehicles, including 1 barrier-free parking space

(3) Proposed recreation site #1. The licensee shall develop appropriate access to this site and provide:

a. an unpaved boat launch

b. gravel parking area for six cars and four trailers

c. one trash receptacle and safety sign.

(4) Proposed recreation site #2. The licensee shall develop appropriate access to this site and provide:

a. an unpaved boat launch

b. gravel parking area for seven cars and four trailers

c. four fishing stations connected by 520 feet of trails. The fishing stations shall consist of cleared areas on the bank of the creek. Three years after construction, the licensee shall evaluate the fishing stations to determine if benches are appropriate

d. one safety sign.

(5) Tailwater Fishing Platform. The licensee shall provide:

a. a shore fishing platform below the dam on the Georgia side of the river

b. parking for 10 vehicles, including one barrier-free parking space

c. a walkway from the parking area to the fishing platform

d. one safety sign.

In addition, the licensee shall restrict access to the area in the Sumter National Forest at the end of Forest Road 636B that was originally proposed as a recreation site by installing a gate across the access road to the site. The recreation plan shall comply with the Cultural Resources Management Plan for the project. The plan shall also include:

- a schedule for implementing the improvements described above within 18 months after the issuance date of this license

- a maintenance plan, including trash and litter collection, clearing of brush and undergrowth, maintenance of signs, facilities, and parking areas.

The recreation plan shall also include specific proposals to:

- minimize destruction of the natural vegetation directly adjacent to the reservoir, and where possible, on the land adjoining the project boundary

- minimize unauthorized use and vandalism of the existing and proposed recreation sites through monitoring, use of certain construction materials, and cooperation with local law enforcement authorities.

- blend the recreation development into the existing landscape character by selective vegetation removal and landscaping

- revegetate, stabilize, and landscape new construction areas and slopes damaged by erosion.

The licensee shall provide sufficient funds to the Forest Service to maintain the existing Fury's Ferry recreation site and proposed recreation sites #1 and #2.

The design and construction of all recreational facilities shall comply with the standards and provisions of the Americans

with Disabilities Act (ADA).

Article 414. The licensee shall file a recreation plan update with the Commission every 6 years following issuance of the license. The first recreation plan update shall be submitted to the Commission in conjunction with the licensee's next Form 80 Inventory of Recreational Resources submission (Section 8.11(a)(2) of the Commission's regulations). The plan update must be prepared in consultation with the Forest Service, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, Columbia, Edgefield, and McCormick Counties, local communities, law enforcement agencies, and any other agencies having land management or planning/zoning authority in the area.

The licensee shall include with the 6-year recreation plan updates documentation of consultation, copies of agency comments and recommendations on the completed plan update, and specific descriptions of how those agencies' comments are accommodated by the plan update. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the update with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The purpose of the plan updates are to evaluate the adequacy of recreational facilities in the project area. The 6-year recreation plan updates shall include:

(1) annual recreation use figures for the reservoir and recreation sites

(2) a discussion of the adequacy of the licensee's recreation facilities to meet recreation demand

(3) an assessment of the need for new or expanded facilities.

(4) a description of the methodology used to collect all study data

(5) consideration of the following project-specific issues:

a. safety, security, and vandalism

b. navigational problems such as shallow water, heavy boat traffic, and aquatic weed growth

c. the viability of providing a recreation site, including a year-round accessible boat launch ramp, on the Georgia side of the reservoir.

If the Commission determines that recreation facilities in the project area are inadequate to meet demand, the Commission may require the licensee to provide recreation facilities adequate to meet recreation needs in the project area.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the action items identified in the plan, including any changes required by the Commission.

Article 415. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article.

If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any noncomplying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the licensee may grant permission without prior Commission approval are:

(1) landscape plantings;

(2) noncommercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings;

(3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and

(4) food plots and wildlife enhancement.

To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall:

(1) inspect the site of the proposed construction;

(2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site; and

(3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline.

To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for:

(1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained;

(2) storm drains and water mains;

(3) sewers that do not discharge into project waters;

(4) minor access roads;

(5) telephone, gas, and electric utility distribution lines;

(6) nonproject overhead electric transmission lines that do not require erection of support structures within the project boundary;

(7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and

(8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir.

No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for:

(1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained;

(2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained;

(3) other pipelines that cross project lands or waters but do not discharge into project waters;

(4) nonproject overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained;

(5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina;

(6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and

(7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year.

At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

(E) The licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(F) This order is issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of this order, pursuant to 18 C.F.R. §§ 385.713. The filing of a request for rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The licensees failure to file a request for rehearing shall constitute acceptance of this order.

Fred E. Springer
Director, Office of
Hydropower Licensing

Document Content(s)

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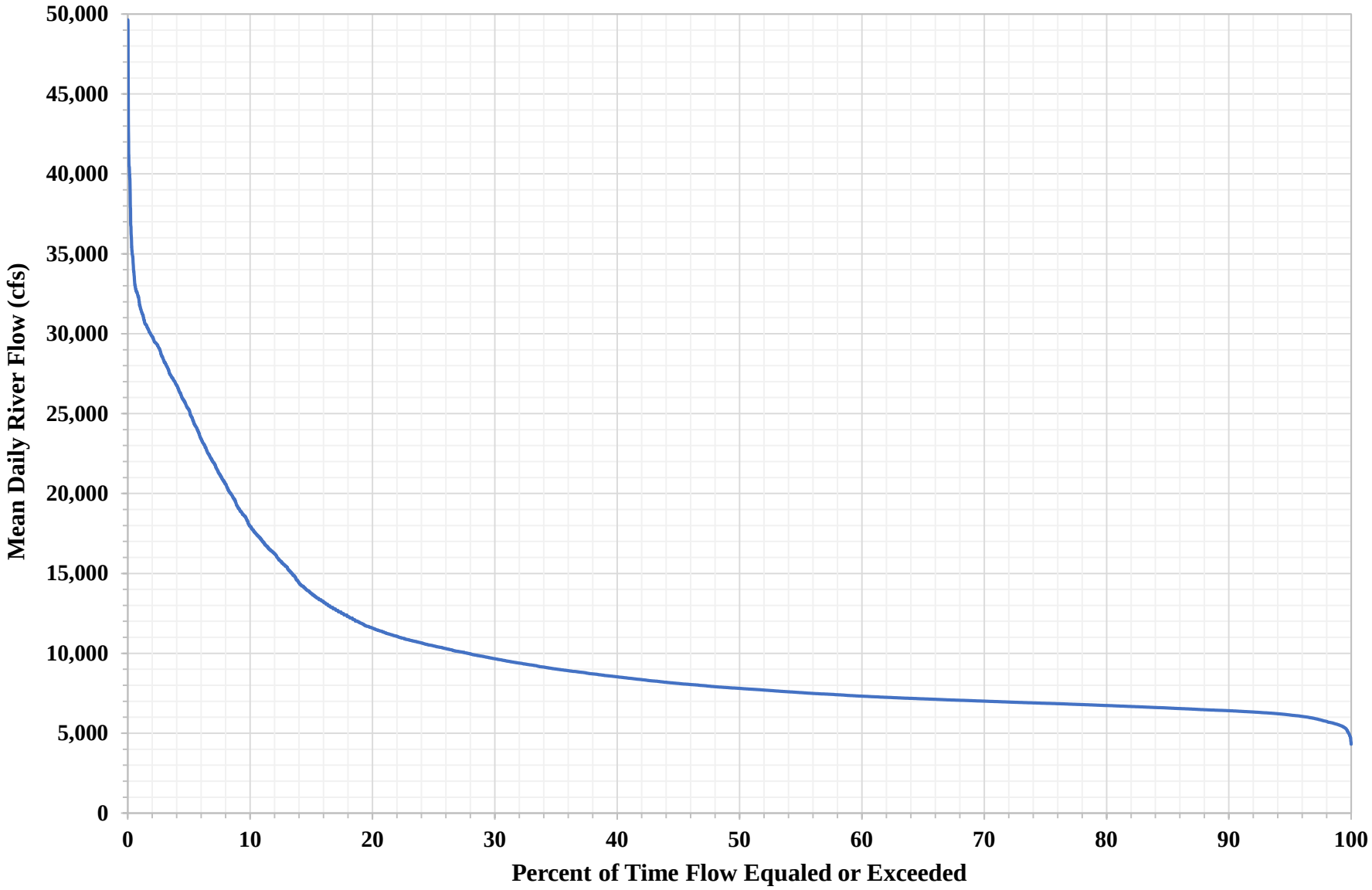
APPENDIX F

FLOW DURATION CURVES

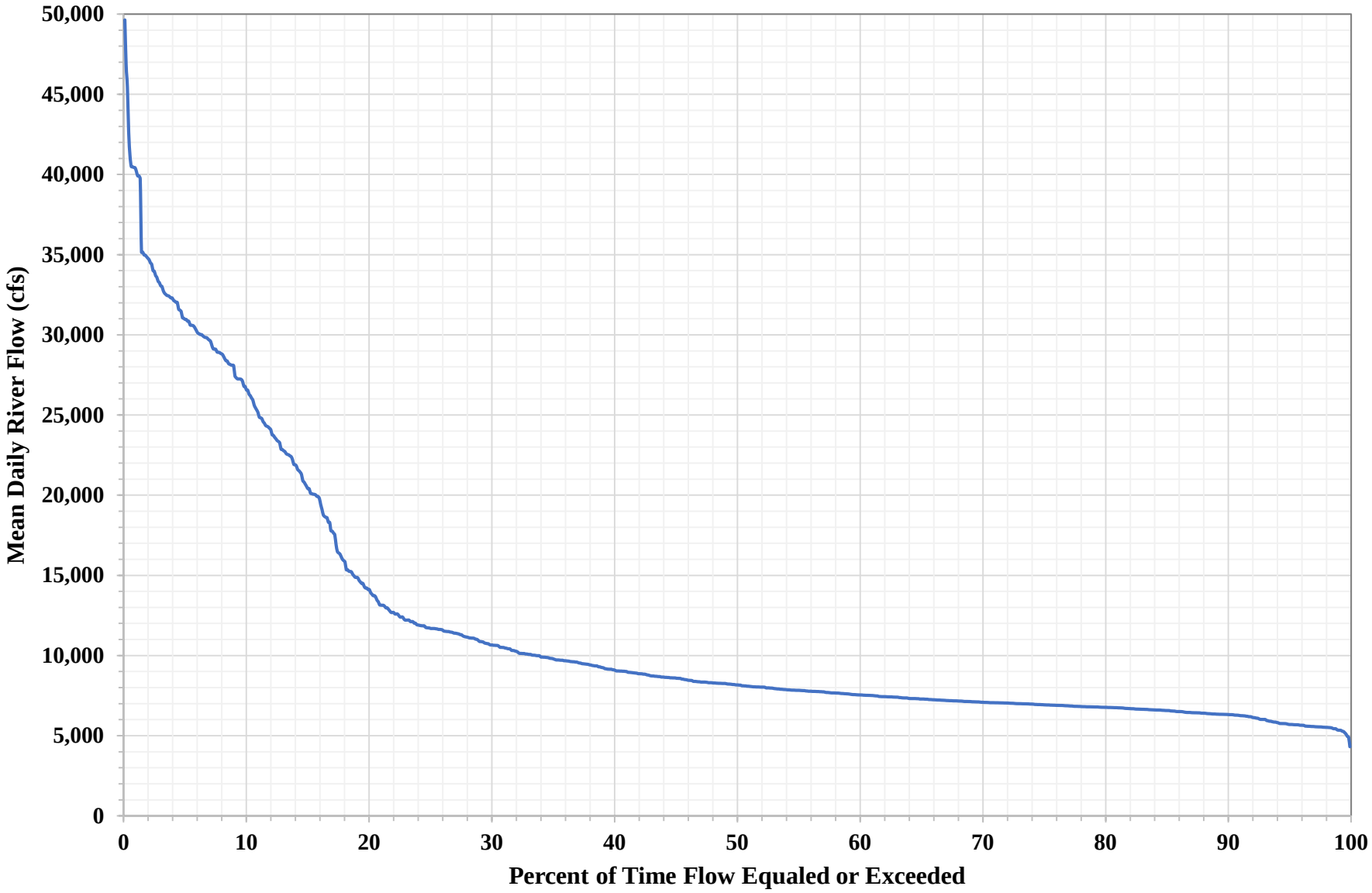
Stevens Creek Dam - Annual Flow Duration Curve

Data prorated from USGS Gage No. 02197000 Savannah River at Augusta, GA and USGS 02196485 Augusta Canal
Period of Record 01/01/1988 to 12/31/2018



