

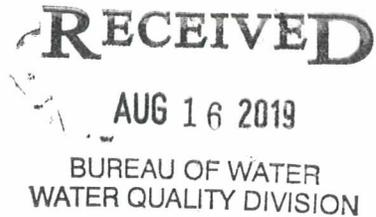
Dominion Energy South Carolina, Inc.  
Fossil Hydro Operations  
220 Operation Way, MC A221, Cayce SC 29033  
DominionEnergySC.com



August 16, 2019

*via hand delivery*

Ms. Heather Preston, Director  
SC Department of Health and Environmental Control  
Bureau of Water  
Division of Water Quality  
2600 Bull Street  
Columbia, SC 29201



Subject: Dominion Energy South Carolina, Inc.  
Parr Hydroelectric Project  
FERC Project No. 1894  
Application for 401 Water Quality Certification

Dear Ms. Preston:

Dominion Energy South Carolina, Inc. (DESC) filed an Application for New License with the Federal Energy Regulatory Commission (FERC) on June 28, 2018. The FERC has completed its initial review of the Application for New License and on July 31, 2019 accepted the Application as Ready for Environmental Analysis (REA).

Per FERC regulations, for a major hydroelectric project (18 CFR § 16.8), DESC must request from the certifying agency 401 Water Quality Certification (WQC) under section 401 (a)(1) of the Clean Water Act within 60 days of issuance of the REA notice. Therefore, in accordance with FERC regulations, DESC requests 401 WQC for the Parr Hydroelectric Project.

In filing for a New License with the FERC, DESC consulted with numerous state and federal resource agencies (including the South Carolina Department of Health and Environmental Control), non-governmental organizations and interested stakeholders through a collaborative relicensing process. As a result of this collaborative process, DESC entered into a Comprehensive Relicensing Settlement Agreement (CSRA) with nearly all of the relicensing participating entities. Contained as part of this CRSA are operational changes at the project and program measures designed to reduce impacts to environmental resources and also protect and enhance terrestrial and aquatic resources contained within the Parr Project boundary and area of influence.

Enclosed with this letter are 1) a completed 401 Water Quality Certification Application form and Appendix A Supporting Documentation and 2) Exhibit G-B, a list of property owners adjacent to the Project.

Pursuant to SCDHEC Regulation 61-101, DESC will publish a notice in the local newspaper indicating we have applied to your agency for 401 WQC and will provide a copy of the official affidavit within seven days after we receive it from the publishing newspaper.

If you have any questions about the material contained in this application, or you need any further information, please contact Ms. Amy Bresnahan at (803) 217-9965 or by email at [amy.bresnahan@scana.com](mailto:amy.bresnahan@scana.com).

Very truly yours,



James M. Landreth

*Mr. James M. Landreth, Vice President  
Fossil & Hydro Operations  
Dominion Energy South Carolina, Inc.  
MC – A221  
220 Operations Way  
Cayce, SC 29033*

AIB/ab

Enclosures

c: J. W. Miller/R. R. Ammarell/File  
D. L. Tucker  
L. Newman  
Corporate Records

**Joint Federal and State Application Form  
For Activities Affecting Waters of the United States  
Or Critical Areas of the State of South Carolina**

**This Space for Official Use Only**

Application No. \_\_\_\_\_  
Date Received \_\_\_\_\_  
Project Manager \_\_\_\_\_  
Watershed # \_\_\_\_\_

*Authorities:* 33 USC 401, 33 USC 403, 33 USC 407, 33 USC 408, 33 USC 1341, 33 USC 1344, 33 USC 1413 and Section 48-39-10 et. Seq of the South Carolina Code of Laws. These laws require permits for activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. The Corps of Engineers and the State of South Carolina have established a joint application process for activities requiring both Federal and State review or approval. Under this joint process, you may use this form, together with the required drawings and supporting information, to apply for both the Federal and/or State permit(s).

*Drawings and Supplemental Information Requirements:* In addition to the information on this form, you must submit a set of drawings and, in some cases, additional information. A completed application form together with all required drawings and supplemental information is required before an application can be considered complete. See the attached instruction sheets for details regarding these requirements. You may attach additional sheets if necessary to provide complete information.

1. Applicant Last Name: Landreth		11. Agent Last Name (agent is not required):	
2. Applicant First Name: James		12. Agent First Name:	
3. Applicant Company Name: Dominion Energy South Carolina, Inc.		13. Agent Company Name:	
4. Applicant Mailing Address: 220 Operaton Way, MC A221		14. Agent Mailing Address:	
5. Applicant City: Cayce		15. Agent City:	
6. Applicant State: South Carolina	7. Applicant Zip: 29033-3701	16. Agent State:	17. Agent Zip:
8. Applicant Area Code and Phone No.: 803-217-7224		18. Agent Area Code and Phone No.:	
9. Applicant Fax No.: 803-933-8241		19. Agent Fax No.:	
10. Applicant E-mail: JLANDRETH@scana.com		20. Agent E-mail:	

21. Project Name: Parr Hydroelectric Project		22. Project Street Address: 1492 Parr Road	
23. Project City: Jenkinsville	24. Project County: Fairfield and Newberry	25. Project Zip Code: 29065	26. Nearest Waterbody: Broad River
27. Tax Parcel ID: 192-00-00-023-000		28. Property Size (acres): 4,699 acres of Project land, 10,850 acres of combined reservoir surface area	
29. Latitude: 34°15'41.08"N		30. Longitude: 81°19'49.38"W	

31. Directions to Project Site (Include Street Numbers, Street Names, and Landmarks and attach additional sheet if necessary):  
From Columbia, SC take SC-215 North towards Jenkinsville, SC, turn left on SC-213, turn right onto SC-16 then turn left on Parr Rd and follow to the end.

32. Description of the Overall Project and of Each Activity in or Affecting U.S. Waters or State Critical Areas (attach additional sheets if needed)  
See Appendix A

33. Overall Project Purpose and the Basic Purpose of Each Activity In or Affecting U.S. Waters (attach additional sheets if needed):  
See Appendix A

<p>34. Type and quantity of Materials to Be Discharged</p> <p>Dirt or Topsoil: <u>n/a</u> <input type="checkbox"/> cubic yards Clean Sand: <u>n/a</u> <input type="checkbox"/> cubic yards Mud: <u>n/a</u> <input type="checkbox"/> cubic yards Clay: <u>n/a</u> <input type="checkbox"/> cubic yards Gravel, Rock, or Stone: <u>n/a</u> <input type="checkbox"/> cubic yards Concrete: <u>n/a</u> <input type="checkbox"/> cubic yards Other (describe): <u>n/a</u> <input type="checkbox"/> cubic yards</p> <p>TOTAL: _____ cubic yards</p>	<p>35. Type and Quantity of Impacts to U.S. Waters (including wetlands).</p> <p>Filling: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Backfill &amp; Bedding: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Landclearing: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Dredging: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Flooding: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Draining/Excavation: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards Shading: <u>n/a</u> <input type="checkbox"/> acres <input type="checkbox"/> sq.ft. <input type="checkbox"/> cubic yards</p> <p>TOTALS: _____ acres _____ sq.ft. _____ cubic yards</p>
---	---

36. Individually list wetland impacts including mechanized clearing, fill, excavation, flooding, draining, shading, etc. and attach a site map with location of each impact (attach additional sheets if needed).