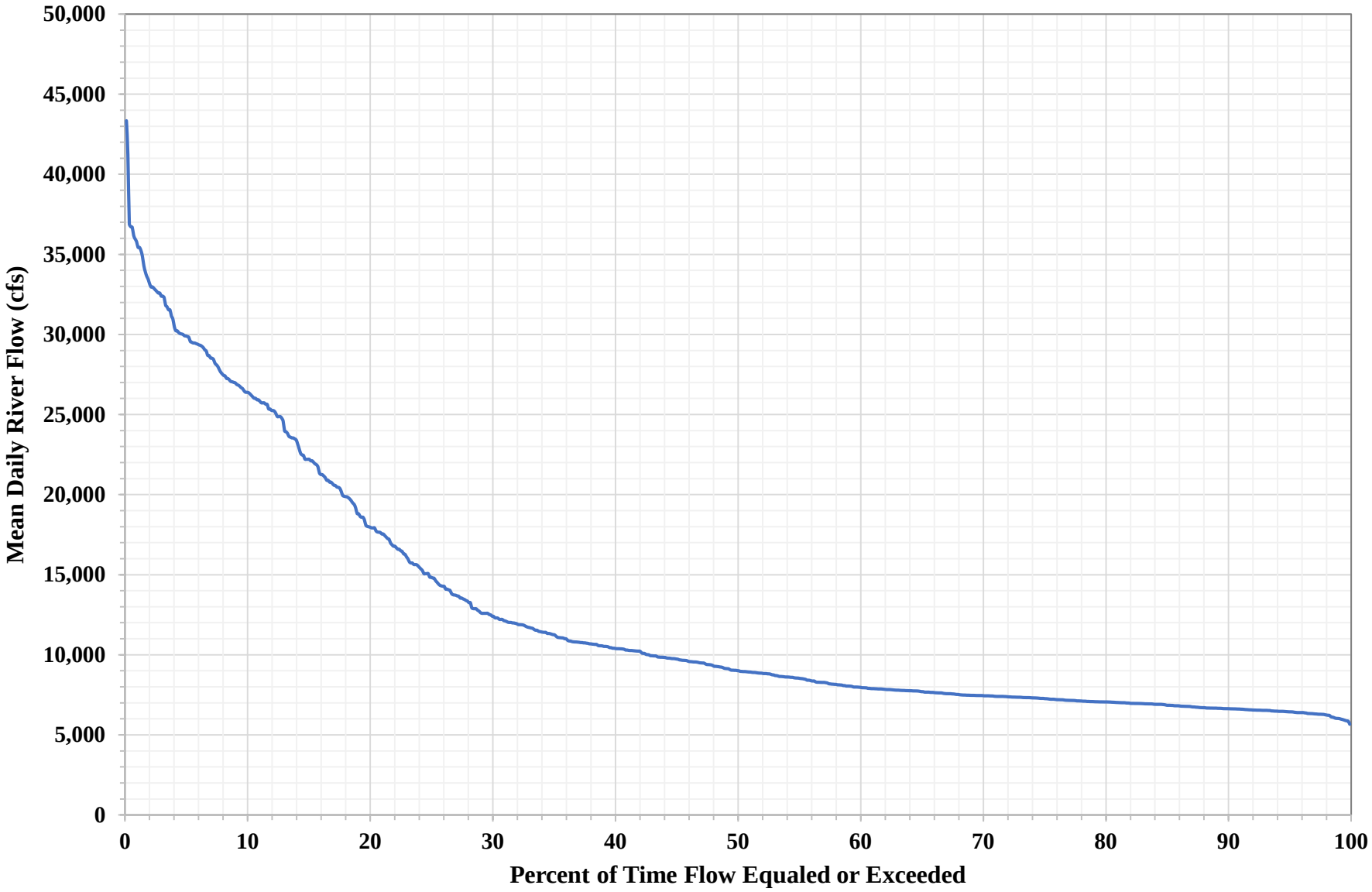
Stevens Creek Dam - January Flow Duration Curve

Data prorated from USGS Gage No. 02197000 Savannah River at Augusta, GA and USGS 02196485 Augusta Canal
Period of Record 01/01/1988 to 12/31/2018



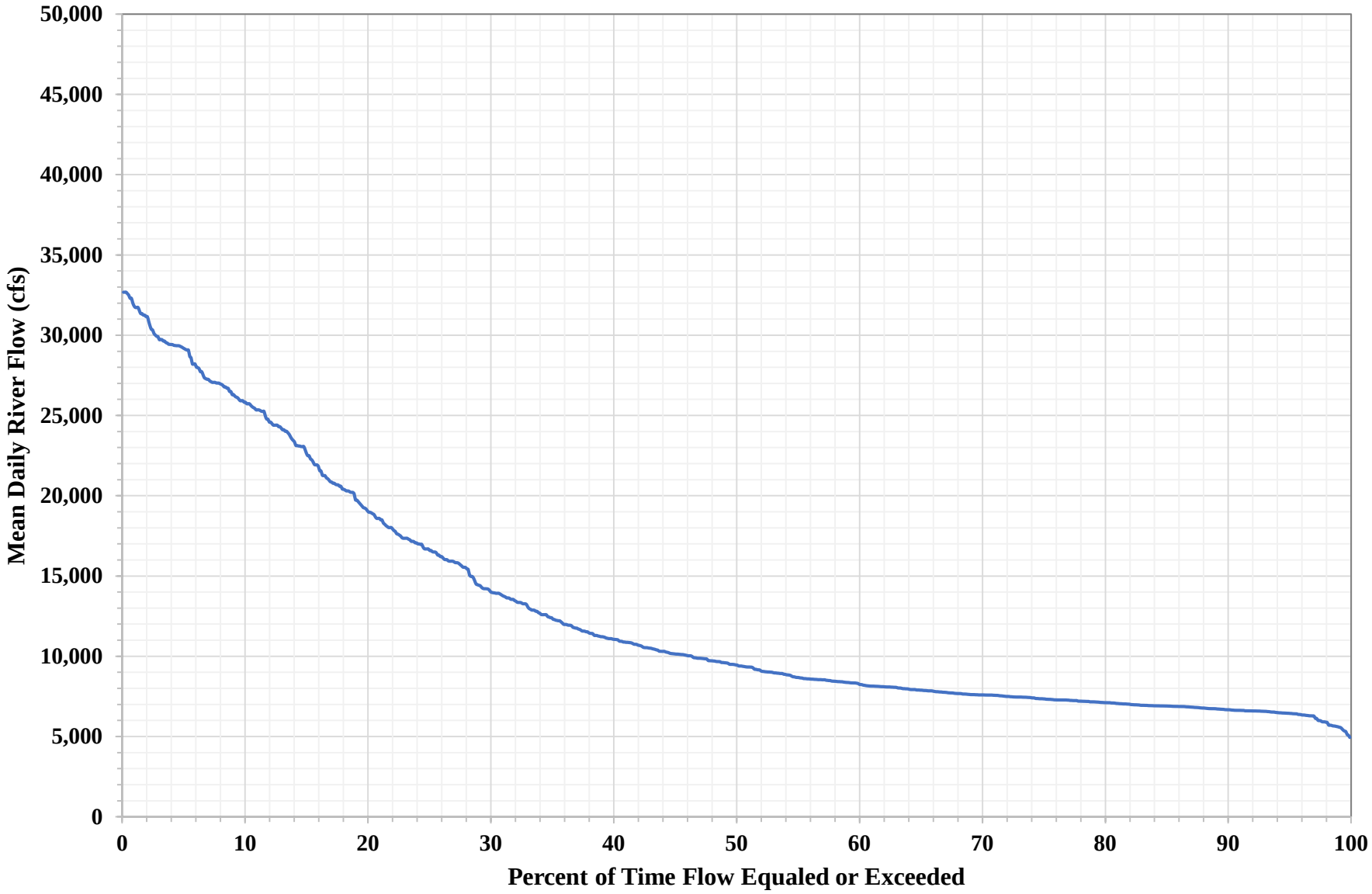
Stevens Creek Dam - February Flow Duration Curve

Data prorated from USGS Gage No. 02197000 Savannah River at Augusta, GA and USGS 02196485 Augusta Canal
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - March Flow Duration Curve

Data prorated from USGS Gage No. 02197000 Savannah River at Augusta, GA and USGS 02196485 Augusta Canal
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - April Flow Duration Curve

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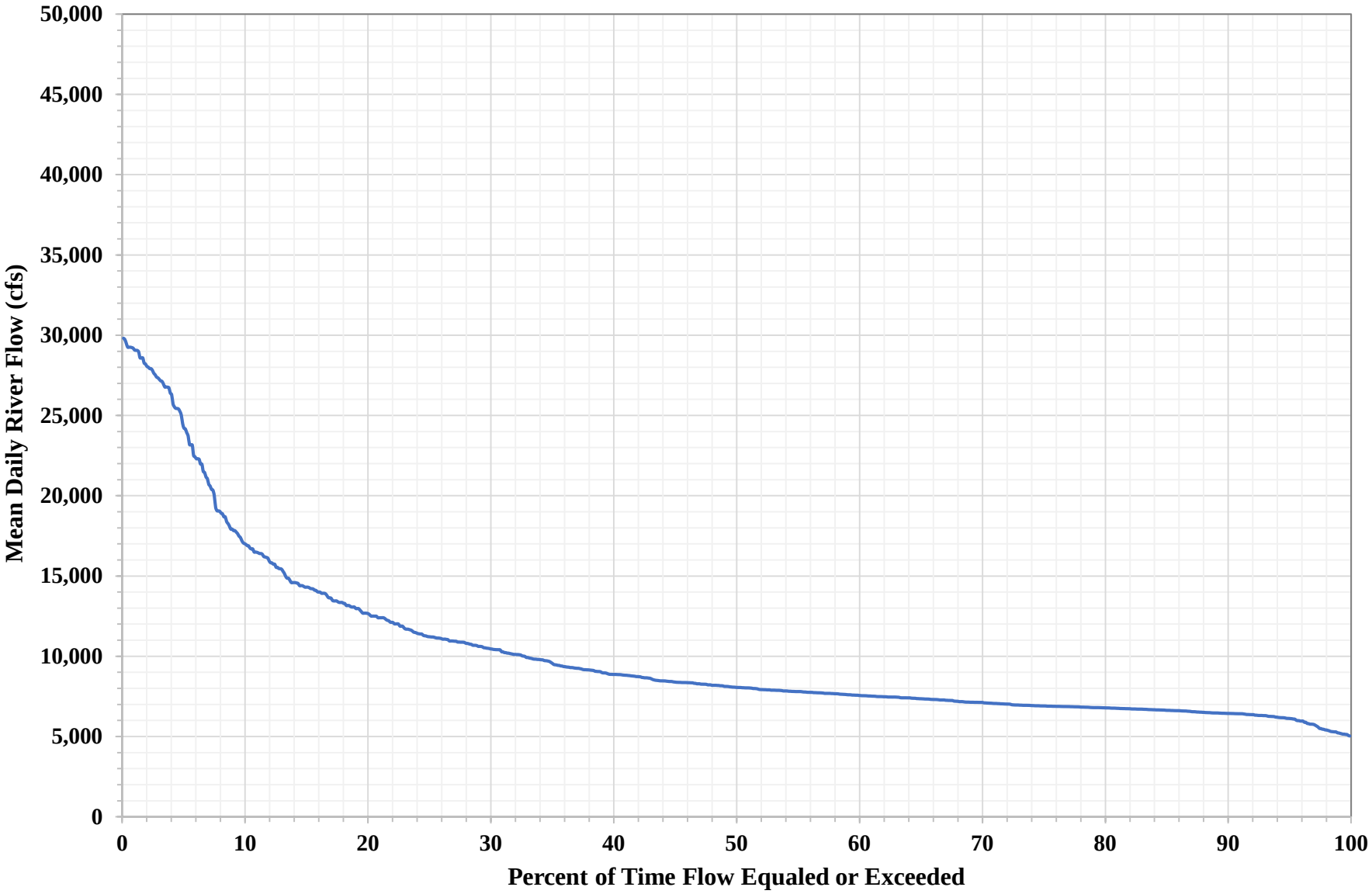

Stevens Creek Dam - May Flow Duration Curve

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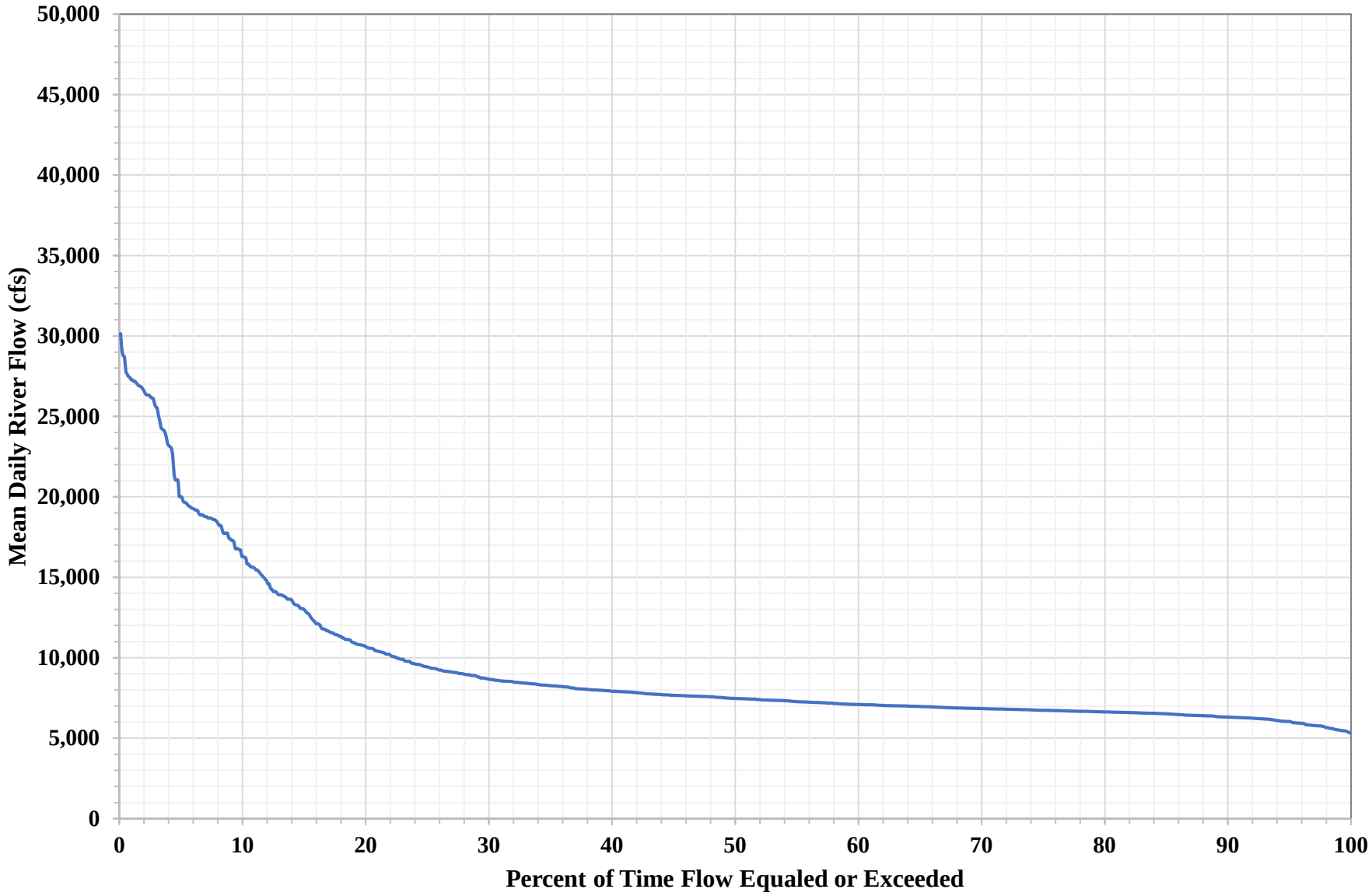