Impact No.	Wetland Type	Distance to Receiving Water body (LF)	Purpose of Impact (road crossing, impoundment, flooding, etc)	Impact Size (acres)
N/A				
Total Wetland Impacts (acres)				

37. Individually list all seasonal and perennial stream impacts and attach a site map with location of each impact (attach additional sheets )

Impact No.	Seasonal or Perennial Flow	Average Stream Width (LF)	Impact Type (road crossing, impoundment, flooding, etc)	Impact Length (LF)
N/A				
Total Stream Impacts (Linear Feet)				

38. Have you commenced work on the project site?  YES  NO If yes, describe all work that has occurred and provide dates.

Parr Hydroelectric Project is an existing project applying for a new operating license and consequently applying for a 401 water quality certification.

39. Describe measures taken to avoid and minimize impacts to Waters of the United States:

See Appendix A

40. Provide a brief description of the proposed mitigation plan to compensate for impacts to aquatic resources or provide justification as to why mitigation should not be required (Attach a copy of the proposed mitigation plan for review).

See Appendix A

41. See the attached sheet to list the names and addresses of adjacent property owners.

42. List all Corps Permit Authorizations and other Federal , State, or Local Certifications, Approvals, Denials received for work described in this application.

There is an existing 401 water quality certification applicable for the existing license.

43. Authorization of Agent. I hereby authorize the agent whose name is given on page one of this application to act in my behalf in the processing of this application and to furnish supplemental information in support of this application. <sup>1</sup>

\_\_\_\_\_  
Applicant's Signature

\_\_\_\_\_  
Date

44. Certification. Application is hereby made for a permit or permits to authorize the work and uses of the work as described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent for the applicant. <sup>1</sup>

*[Signature]*  
Applicant's Signature

*8/13/2019*  
Date

\_\_\_\_\_  
Agent's Signature

\_\_\_\_\_  
Date

<sup>1</sup>The application must be signed by the person who desires to undertake the proposed activity or it may be signed by a duly authorized agent if the authorization statement in blocks 11 and 43 have been completed and signed. 18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

**#41- Adjacent Property Owner Mailing List**

NOTE: A depiction of the adjacent properties with identifying corresponding property owner names must accompany this mailing list.

(Attach additional sheets if necessary)

Applicant Name: James Landreth, Dominion Energy South Carolina, Inc.

Project Name: Parr Hydroelectric Project

**Property Owner Name**

**Mailing Address**

<b>Property Owner Name</b>	<b>Mailing Address</b>
	See attached Exhibit G-B

# APPLICATION FOR 401 WATER QUALITY CERTIFICATION

## Appendix A

Dominion Energy South Carolina, Inc.  
Parr Hydroelectric Project, FERC Project No. 1984

**PARR HYDROELECTRIC PROJECT  
FERC PROJECT NO. 1894**

**APPLICATION FOR 401 WATER QUALITY CERTIFICATION  
SUPPORTING DOCUMENTATION**

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**ATTACHMENTS**

ATTACHMENT A-1	2018 TURBINE VENTING MEMO
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**PARR HYDROELECTRIC PROJECT  
FERC No. 1894**