Stevens Creek Dam - June Flow Duration Curve

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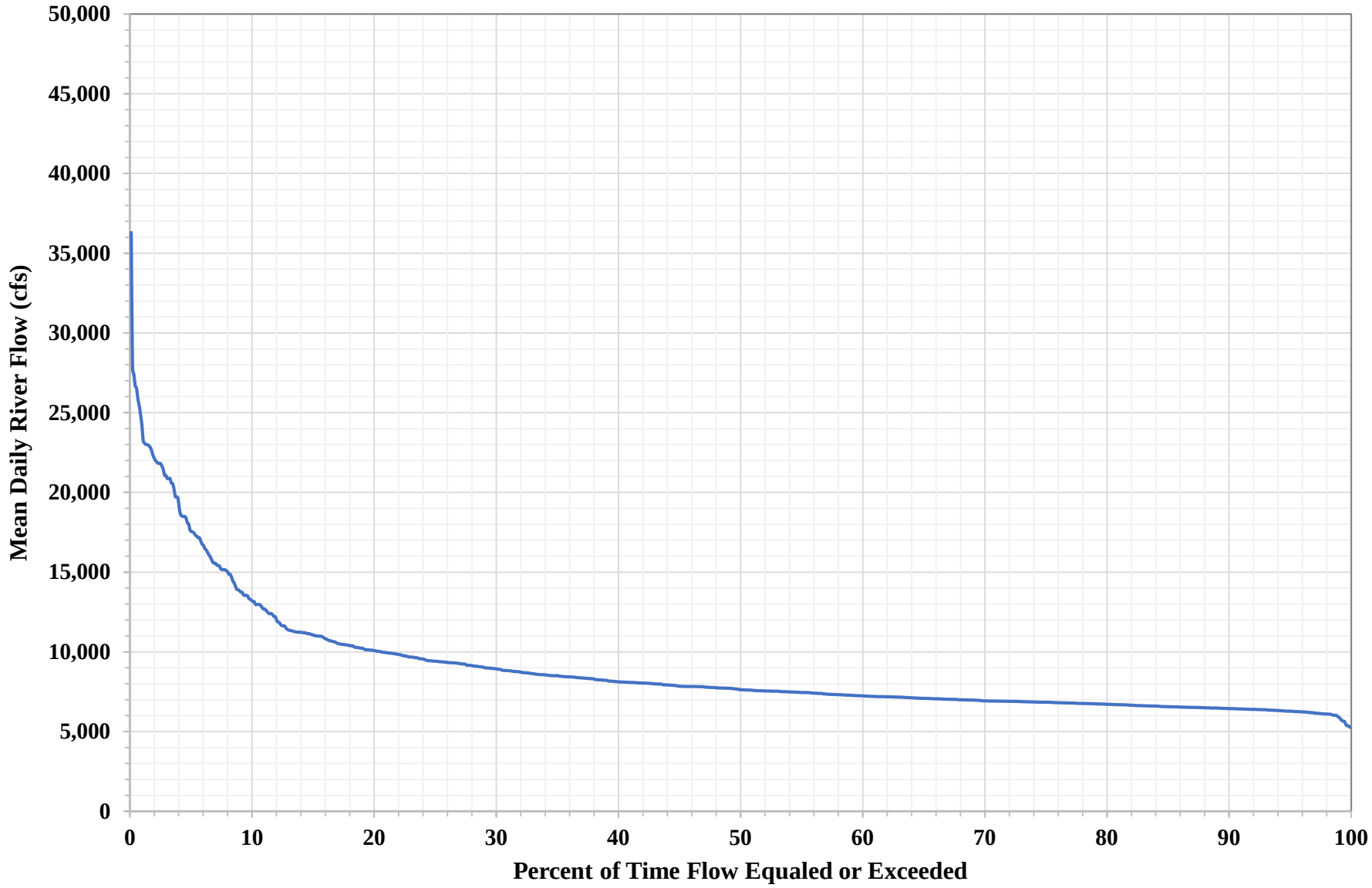

Stevens Creek Dam - July Flow Duration Curve

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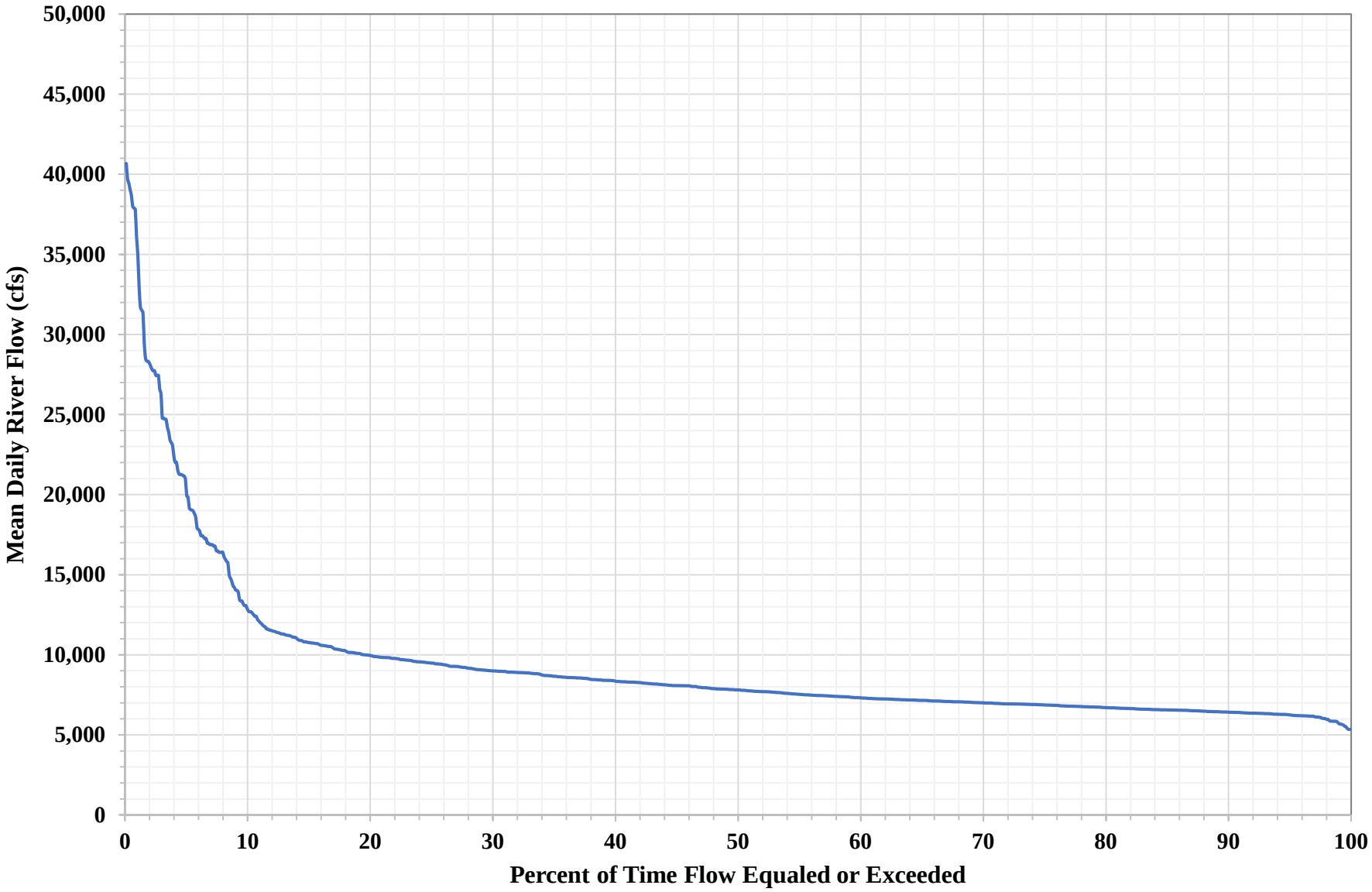

Stevens Creek Dam - August Flow Duration Curve

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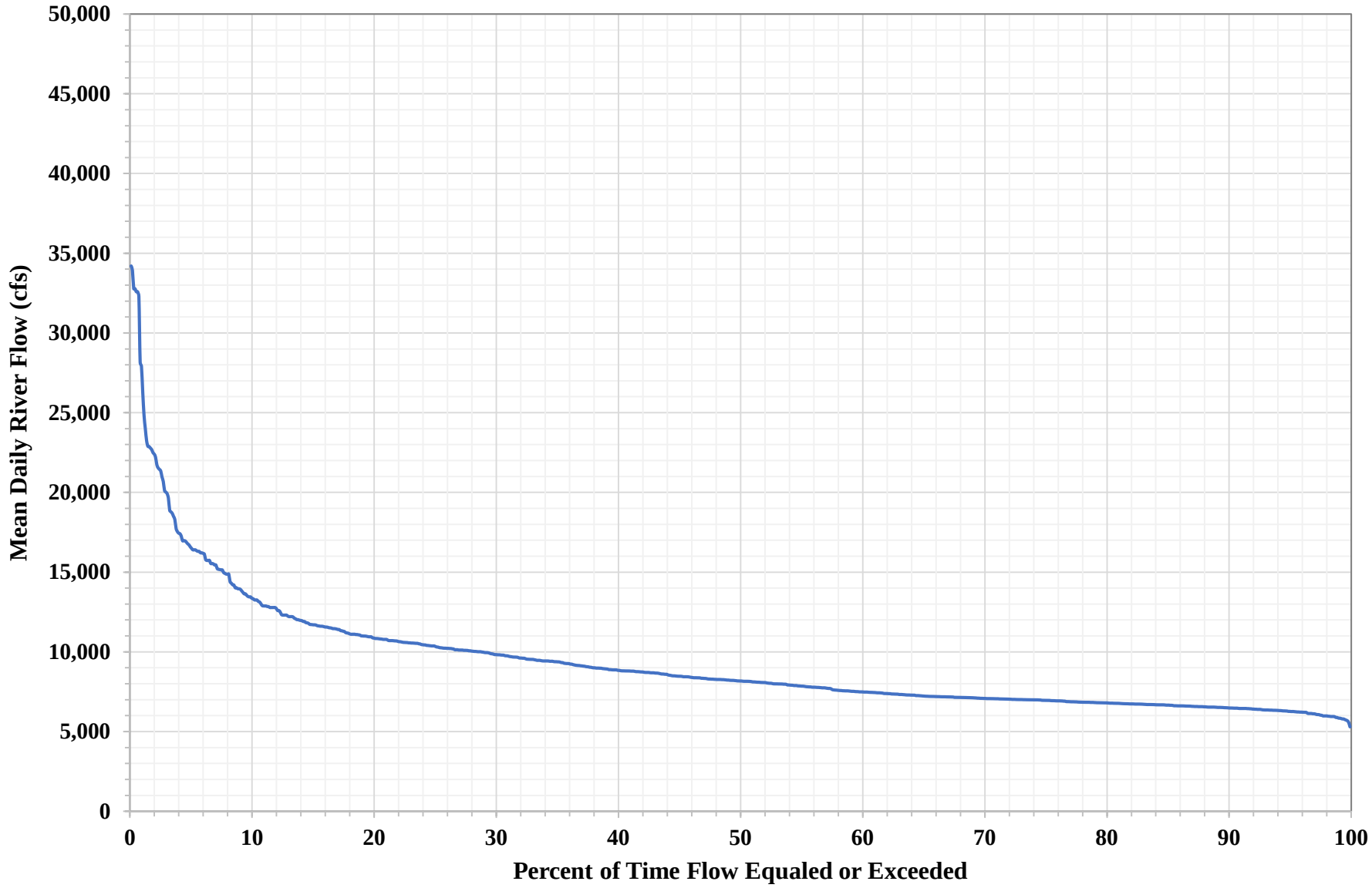

Stevens Creek Dam - September Flow Duration Curve

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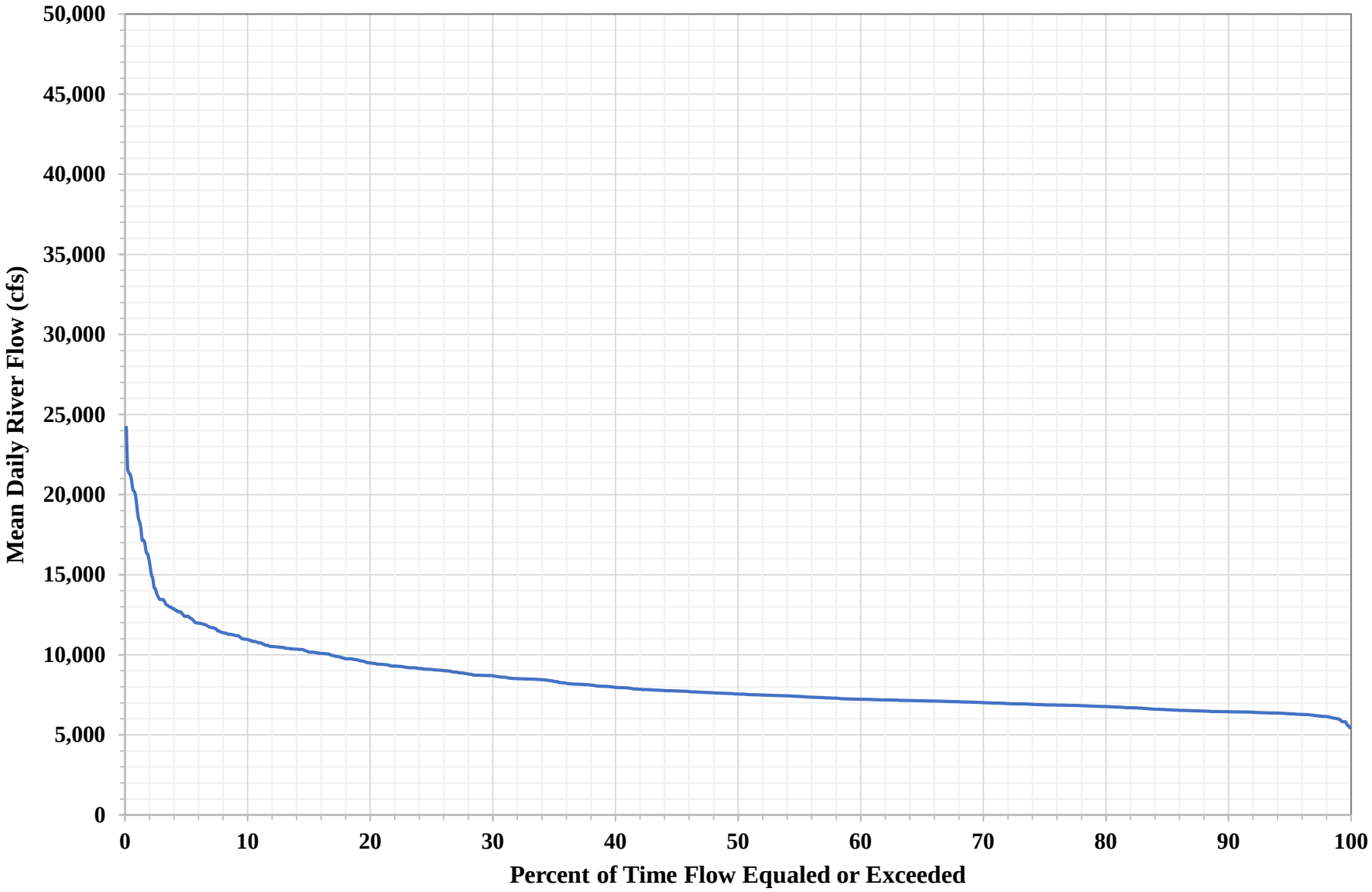

Stevens Creek Dam - October Flow Duration Curve

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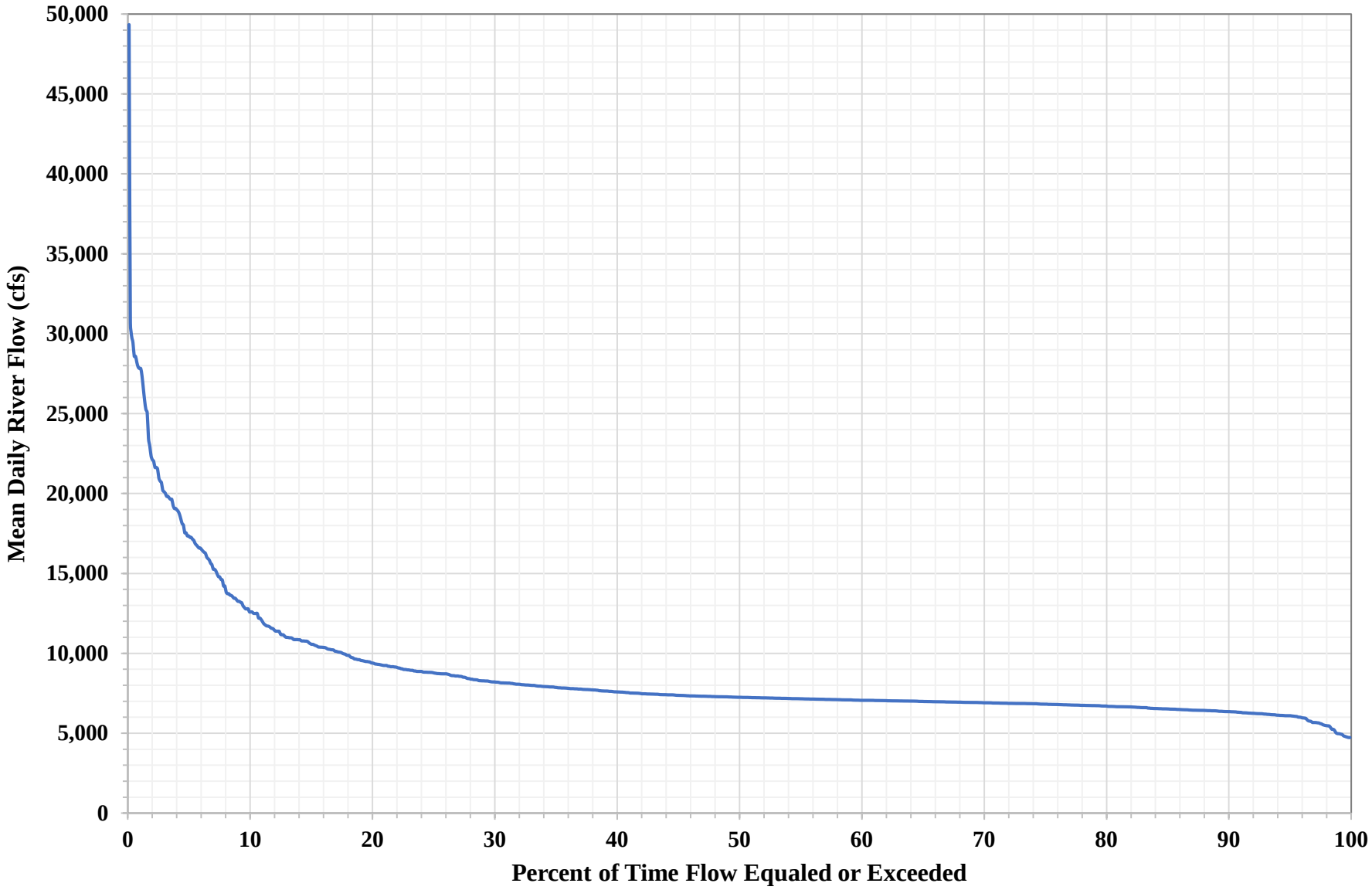

Stevens Creek Dam - November Flow Duration Curve

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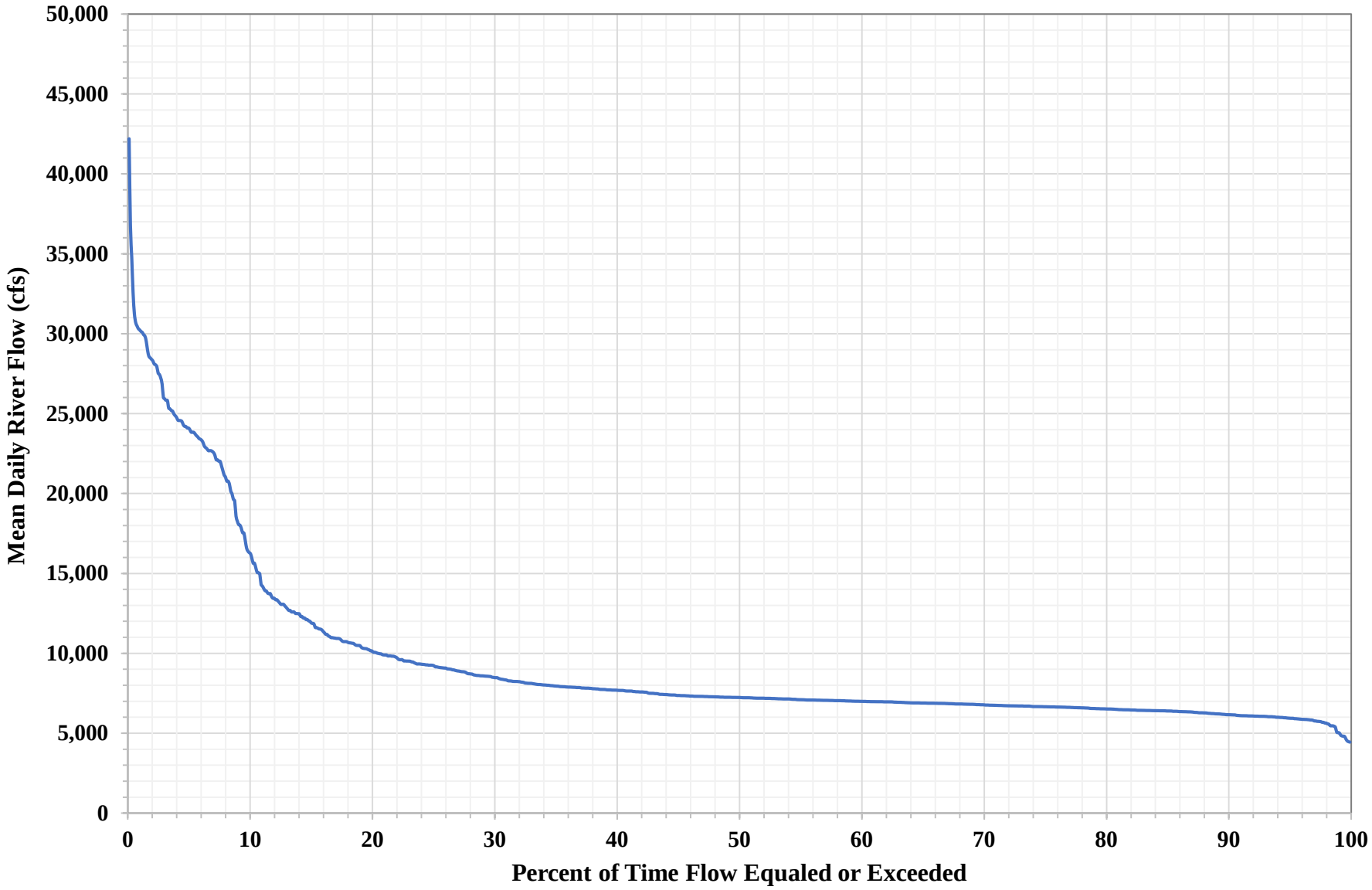

Stevens Creek Dam - December Flow Duration Curve

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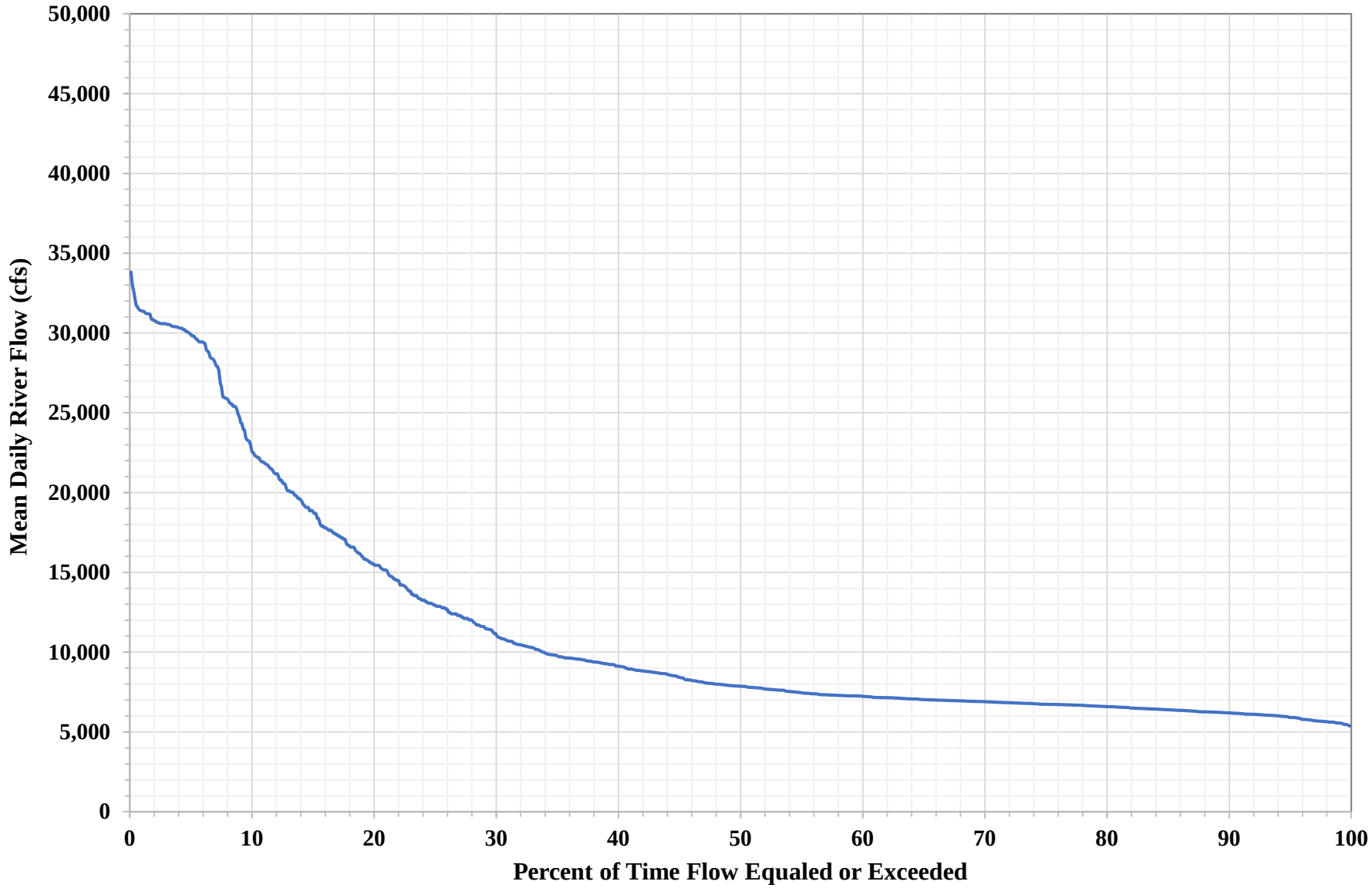