**APPLICATION FOR 401 WATER QUALITY CERTIFICATION  
SUPPORTING DOCUMENTATION**

**APPENDIX A**

**1.0 INTRODUCTION**

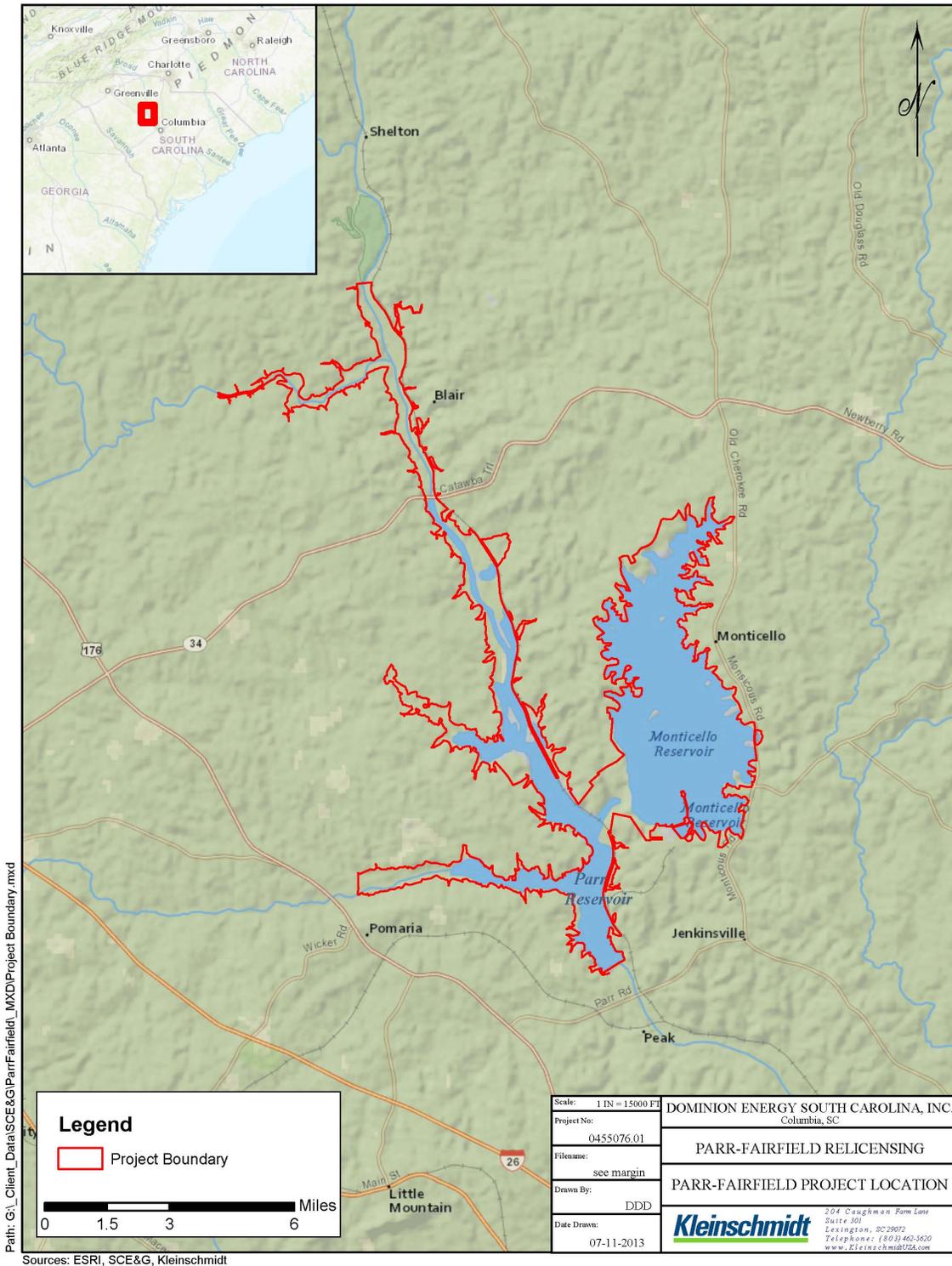
Pursuant to section 401 of the Clean Water Act, 33 U.S.C. § 1341 (2006), Dominion Energy South Carolina, Inc. (DESC) (Licensee or Applicant), formerly South Carolina Electric & Gas Company, herein submits to the South Carolina Department of Health and Environmental Control (SCDHEC) this application for Water Quality Certification (WQC) for the Parr Hydroelectric Project (FERC Project No. 1894) (Project). Over the past six years, DESC has been working cooperatively with stakeholders and state and federal resource agencies throughout a Federal Energy Regulatory Commission (FERC or Commission) relicensing process to receive a new operating license. SCDHEC has been a full and active participant throughout the process. The currently effective license expires on June 30, 2020. DESC initiated pre-licensing public outreach, educational, and informal scoping efforts in 2012. DESC initiated the formal relicensing process on January 5, 2015 with the timely filing for the Notice of Intent (NOI) to the Commission and with the transmittal of its Pre-Application Document (PAD) to resource agencies and other interested stakeholders for review and comment. Numerous meetings with stakeholders and agencies were held to scope and develop study plans and to review study findings after study completion. This supported the preparation and issuance of the Draft License Application (DLA), which was issued for review and comment on May 31, 2017. The Final License Application (FLA) was filed with the Commission on June 28, 2018. Following the issuance of the DLA and prior to the filing of the FLA, DESC continued to work with agencies and other stakeholders to develop the Comprehensive Relicensing Settlement Agreement (CRSA) which was completed and filed with the Commission simultaneously with the FLA, on June 28, 2018. The CRSA was signed by eight parties who were involved in the relicensing process. The Commission issued the Notice of Application Tendered for filing and solicited additional study requests on July 11, 2018. Concurrently, the Commission issued the Notice of Settlement Agreement and Soliciting Comments on July 11, 2018.

Among other things, the CRSA presents issue resolutions representing consensus achieved among those parties during the many CRSA meetings. These resolutions, discussed in more detail below, have been proposed for consideration by the FERC, as it develops terms for the new license.

Issues resolved in accordance with the provisions included in the CRSA fall into the following principal areas of concern: Recreation, Fish and Wildlife, Water Quality, Operations, Lake and Land Management, and Cultural Resources. There are 16 study plans/programs appended to the CRSA. For the purposes of this water quality application, the resolutions with relevance to water quality in this process, as well as relevant studies performed during the relicensing process itself, are further detailed below. DESC believes that the studies and programs discussed below will have significant positive impacts for the environmental resources of the Project Area during the new license term.

## **2.0 PROJECT DESCRIPTION AND SCOPE**

The Project is located in Newberry and Fairfield counties, South Carolina, on the Broad River, approximately 26-river-miles upstream from the City of Columbia, South Carolina (Figure 2-1). Project street address, latitude/longitude coordinates, and directions to the Project site are provided on the Joint Federal State Application form.



**FIGURE 2-1 PROJECT LOCATION MAP**

The Project includes the existing Parr Development, which consists of a powerhouse with six generators, a 2,390-foot-long dam (including spillway and non-overflow sections), an approximate 4,250-acre reservoir, and transmission and appurtenant facilities. The Project also includes the existing Fairfield Development, which is composed of an approximate 6,600-acre reservoir, four earthen dams, an intake channel, a gated intake structure, four surface penstocks bifurcating into eight concrete-encased penstocks, a generating station housing eight pump-turbine units and transmission and appurtenant facilities.

## **2.1 POWERHOUSES, DAMS, SPILLWAYS AND PENSTOCKS**

### **Parr Development**

Parr Shoals Dam is situated across the Broad River, oriented in a northeast-southwest direction, and consists of the northeast non-overflow section and integral powerhouse, the gated spillway, and the southwest non-overflow embankment.

The northeast non-overflow section is a 90-foot-long concrete gravity structure with a crest elevation of 270.4<sup>1</sup> feet. The adjacent powerhouse is concrete with a steel-framed superstructure, and is approximately 60-feet-wide by 300-feet-long. The powerhouse substructure has an integral intake with eight primary turbine bays and two smaller bays cast into the concrete. Six turbine-generator units occupy the primary bays, and the two bays nearest the shore are empty. The two smaller bays contain turbine-generators for excitation of the primary generators, but those are no longer required and have been abandoned in place. A trash raking system mounted on the intake deck is used to clean debris from the forebay area and the trashracks.

At the southwest end of the powerhouse, the gated spillway section of the dam extends for 2,000 feet across the river. Six abandoned sluice gate bays occupy the 112-foot section adjacent to the powerhouse; two sluice gates have been filled with concrete, while sedimentation in the impoundment prevents the use of the other four. The spillway dam is a concrete gravity structure approximately 37 feet high, with a permanent crest elevation (El.) of

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<sup>1</sup> Unless otherwise noted, all elevation references are referenced to the North American Vertical Datum of 1988 (NAVD 88); conversion to National Geodetic Vertical Datum of 1929 (NGVD29), used in numerous supporting studies for this license application and often erroneously referred to as mean sea level (MSL), requires the addition of 0.7 feet to elevation values referenced to NAVD88.

256.3 feet. Ten bottom-hinged bascule gates mounted on the crest of the dam are used to raise the impoundment to El. 265.3 feet.

The non-overflow earthen embankment with crest El. 271.4 feet is located at the southwest end of the spillway and extends approximately 300 feet to the southwest abutment. A concrete wing-wall retains the embankment, separating it from the adjacent spillway section.

### **Fairfield Development**

The Fairfield Development consists of four earthen embankment dams that impound Monticello Reservoir, an intake channel and structure in the upper impoundment, four penstocks, and the Fairfield powerhouse with a tailrace channel connected to the Parr Reservoir. There are also two highway relocation embankments and a freeboard protection dike located on the reservoir perimeter.

The four dams are constructed of random fill and have crests at El. 433.3 feet. Each has an impervious blanket on the reservoir side, as well as a low permeability clay core wall. Fairfield Dam A is located on the west side of the impoundment, and has a crest length of 3,130 feet, and a maximum structural height of 85 feet. Dam B is located to the south of Dam A and is the largest of the four dams at a total length of 4,700 feet and a maximum height of 160 feet. Dam C abuts the south side of the intake structure and has a crest length of approximately 2,000 feet and a maximum height of 60 feet. Dam D is located just south of Dam C and has a crest length of approximately 1,300 feet and a maximum height of approximately 30 feet. All four dams have riprap protection on the upstream slopes and grassed downstream slopes.

The intake feature in the Monticello Reservoir is located between Dam B and Dam C and consists of an open-channel intake and adjacent intake structure. The concrete-lined intake channel is approximately 300-feet-long and tapers from 260-feet-wide at the mouth to 132-feet-wide at the interface with the intake structure. The reinforced concrete intake structure is 265-feet-long; the first 225 feet consist of four separate water passages that taper uniformly from the upstream trash racks down to the headgate end. The final 40-foot length of the intake is a transitional section with 26-foot-diameter, concrete water passages at the gated end leading to the top of the penstocks. The trashracks, which are connected to the intake structures, consist of 6 inches of clear space and 1-inch bars.

The four steel penstocks are 26 feet in diameter and approximately 800-feet-long and fan out horizontally as they extend down the slope to the powerhouse on the Parr Reservoir. The penstocks are above ground, and the lower 270 feet are encased in concrete. The penstocks bifurcate within the encased section of the conveyance, transitioning to a total of eight water conveyances approximately 18.5 feet in diameter, each connected to a turbine scroll case in the powerhouse.

The powerhouse is a reinforced concrete structure approximately 520-feet-long by 150-feet-wide with a total structural height of 108 feet. The powerhouse has eight bays, each 65-feet-wide and each containing one reversible pump-turbine unit. There are 16 draft tube gates at the downstream end of the elbow draft tubes, and center support piers split the draft tube exits. A 185-ton gantry crane sits over the powerhouse, outdoors and above the surrounding grade.

## **2.2 UPPER RESERVOIR**

Monticello Reservoir serves as the upper reservoir for the pumped storage facility. It has a surface area of approximately 6,600 acres and a gross storage of 400,000 acre-feet. The normal maximum water level in Monticello Reservoir is El. 424.3 feet, although it can fluctuate up to 4.5 feet daily as part of the pumped storage operations. An active storage of up to 29,000 acre-feet can be transferred between the Monticello Reservoir and Parr Reservoir, which acts as the lower reservoir, by the pumped storage operations.

An approximately 300-acre portion of Monticello Reservoir, known as the Recreation Lake, is separated from the main body of the reservoir by an embankment. The Recreation Lake's sole purpose is to provide recreation for the public and is not affected by the operation of the pumped storage facility and thus is maintained at a stable water level.

## **2.3 LOWER RESERVOIR**

Parr Reservoir has a surface area of approximately 4,250 acres and a gross storage of approximately 32,000 acre-feet. The normal maximum water level is El. 265.3 feet, although the reservoir may fluctuate up to 10 feet daily as part of the pumped storage operations. Parr Reservoir extends 15 miles upstream to the tip of Henderson Island<sup>2</sup>.

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<sup>2</sup> Some study plans and reports reference Parr Reservoir as having a length of 13 miles. However, the correct length of the reservoir is 15 miles.

## 2.4 PROJECT TRANSMISSION

Primary transmission lines associated with the Parr Development include the 13.8-kV tie from the hydro station to the Parr 115 kV substation, and appurtenant facilities at the existing Parr Hydroelectric Project. Primary transmission lines at the Fairfield Development include the two 230-kV lines from Fairfield powerhouse to the V.C. Summer Nuclear Station switchyard and appurtenant facilities. All other lines connected to the V.C. Summer Nuclear Station switchyard are part of the Licensee's interconnected system.

## 2.5 PROJECT LANDS

DESC owns 4,699 acres of land within the FERC-delineated boundary line surrounding the Project. These lands are divided by development (i.e. Parr Development and Fairfield Development) and categorized into several different land classifications that support various uses. The Parr Development has three distinct land management classifications for the shorelines surrounding Parr Reservoir, while the Fairfield Development has five land management classifications for the shorelines surrounding Monticello Reservoir. The shoreline miles and acreages for each land use classification at each development are shown in Table 2-1 and Table 2-2 and Figure 2-2 and Figure 2-3.

**TABLE 2-1 PARR DEVELOPMENT SHORELINE MILES AND ACREAGES BY LAND USE CLASSIFICATION**

<b>Classification</b>	<b>Shoreline Miles</b>	<b>Acres</b>
Project Operations <sup>1</sup>	0.90	10
Public Recreation <sup>1, 2</sup>	6.97	857
Non-Development Areas <sup>1</sup>	67.05	2,131
<b>Total</b>	<b>74.91</b>	<b>2,998</b>