Stevens Creek Dam - Annual Flow Duration Curve

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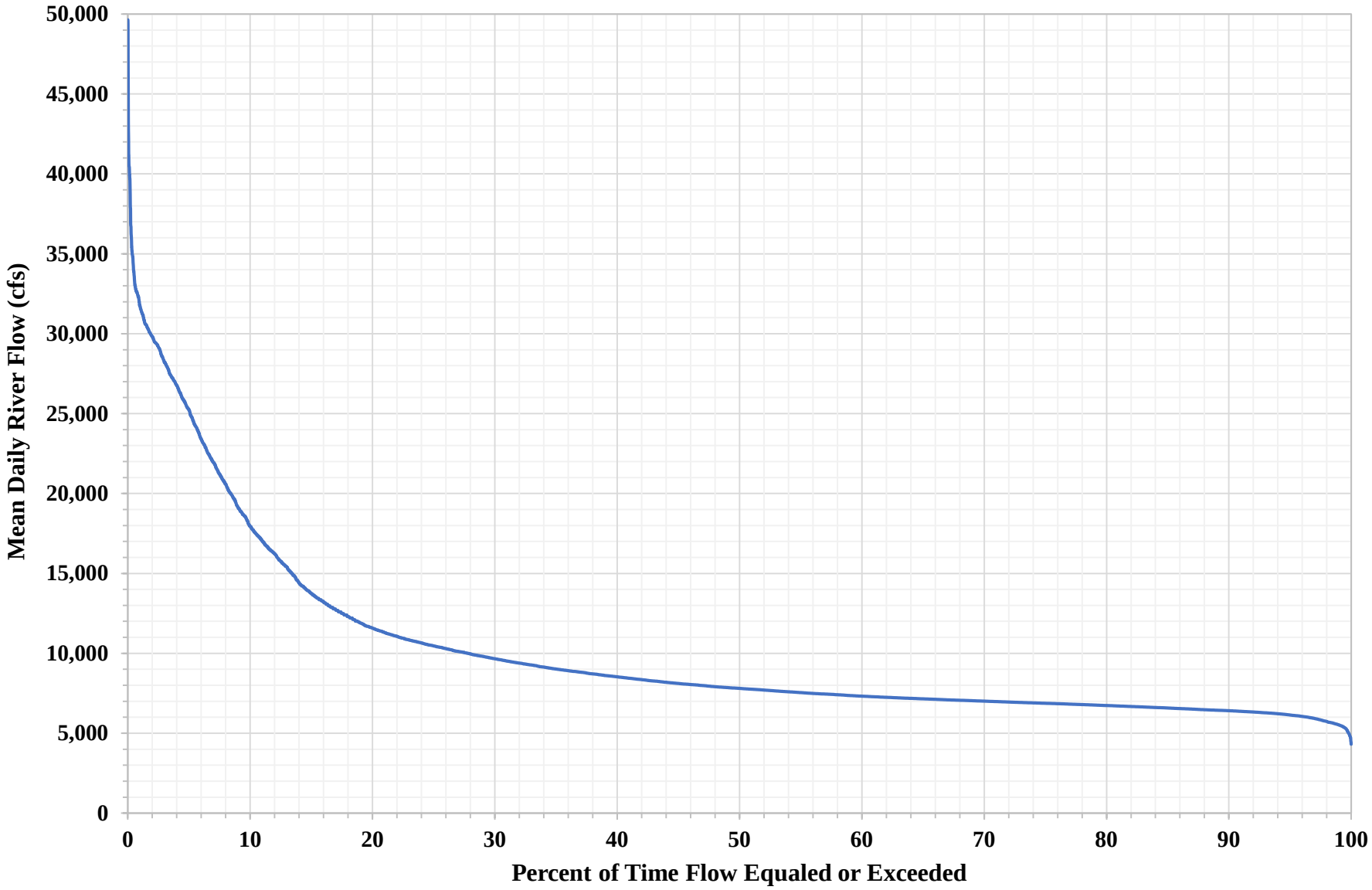
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - January Flow Duration Curve

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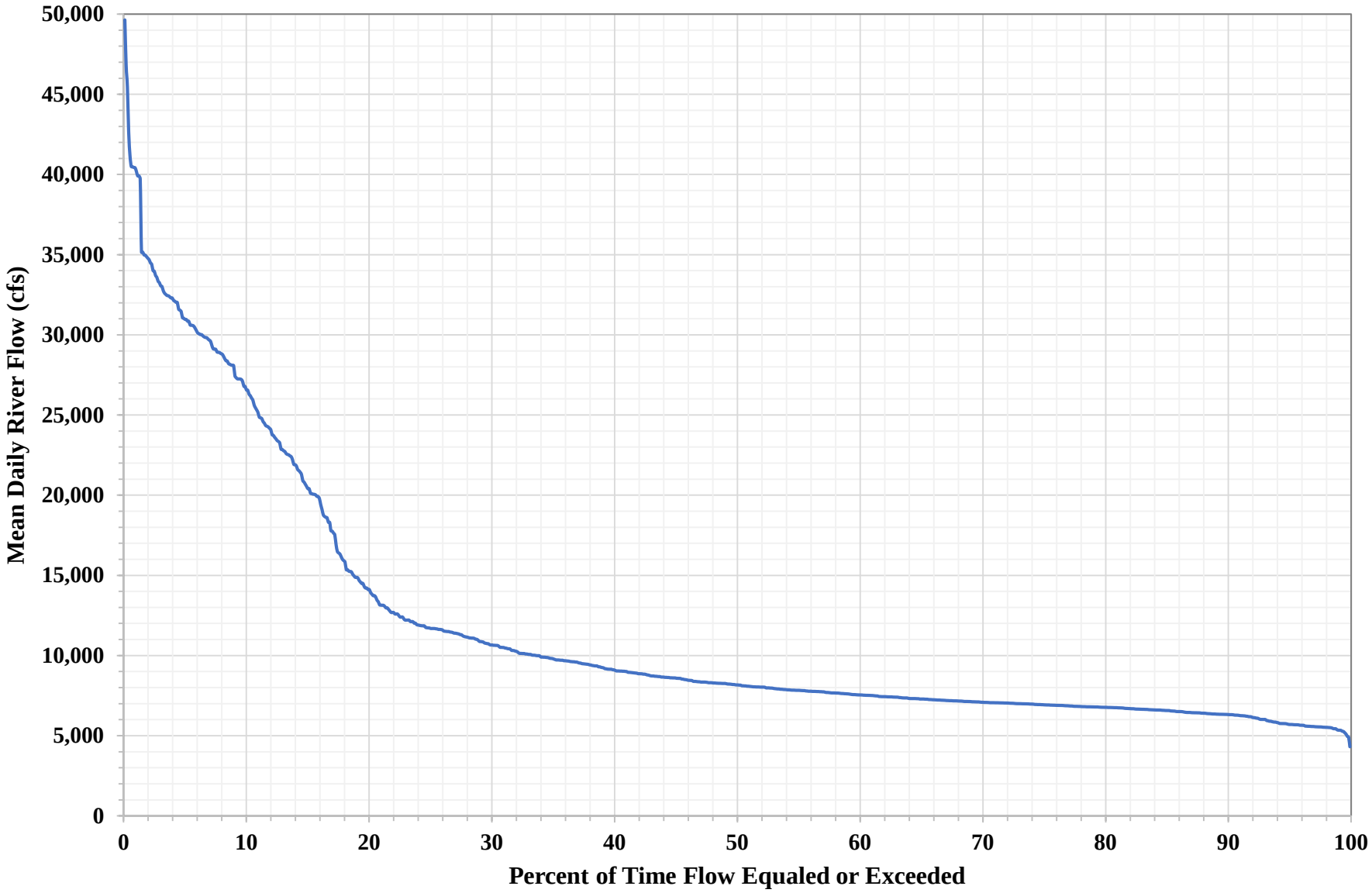
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - February Flow Duration Curve

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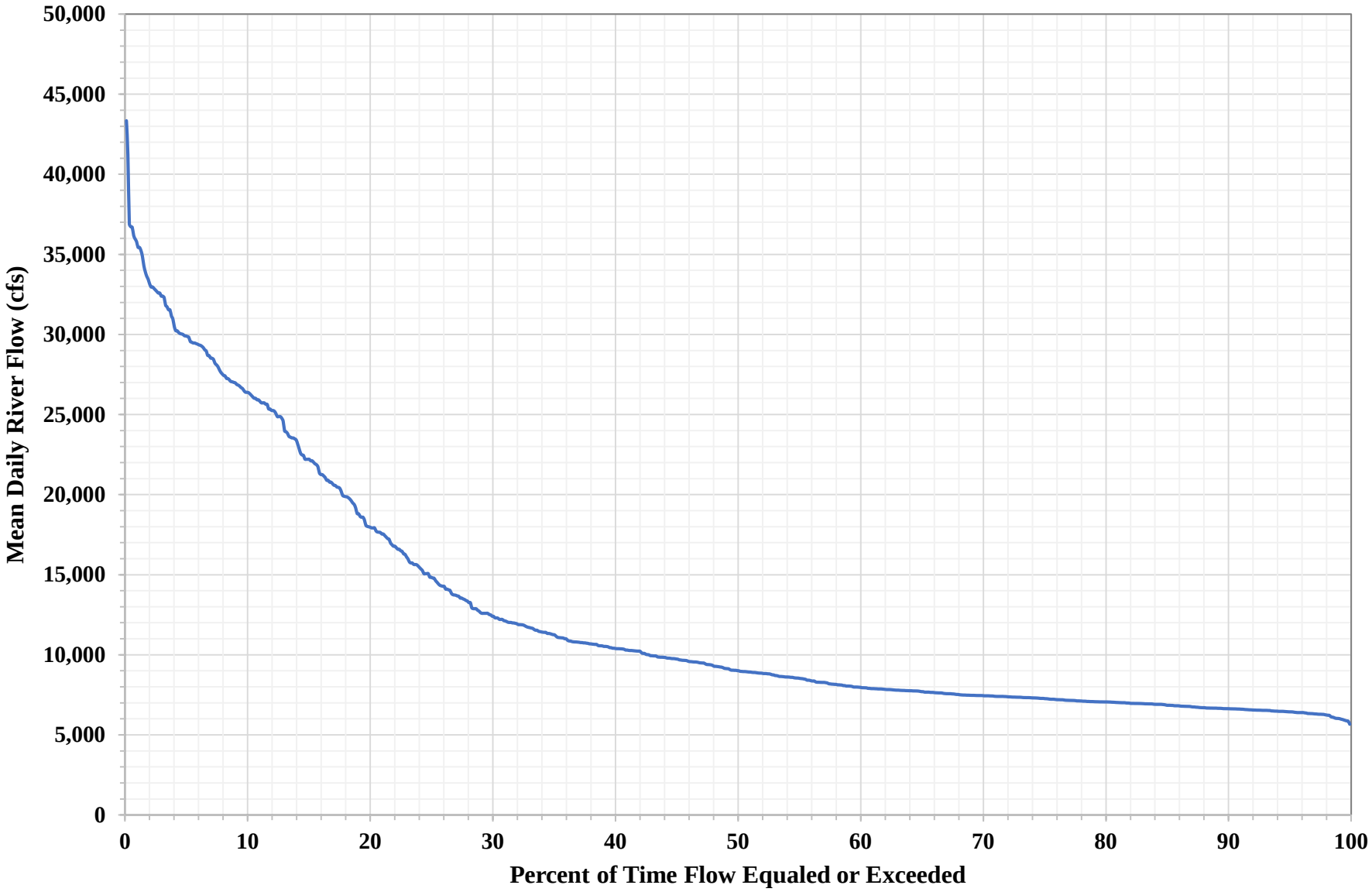
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - March Flow Duration Curve

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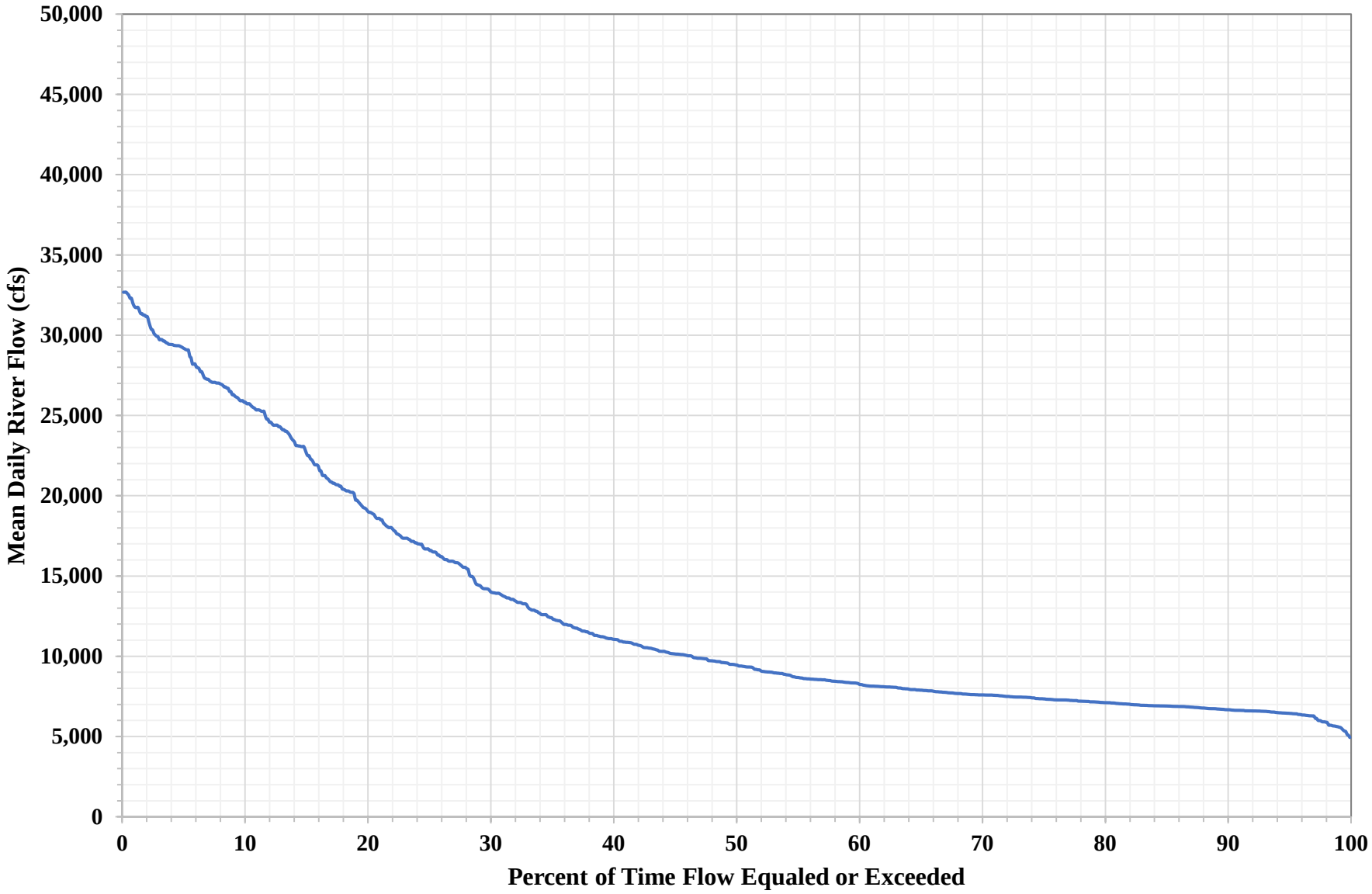
Period of Record 01/01/1988 to 12/31/2018