<sup>1</sup> No docks allowed

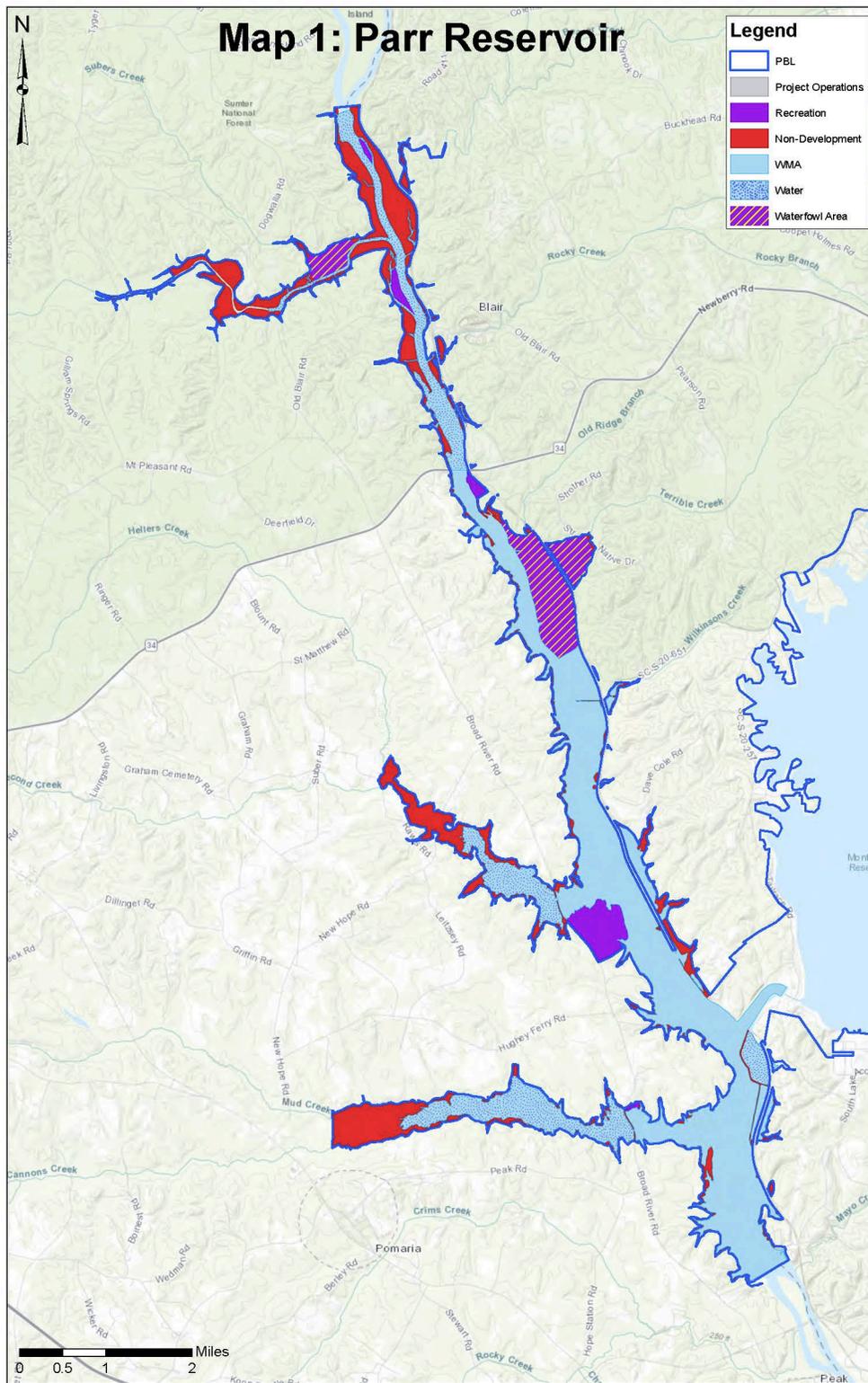
<sup>2</sup> Includes recreation lands and SCDNR-managed waterfowl areas

**TABLE 2-2 FAIRFIELD DEVELOPMENT SHORELINE MILES AND ACREAGES BY LAND USE CLASSIFICATION**

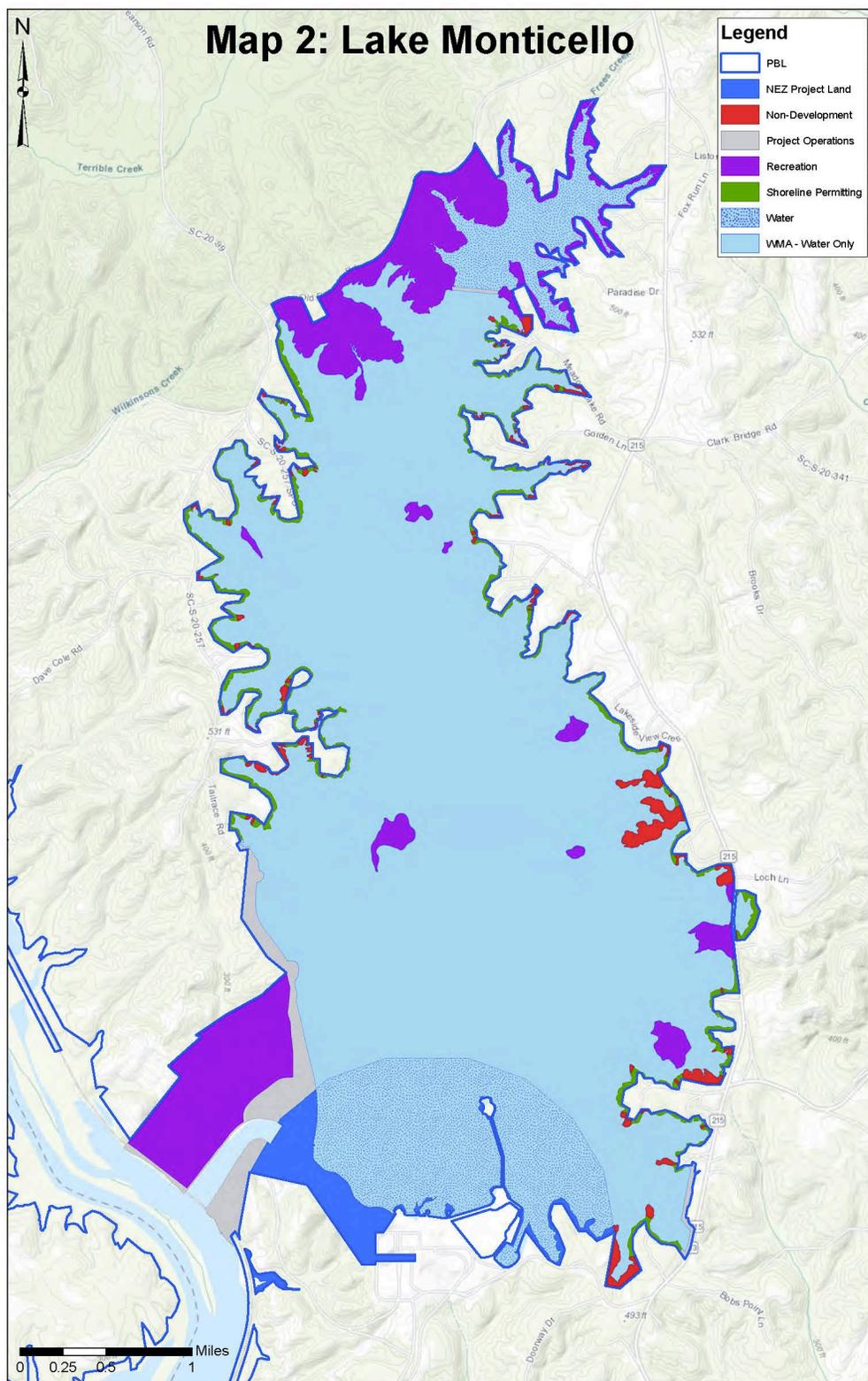
<b>Classification</b>	<b>Shoreline Miles</b>	<b>Acres</b>
Project Operations <sup>1</sup>	4.90	186
Nuclear Exclusion Zone <sup>1</sup>	6.43	203
Shoreline Permitting	22.36	235
Public Recreation <sup>1, 2</sup>	19.49	927
Non-Development Areas <sup>1</sup>	10.72	151
<b>Total</b>	<b>63.90</b>	<b>1,701</b>

<sup>1</sup> No docks allowed

<sup>2</sup> Includes the shoreline surrounding the Recreation Lake and all islands



**FIGURE 2-2 LAND USE CLASSIFICATIONS AT THE PARR DEVELOPMENT**



**FIGURE 2-3 LAND USE CLASSIFICATIONS AT THE FAIRFIELD DEVELOPMENT**

## 2.6 PROJECT AREA WETLANDS

Approximately 12,000 acres of wetlands exist within the Project boundary, including the Project reservoirs. Wetlands in the Project area are typical of those found in the South Carolina Piedmont and include palustrine and lacustrine wetlands. The lacustrine habitat in the Project area includes permanently flooded/impounded habitat located at the Parr and Monticello reservoirs. Table 2-3 shows a breakdown by acre of the various types of wetlands within the Project area. Project area wetlands are shown in Figure 2-4. Much of the land surrounding wetlands persisting in the Project boundary is in the non-development classification or is associated with SCDNR-administered waterfowl management areas. No new construction affecting wetlands communities is required for continued operation of the Project. As such, no impacts to wetland communities are anticipated for the new license term.

**TABLE 2-3 WETLANDS WITHIN THE PROJECT BOUNDARY**

<b>Wetland Type</b>	<b>Acres</b>
Freshwater Emergent Wetland	315
Freshwater Forested/Shrub Wetland	1,355
Freshwater Pond	82
Lake	9,911
Riverine	285
<b>Total</b>	<b>11,948</b>



U.S. Fish and Wildlife Service  
National Wetlands Inventory

Parr-Fairfield  
Project

Mar 21, 2014



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

User Remarks:

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or completeness of the base data shown on this map. All wetlands related data should be used in accordance with the report methods found on the Wetlands Mapper web site.

SOURCE: USFWS, 2014

FIGURE 2-4 PROJECT AREA WETLANDS

## **2.7 EXISTING PROJECT OPERATION**

The Parr Development generates using available inflows up to the maximum station hydraulic capacity of 4,800 cubic feet per second (cfs). When inflows are below 4,800 cfs, the Parr Development's turbines are operated to meet the minimum flow requirements. The minimum flow required to be released from the Project during the months of March, April and May is the lesser of 1,000 cfs or daily average inflow (minus evaporative losses from both reservoirs). During the remainder of the year, the minimum flow requirements are 150 cfs instantaneous flow and 800 cfs daily average flow, or the daily average inflow (minus evaporative losses), whichever is less.

The Fairfield Development generates and pumps using an active storage of 29,000 acre-feet. During the generation cycle, active storage in the upper Monticello Reservoir is released from the powerhouse into the lower Parr Reservoir. During the pumping cycle, all or a portion of the active storage is transferred from the Parr Reservoir back into the Monticello Reservoir. This cycle occurs daily, and the transfer of the full active storage results in an upper reservoir maximum fluctuation of 4.5 feet, and a corresponding lower reservoir fluctuation of 10 feet.

When inflows to the Project are projected to exceed 4,800 cfs, the bascule gates on the Parr Dam spillway are systematically lowered to prevent the Parr Reservoir from exceeding the maximum elevations. Generation from the Fairfield Development is also partially curtailed during these conditions to prevent total project flow releases from contributing to downstream flooding. When inflows reach a threshold that causes flooding downstream of the Project, all spillway gates are fully lowered to pass natural inflows, and the Fairfield Development generation is completely suspended until flows recede. Fairfield Development pumping operations may occur with any flow in the Broad River. On the falling leg of a flood event, the gates are gradually raised to retain active storage while preventing the reservoir from exceeding the maximum elevations.

## **2.8 EXISTING ENVIRONMENTAL MEASURES**

Per the existing license, the Licensee is required to maintain the lesser of a minimum flow of 150 cfs and a minimum daily average flow of 800 cfs, or the daily natural inflow to the Parr Reservoir (minus evaporative losses from the Parr and Monticello reservoirs), except during March, April and May. During these months, a minimum flow of the lesser of 1,000 cfs or the

average daily natural inflow into the Parr Reservoir (minus evaporative losses from the Parr and Monticello reservoirs), is required to protect striped bass spawning.

The Licensee provides public access to project waters and adjacent project lands for navigation and outdoor recreational purposes. In addition, the Licensee controls activities associated with project lands and waters through the existing Recreation Management Plan.

DESC monitors erosion of the shoreline of Parr Reservoir on an annual basis and at Monticello Reservoir on a bi-annual basis. When areas of severe erosion are noted, DESC addresses the erosion by installing riprap, following United States Army Corps of Engineers (USACE) permitting procedures as required.

### **3.0 PURPOSE OF THE PROJECT**

The Project includes a run-of-river generating facility at the Parr Development and a pumped storage facility at the Fairfield Development. The Fairfield Development provides pumped storage generation during periods of peak electricity demand and acts as a load on the system during non-peak periods. Parr Development has an installed capacity of 14.88-MW and Fairfield Development has an installed capacity of 511.2-MW. The Project's dependable capacity estimate is based on the Fairfield Development, since low-inflow conditions diminish the contributions of the Parr Development. The dependable capacity of the Project is the capacity of Fairfield Development at the minimum head, 511.2-MW, which occurs at the end of a full generating cycle. From 2000 through 2017, average annual gross generation was 55,893 megawatts per hour (MWH) for the Parr Development and 660,582 MWH for the Fairfield Development. During this time, the Fairfield Development accounted for over 90 percent of the Project's total gross generation.

In addition to meeting peak energy needs, the Project's ability to use base load electricity during periods of low demand for pumping operations provides important grid stabilization benefits to DESC. Likewise, the Fairfield Development is often relied on as a reserve asset, as units can be started and brought to full load within 15 minutes. Because of this, the Licensee has a very short response time to emergencies within the Licensee's system. This also helps fulfill the Licensee's reserve share obligation as a member of the Virginia-Carolinas Electric Reliability Council (VACAR) under the VACAR Reserve Sharing Agreement (VRSA).