Stevens Creek Dam - April Flow Duration Curve

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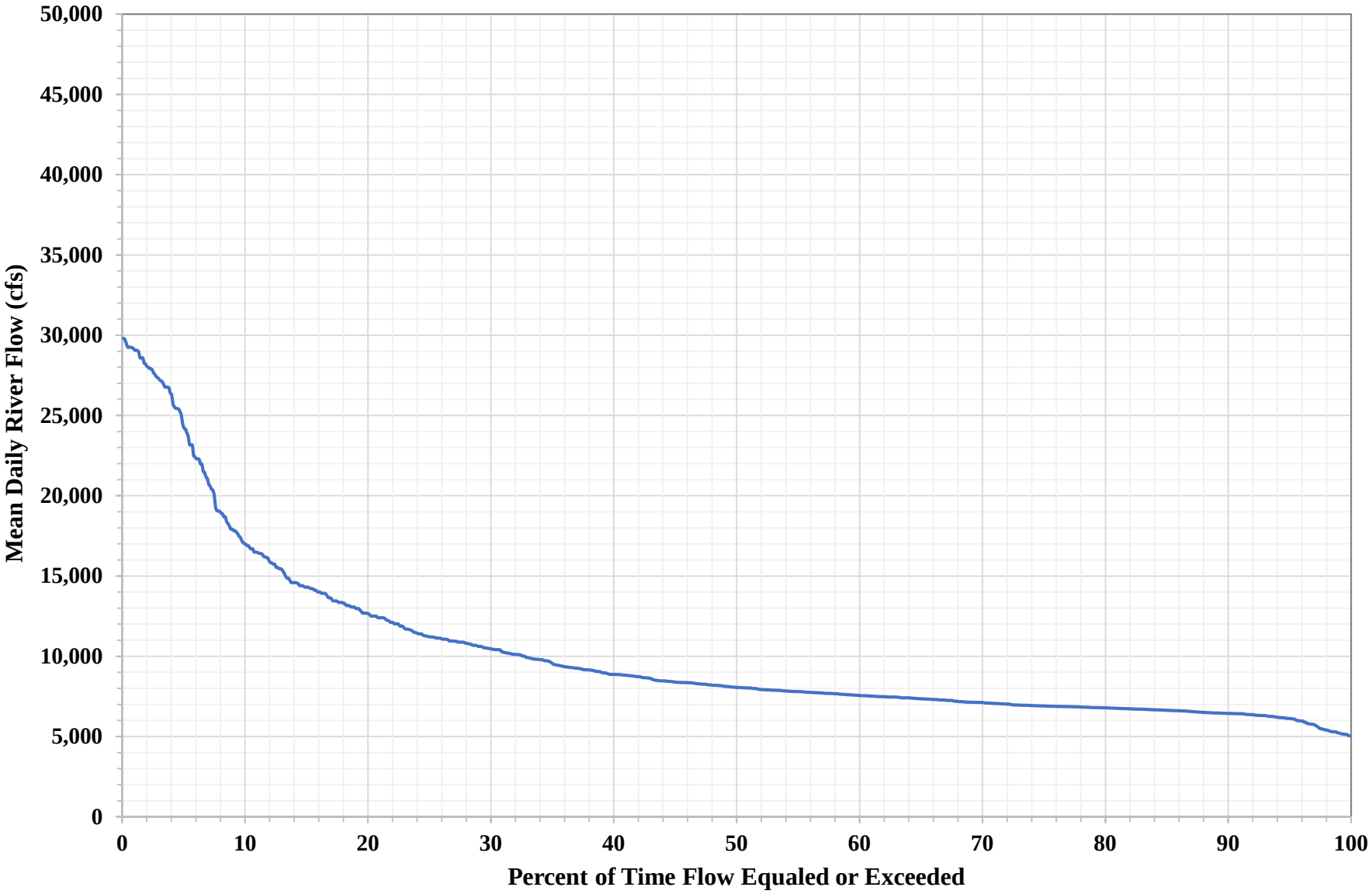

Stevens Creek Dam - May Flow Duration Curve

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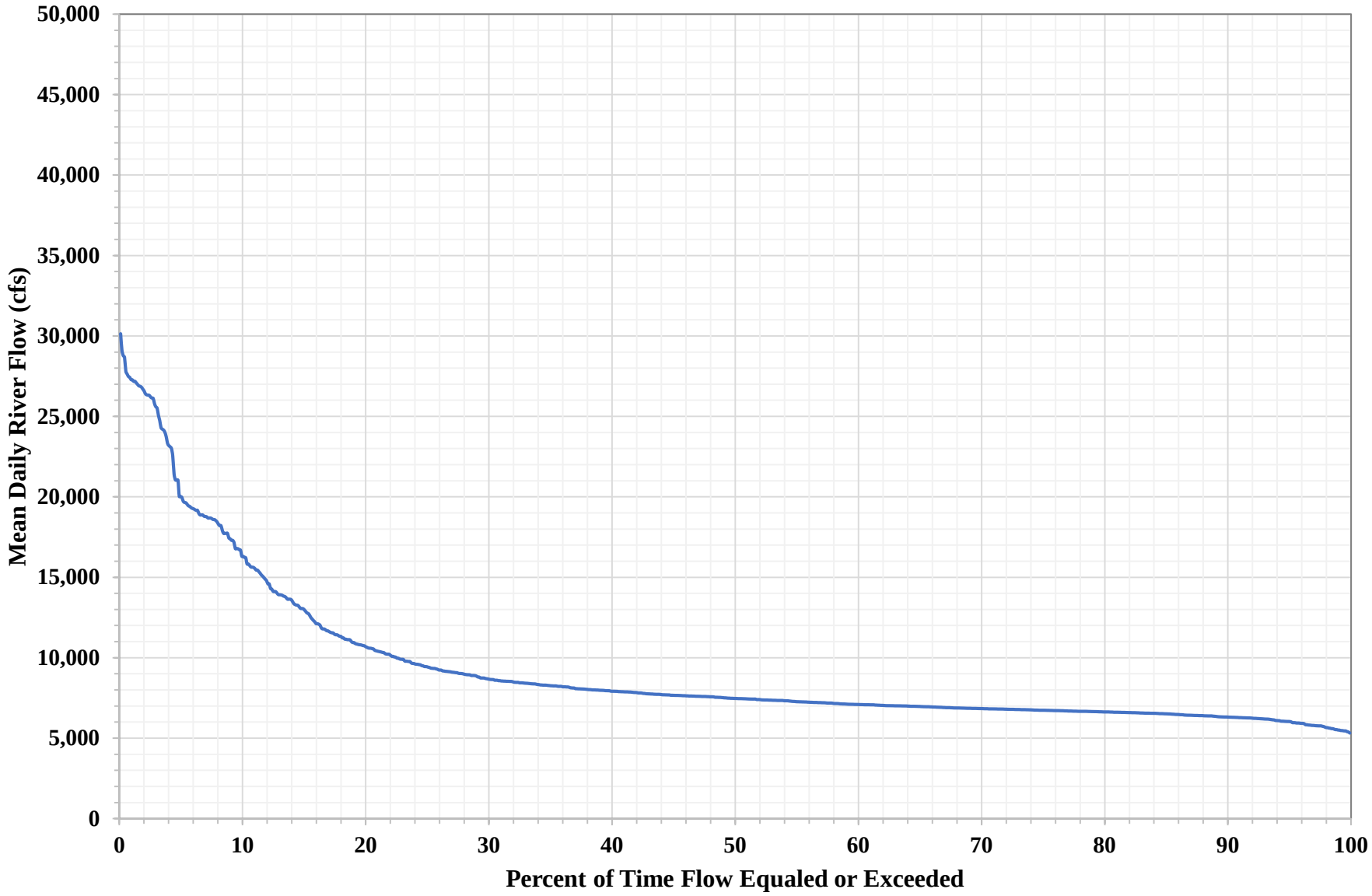

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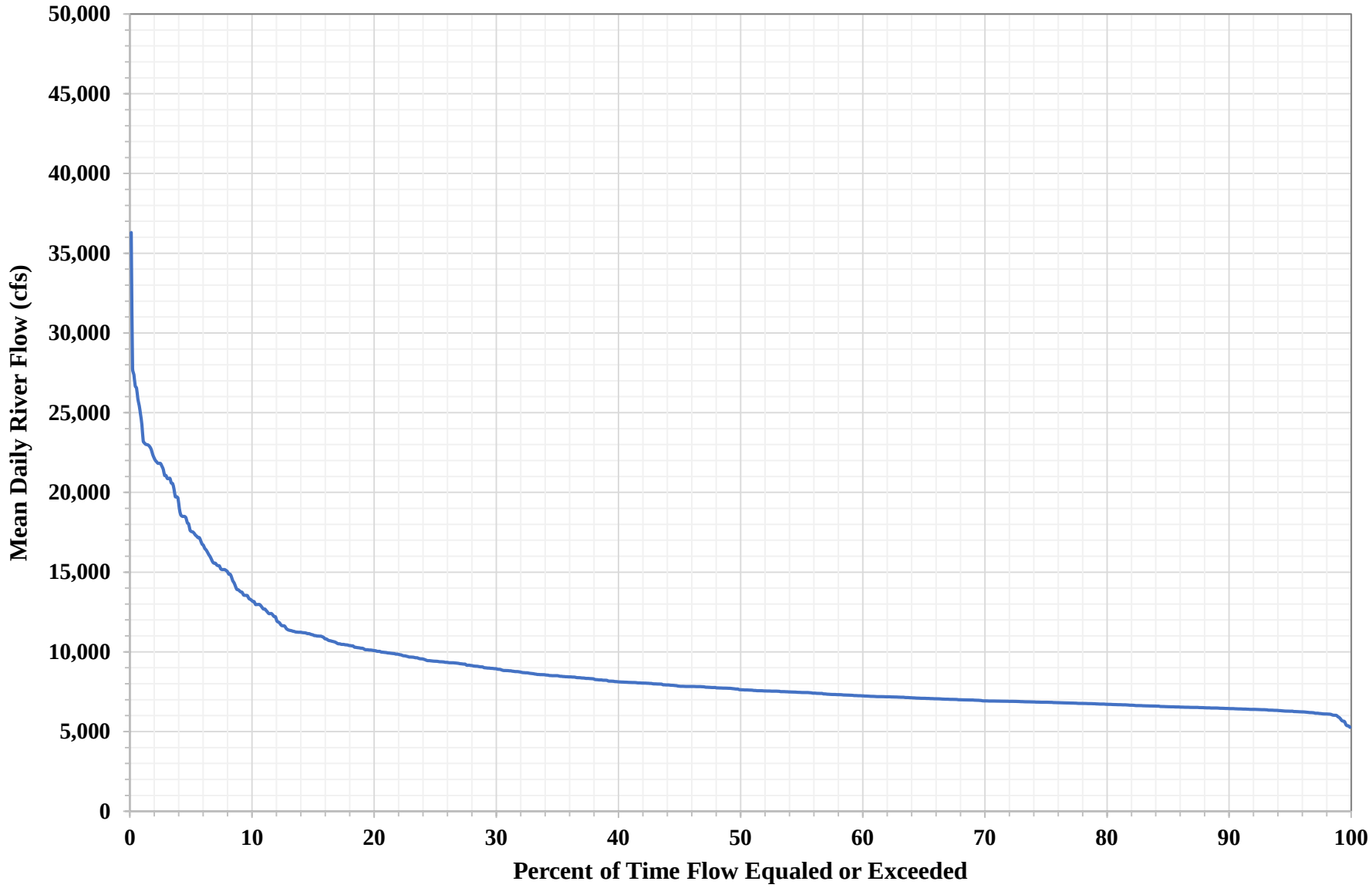