#### **4.0 WATER RESOURCES OF THE PROJECT AREA**

Parr Reservoir has a surface area of approximately 4,250 acres and a total storage capacity of approximately 32,000 acre-feet. Monticello Reservoir has a surface area of approximately 6,600 acres with a total storage capacity of approximately 400,000 acre-feet. The drainage area for the Parr Development is 4,750 square miles, and the drainage area for the Fairfield Development is 15 square miles.

Private development around the Parr and Fairfield developments is minimal and generally consists of rural communities (FERC 2011). The primary use of project waters, excluding hydropower, is for a cooling water system at the V.C. Summer Nuclear Station. DESC applied for a renewal of the National Pollutant Discharge Elimination System (NPDES) permit for V.C. Summer Nuclear Station and the new permit was issued on May 7, 2014 (effective June 1, 2014). The V.C. Summer Nuclear Station uses a once-through cooling water system that withdraws water from the Monticello Reservoir into its condensers. After the water cools the condensers, the heated water is transferred to a discharge bay and then flows back into the Monticello Reservoir via a 1,000-foot-long discharge channel (SCE&G 2012). Approximately 1,190 cfs is withdrawn and returned to Monticello Reservoir through this once-through operation.

Project waters are classified as freshwater, which SCDHEC identifies as; suitable for primary and secondary contact recreation and as a source for drinking water supply after conventional treatment in accordance with SCDHEC requirements; suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora; and suitable for industrial and agricultural uses. Table 4-1 and Table 4-2 list the SCDHEC water quality standards applicable to project waters (SCDHEC 2012).

**TABLE 4-1 SCDHEC WATER QUALITY STANDARDS FOR FRESHWATERS**

PARAMETER <sup>1</sup>	STANDARD
Temperature	<ul style="list-style-type: none"> <li>• The water temperature of all freshwaters which are free flowing shall not be increased more than 5°F (2.8°C) above natural temperature conditions and shall not exceed a maximum of 90°F (32.2°C) as a result of the discharge of heated liquids unless a different site-specific temperature standard as provided in C.12.</li> <li>• Has been established, a mixing zone as provided in C.10.</li> <li>• Has been established, or a Section 316(a) determination under the Federal CWA has been completed.</li> </ul>
pH	Between 6.0 and 8.5.
DO	Daily average not less than 5.0mg/l with a low of 4.0 mg/l
Turbidity (reservoirs only)	Not to exceed 25 NTUs provided existing uses are maintained.
Turbidity (excluding reservoirs)	Not to exceed 50 NTUs provided existing uses are maintained
<i>E. coli</i>	Not to exceed a geometric mean of 126/100 ml based on at least four samples collected from a given sampling site over a 30-day period, nor shall a single sample maximum exceed 349/100 ml.
Garbage, cinders, ashes, oils, sludge, or other refuse	None allowed.
Treated wastes, toxic wastes, deleterious substances, colored or other wastes except garbage, cinders, ashes, oils, sludge, or other refuse	None alone or in combination with other substances or wastes in sufficient amounts to make the waters unsafe or unsuitable for primary contact recreation or to impair the waters for any other best usage as determined for the specific waters which are assigned to this class.
Stormwater, and other non-point source runoff, including that from agricultural uses, or permitted discharge from aquatic farms, concentrated aquatic animal production facilities, and uncontaminated groundwater from mining.	Allowed if water quality necessary for existing and classified uses shall be maintained and protected consistent with anti-degradation rules.

<sup>1</sup>Water quality standards for toxic pollutants can be found in Section E and the appendix of the SCDHEC R. 61-68, Water Classifications & Standards

Source: SCDHEC 2012

Key: mg/L milligrams per liter  
ml milliliter  
NTU Nephelometric Turbidity Unit

**TABLE 4-2 SCDHEC NUTRIENT STANDARDS FOR WATERS IN THE PIEDMONT AND SOUTHEASTERN PLAINS ECOREGIONS<sup>1</sup>**

PARAMETER	STANDARD
Total nitrogen	≤1.50 mg/l
Total phosphorus	≤0.06 mg/l
Chlorophyll a	≤40 µg/l

Source: SCDHEC 2012

<sup>1</sup>Listed are the nutrient standards for lakes and reservoirs. Currently, there are no nutrient standards for streams and rivers.

Key: mg/l milligrams per liter

µg/l micrograms per liter

SCDHEC identified several "core indicator" metals considered to be essential as indicators of the ability of a body of water to support aquatic life: cadmium, chromium, copper, lead, mercury, nickel and zinc.

Federal and state water quality standards for the state of South Carolina are guided through implementation of Sections 303(d) and 305(b) of the Clean Water Act (CWA). The CWA directs individual states to monitor and report on the condition of their water resources. SCDHEC is charged with monitoring water quality for the state. Pursuant to Section 305(b) of the CWA, SCDHEC prepares a biennial integrated report on its assessment of the condition of water quality and water pollution control programs. It also publishes a companion document containing a list of waters impaired, as required by Section 303(d) (SCDHEC 2016a, 2016b). Water bodies not meeting standards are included on South Carolina's list of water bodies impaired as required by Section 303(d). South Carolina has a program for water bodies listed as impaired that establishes total maximum daily loads (TMDLs) (which includes point and non-point sources and controls) that are managed through the NPDES permitting program, with the objective of bringing water quality to within set criteria.