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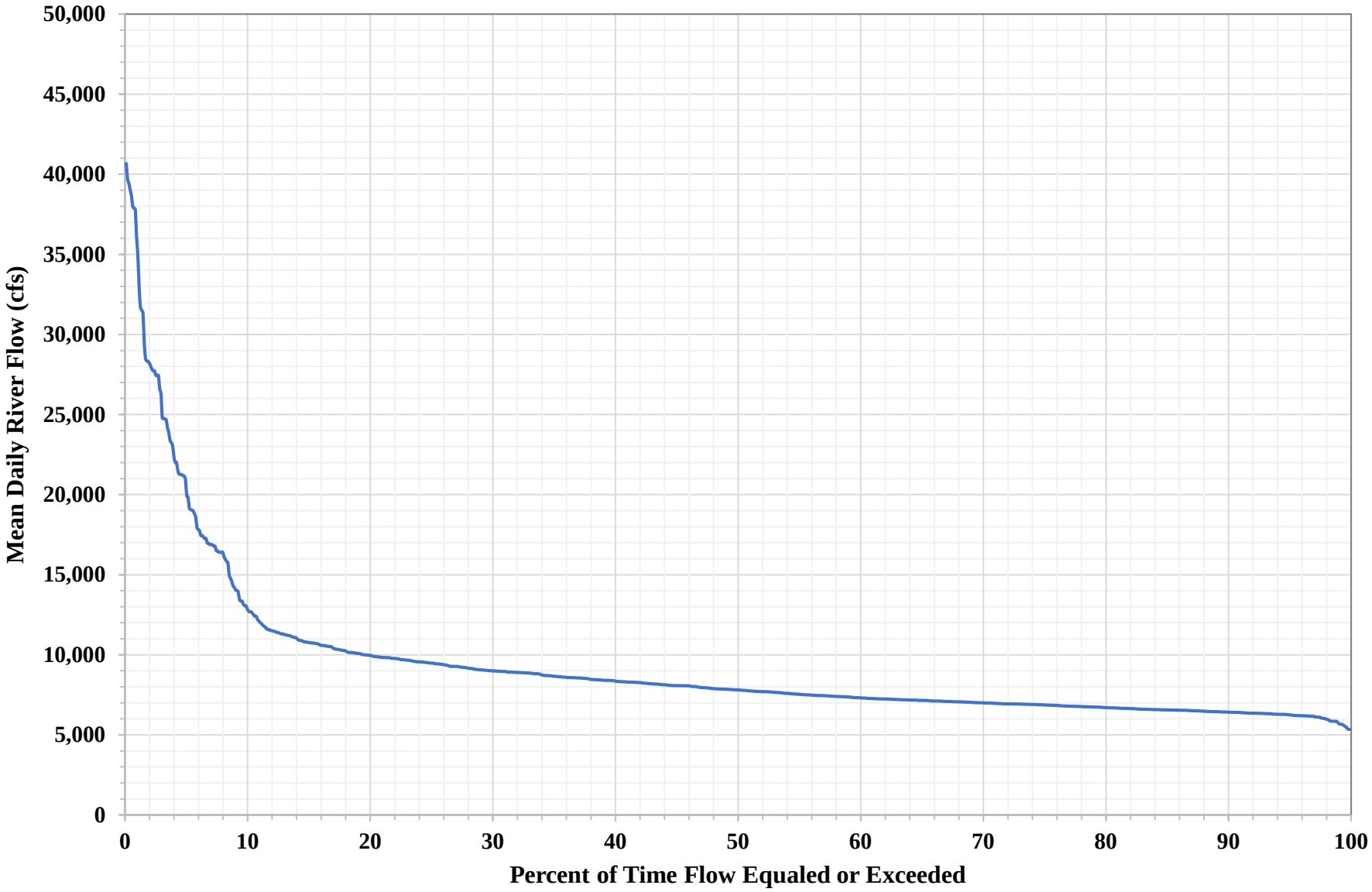

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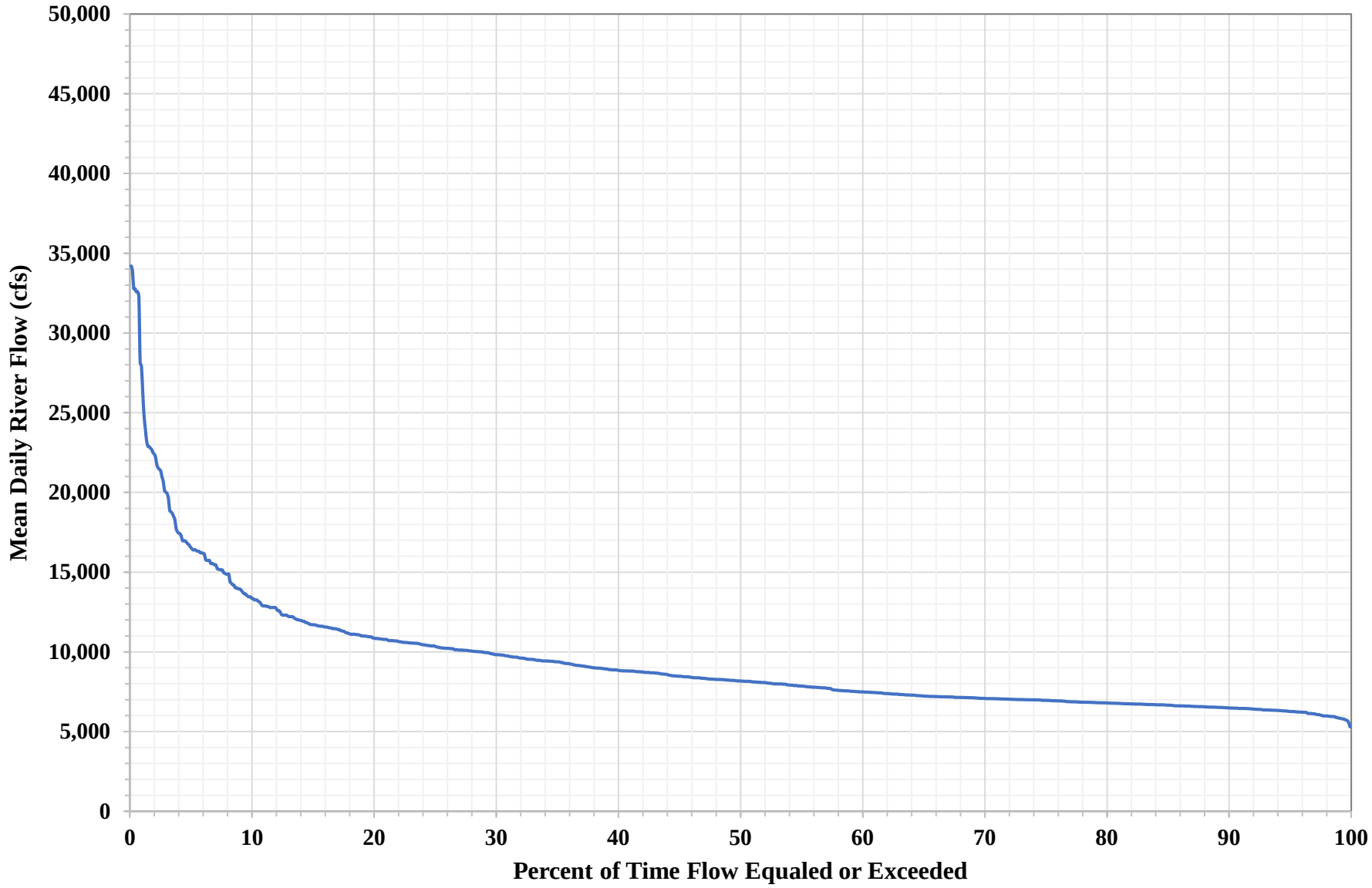

Stevens Creek Dam - September Flow Duration Curve

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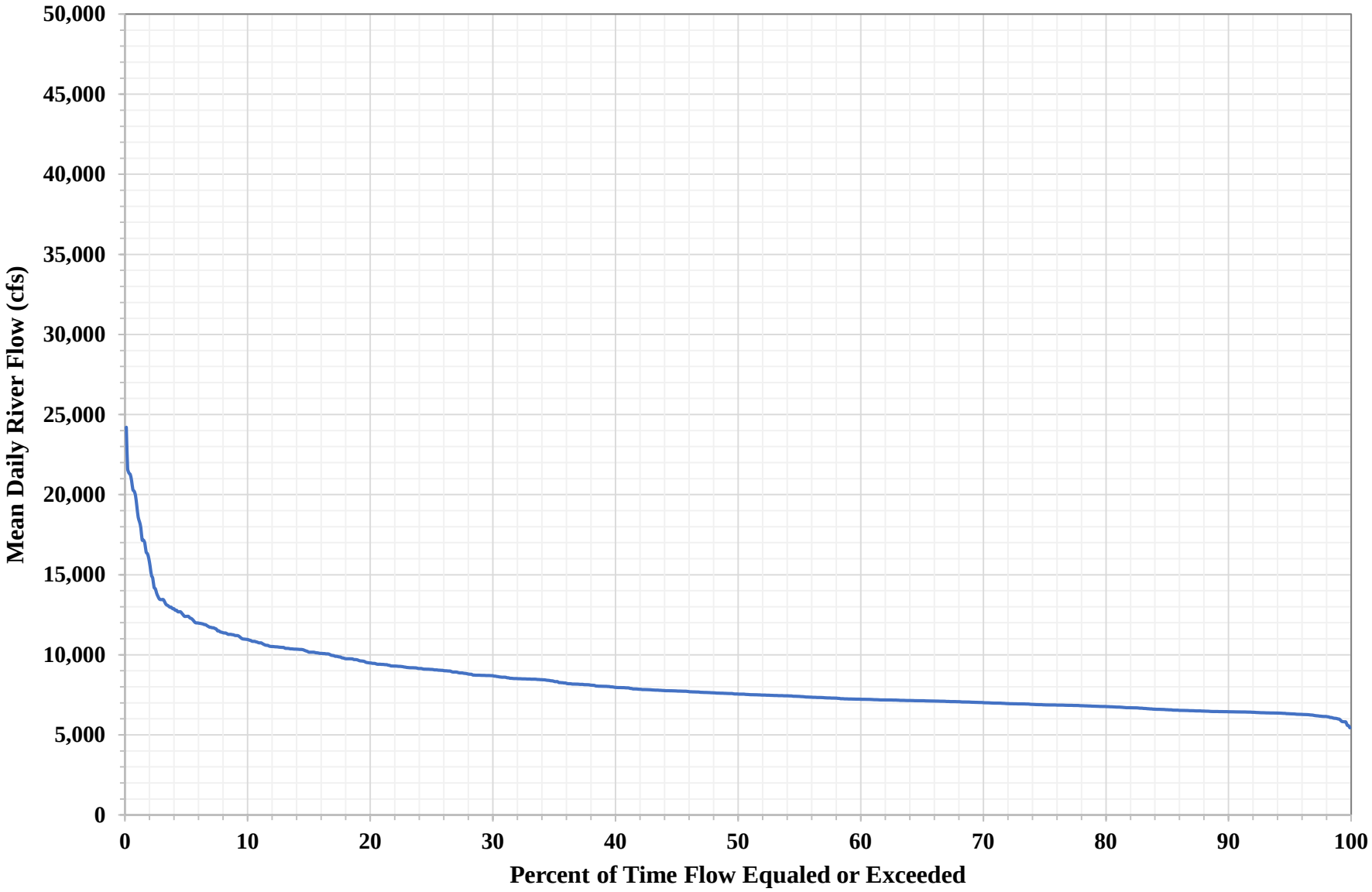

Stevens Creek Dam - October Flow Duration Curve

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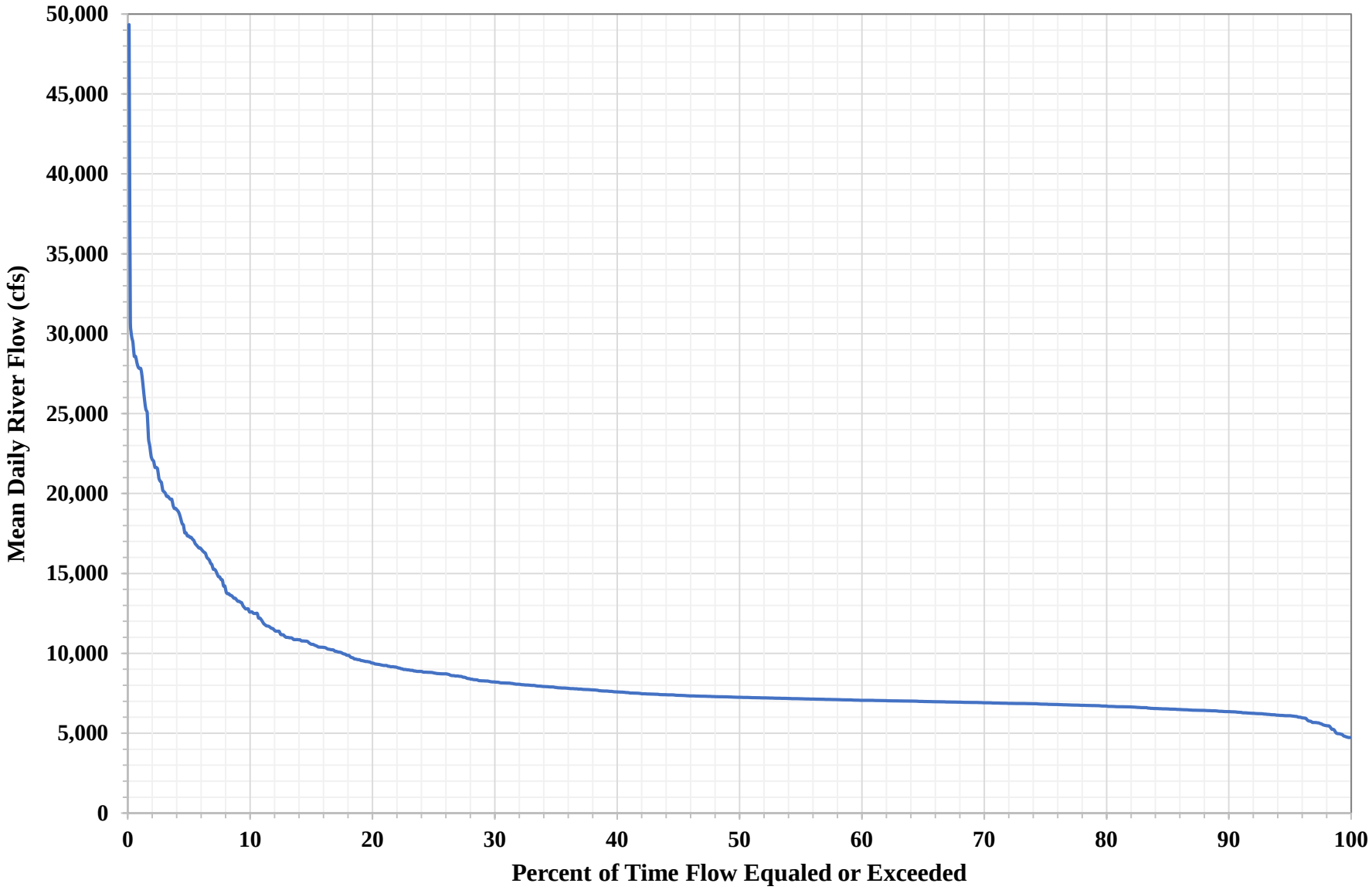

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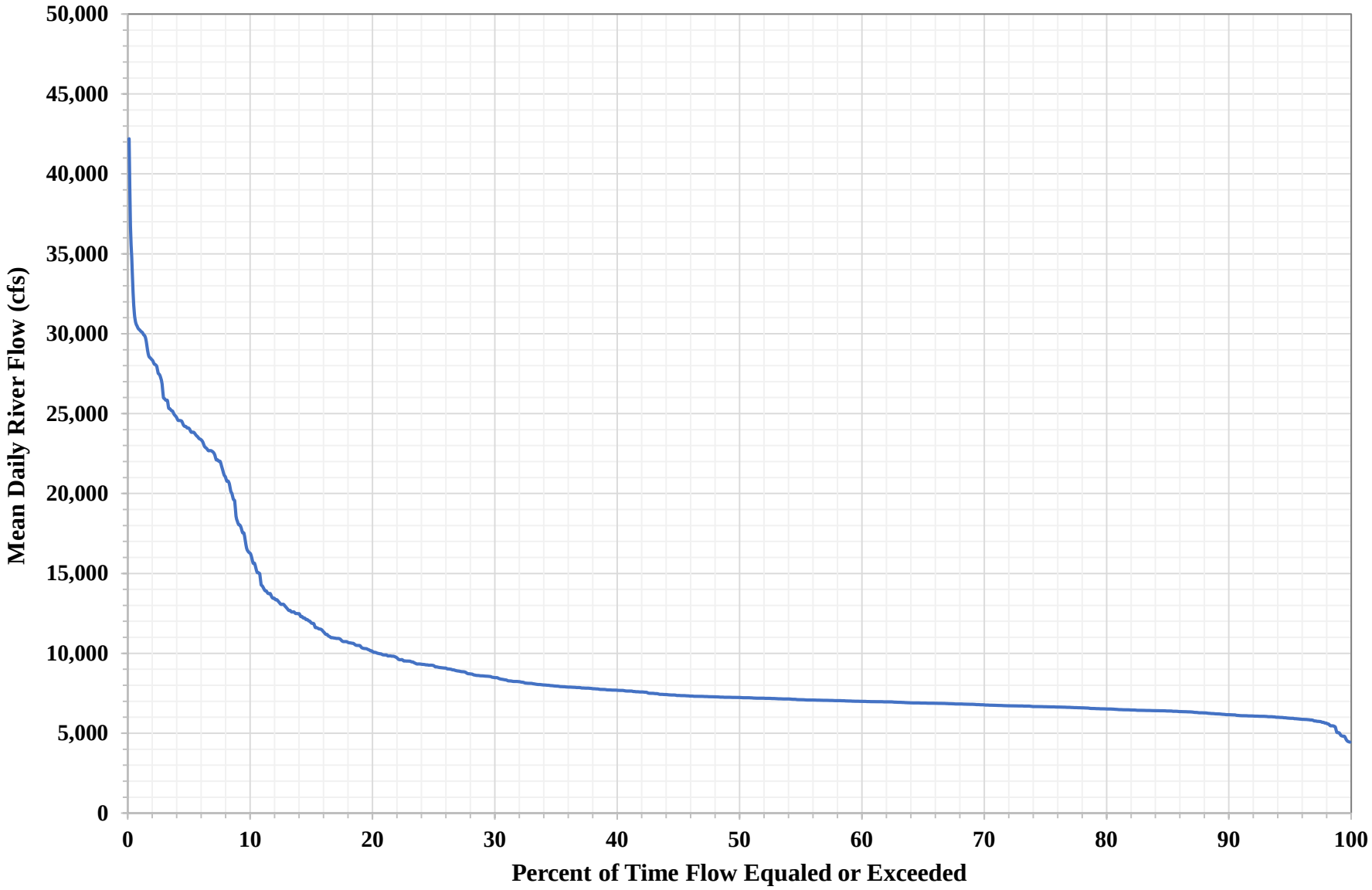

Stevens Creek Dam - December Flow Duration Curve

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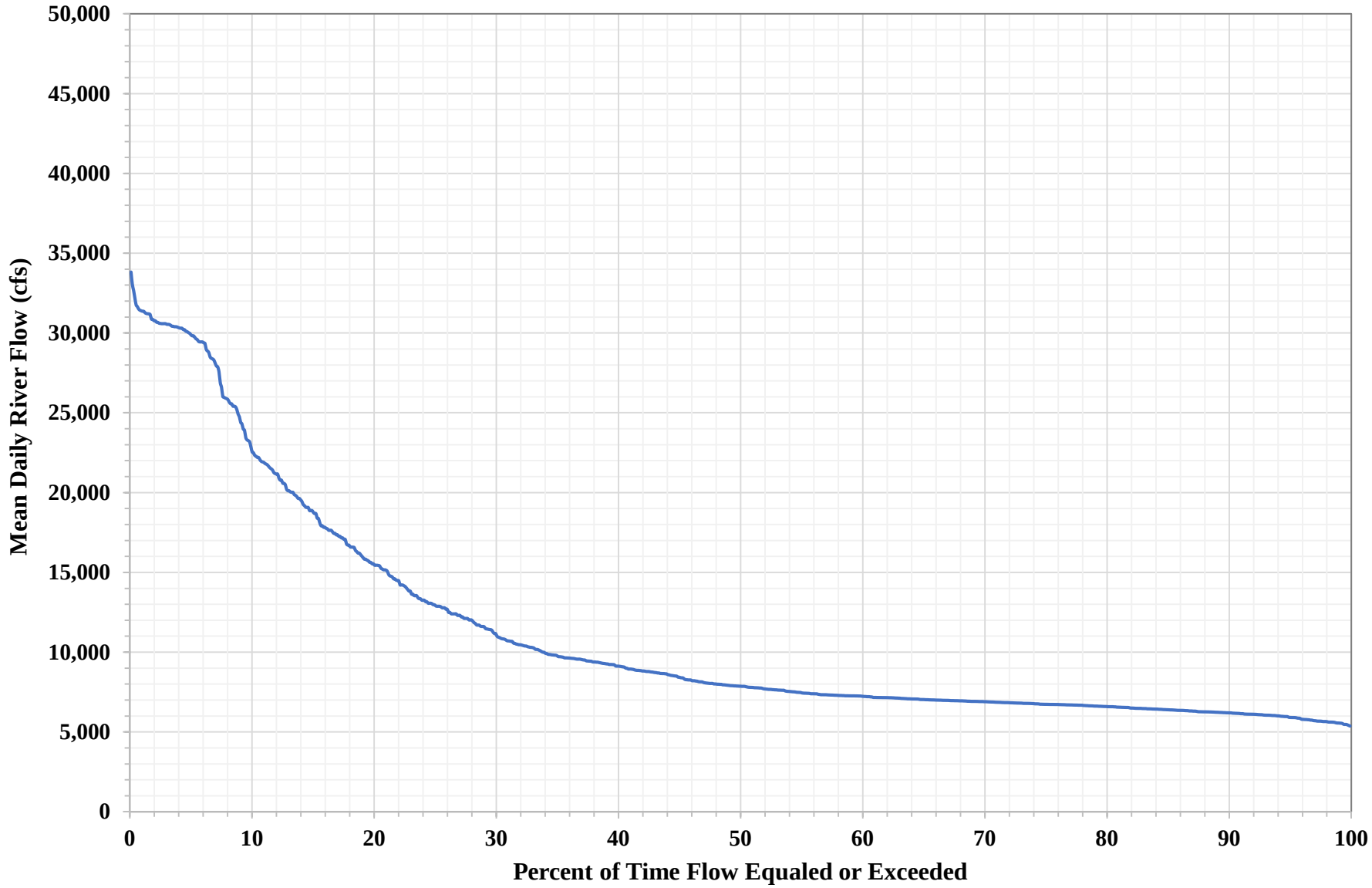
Period of Record 01/01/1988 to 12/31/2018



APPENDIX G

RTE SPECIES LIST

Federal Rare, Threatened & Endangered Species			
Common Name	Scientific Name	Status	Critical Habitat
Red-cockaded Woodpecker	Picoides borealis	Endangered	None
Wood Stork	Mycteria americana	Threatened	None
Gopher Tortoise	Gopherus polyphermus	Candidate	None
Carolina Heelsplitter	Lasmigona decorata	Endangered	Critical habitat is outside the Project boundary.
Harperella	Ptilimnium nodosum	Endangered	None
Miccosukee Gooseberry	Ribes echinellum	Threatened	None
Relict Trillium	Trillium reliquum	Endangered	None
Smooth Coneflower	Echinacea laevigata	Endangered	None
Source: USFWS IPaC List, 2019			

Migratory Birds/Birds of Conservation Concern/Protected Birds		
Common Name	**Scientific Name**	**Breeding Season within the Project Area**
American Kestrel	Falco sparverius paulus	April 1 to August 31
Bachman's Sparrow	Aimophila aestivalis	May 1 to September 30
Bald Eagle	Haliaeetus leucocephalus	September 1 to July 31
Blue-winged Warbler	Vermivora pinus	May 1 to June 30
Common Ground-dove	Columbina passerina exigua	February 1 to December 31
Dunlin	Calidris alpina articola	Breeds elsewhere
Eastern Whip-poor-will	Antrostomus vociferus	May 1 to August 20
Kentucky Warbler	Oporornis formosus	April 20 to August 20
King Rail	Rallus elegans	May 1 to September 5
Lesser Yellowlegs	Tringa flavipes	Breeds elsewhere
Prairie Warbler	Dendroica discolor	May 1 to July 31
Prothontary Warbler	Protonotaria citrea	April 1 to July 31
Red-headed Woodpecker	Melanerpes erythrocephalus	May 10 to September 10
Red-throated Loon	Gavia stellata	Breeds elsewhere
Rusty Blackbird	Euphagus caorlinus	Breeds elsewhere
Semipalmated Sandpiper	Calidris pusilla	Breeds elsewhere
Short-billed Dowitcher	Limnodromus griseus	Breeds elsewhere
Wood Thrush	Hylocichla mustelina	May 10 to August 31
Source: USFWS IPaC List, 2019		

Georgia State Protected Species within 3 miles of Project Area	
Common Name	**Scientific Name**
Carolina Trefoil	Acmispon helleri

Curly-heads	Clematis ochroleuca
Log Fern	Dryopteris celsa
Georgia Plume	Elliottia racemosa
False Rue-anemone	Enemion biternatum
Shoals Spiderlily	Hymenocallis coronaria
Pineland Barbra Buttons	Marshallia ramosa
Yellow Nailwort	Paronychia virginica
Dixie Mountain Breadroot	Pediomelum piedmontanum
Wingpod Purslane	Portulaca umbraticola ssp.coronata
Ocmulgee Skullcap	Scutellaria ocmulgee
Pale Yellow Trillium	Trillium discolor
Relict Trillium	Trillium reliquum
Shortnose Sturgeon	Acipenser vrevirostrum
Atlantic Sturgeon	Acipenser oxyrinchus oxyrinchus
American Barberry	Ververis canadensis
Spotted Turtle	Clemmys guttata
Savannah Elimia	Elimia caelatura
Delicate Spike	Elliptio arctata
Carolina Slabshell	Elliptio congaraea
Brother Spike	Elliptio fraterna
Roanoke Slabshell	Elliptio roanokensis
Atlantic Pigtoe	Fusconaia masoni
Yellow Lampmussel	Lampsilis cariosa
Robust Redhorse	Moxostoma robustum
Dwarf Waterdog	Necturus punctatus
Ironcolor Shiner	Notropis chalybaeus
Savannah Lilliput	Toxolasma pullus

Source: GDNR, Letter dated February 4, 2019

Edgefield County, South Carolina RTE Species			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Brook Floater	Alasmidonta varicosa	At-Risk Species	
Blueback Herring	Alosa aestivalis	At-Risk Species	
Monarch Butterfly	Danaus plexippus	At-Risk Species	
Atlantic Pigtoe	Fusconaia masoni	At-Risk Species	Endangered
Bald Eagle	Haliaeetus leucocephalus		Threatened
Carolina Heelsplitter	Lasmigona decorata	Endangered	Endangered
Robust Redhorse	Moxostoma robustum	At-Risk Species	

Tricolored Bat	Perimyotis subflavus	At-Risk Species	
Red-cockaded Woodpecker	Picoides borealis	Endangered	Endangered
Webster's Salamander	Plethodon websteri		Endangered
Carolina Bird-in-a-nest	Macbridea caroliniana	At-Risk Species	
Miccosukee Gooseberry	Ribes echinellum	Threatened	
Georgia Aster	Symphyotrichum georgianum	At-Risk Species	
Relict Trillium	Trillium reliquum	Endangered	
Source: SCDNR, 2019			

McCormick County, South Carolina RTE Species			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Brook Floater	Alasmidonta varicosa	At-Risk Species	
Monarch Butterfly	Danaus plexippus	At-Risk Species	
Septima's Clubtail	Gomphus septima	At-Risk Species	
Bald Eagle	Haliaeetus leucocephalus		Threatened
Carolina Heelsplitter	Lasmigona decorata	Endangered	Endangered
Robust Redhorse	Moxostoma robustum	At-Risk Species	
Wood Stork	Mycteria americana	Threatened	Endangered
Tricolored Bat	Perimyotis subflavus	At-Risk Species	
Red-cockaded Woodpecker	Picoides borealis	Endangered	Endangered
Webster's Salamander	Plethodon websteri		Endangered
Miccosukee Gooseberry	Ribes echinellum	Threatened	
Georgia Aster	Symphyotrichum georgianum	At-Risk Species	
Source: SCDNR, 2019			