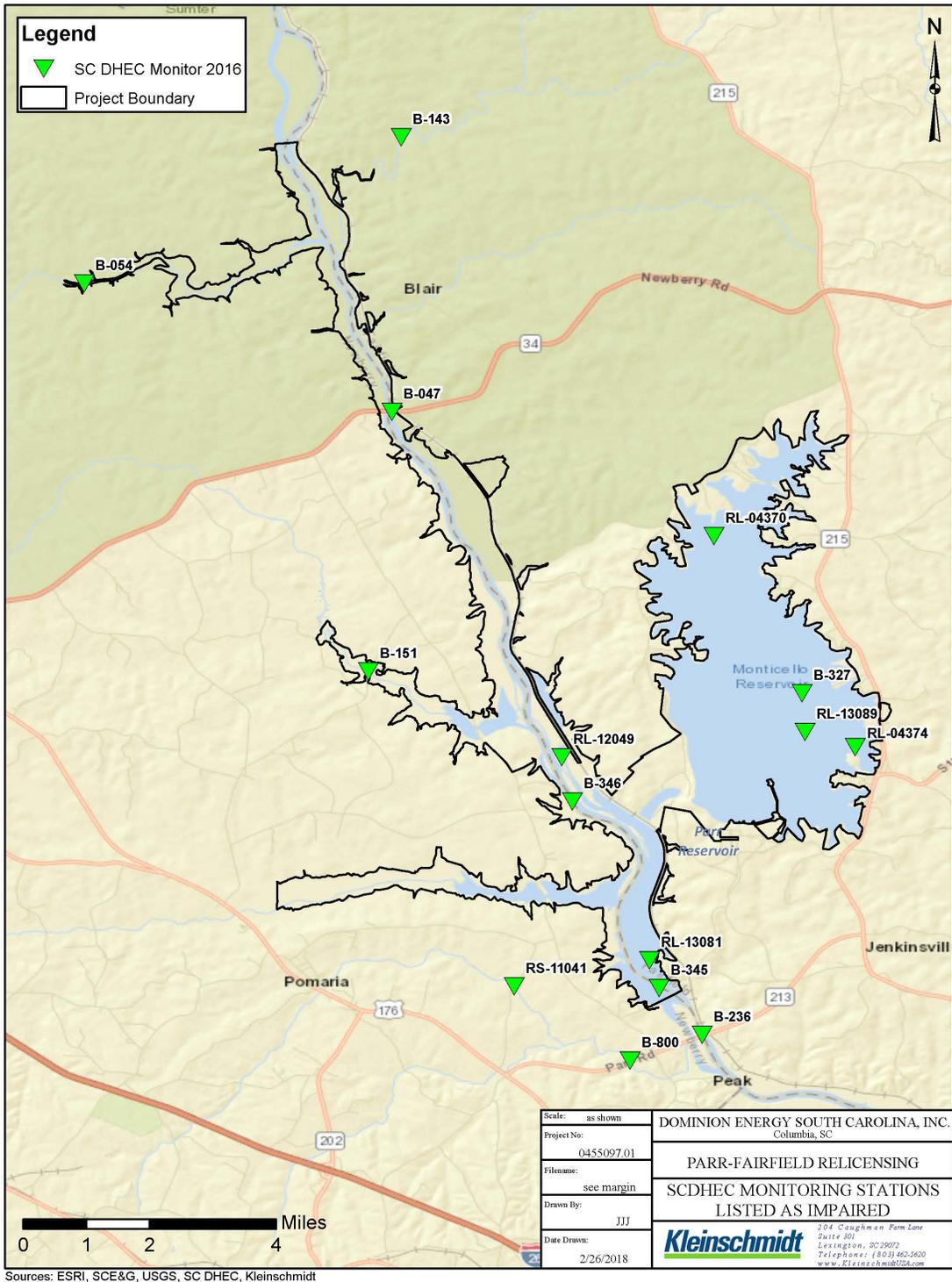
In the 2016 303(d) list for the state of South Carolina, several point locations in both Parr and Monticello reservoirs were listed as impaired. SCDHEC lists point locations based on water quality sampling stations but specifies that the impairment is considered to extend to the surrounding waters upstream and downstream of the sampling station. Table 4-3 lists the impaired waters in the project area along with the cause for the impaired listing (SCDHEC 2016a). Figure 4-1 is a map of the SCDHEC monitoring stations at the Project.

**TABLE 4-3 SCDHEC MONITORING STATIONS LISTED AS IMPAIRED WITHIN THE PROJECT BOUNDARY AND DOWNSTREAM OF PARR SHOALS DAM**

STATION	LOCATION	USE	CAUSE FOR IMPAIRMENT LISTING	TARGET YEAR FOR TMDL DEVELOPMENT
B-327	Monticello Lake <sup>1</sup> Lower impoundment between large islands	Aquatic life	pH	2022
RL-04370	Monticello Lake 1.7 miles northwest of Monticello	Aquatic life	pH	2022
RL-04374	Monticello Lake 3.5 miles north of Jenkinsville	Aquatic life	pH	2022
RL-13089	Monticello Reservoir Approx 0.8-mile SW of Lake Monticello East Landing	Aquatic life	pH	2022
B-346 (inactive site)	Parr Reservoir Approx. 3 miles north of dam, upstream Monticello Lake	Aquatic life	Total phosphorus	2022
RL-12049	Parr Reservoir Approx 0.7-mile NNW OF B-346 and approx 0.9-mile SE of mouth of Hellers Creek	Aquatic life	Total phosphorus	2022
B-236 (inactive site)	Broad River At So. Railroad Trestle, 0.5 miles downstream of SC213	Aquatic life	Copper	2022
B-151	Hellers Creek at SR 97	Aquatic life	Bio (macroinvertebrate)	2022

<sup>1</sup>SCDHEC defines a lake as any water of the State that is a freshwater pond, reservoir, impoundment, or similar body of water located wholly or partially within the state (SCDHEC 2012). Therefore, SCDHEC classifies Monticello Reservoir as a lake.

Source: SCDHEC 2016a



**FIGURE 4-1 SCDHEC MONITORING STATIONS AT THE PARR PROJECT**

#### **4.1 MEASURES TAKEN TO AVOID OR MINIMIZE IMPACTS TO WATER RESOURCES OF THE PROJECT AREA**

##### **4.1.1 Parr Shoals Dam Turbine Venting Plan**

DESC proposes to implement the Turbine Venting Plan (Exhibit E-4 of Exhibit E of the Final License Application [FLA]) at Parr Shoals Dam during the first year following license issuance. This will improve dissolved oxygen (DO) levels downstream of the dam, minimizing excursions from the instantaneous minimum. In addition to the Exhibit E-4 filed with the FLA, DESC conducted another test of the Plan in 2018. The 2018 test results are included in Attachment A-1 of this Appendix.

The plan states that turbine venting shall occur continuously during a “venting period” for each calendar year, with vents opened as turbines are started and brought online. During the venting period, the turbines will be operated with vents opened in a first-on / last-off order as follows: 3, 1, 5, 2, 4, and 6. Exceptions to this operating order will occur due to equipment maintenance that results in unit outages, or emergency conditions. DESC will follow the venting procedures from June 15 through August 31 of each year. This period captures all of the excursions recorded by the nearby USGS Jenkinsville gage since the newer style DO probe was installed in 2011.

DESC will provide documentation to SCDHEC of DO excursions below the standard within 10 days of occurrence. Upon request from a consulting agency, DESC will provide hourly records to agency representatives to demonstrate adherence to the order of turbine operating during a venting period. Documentation of maintenance activities to justify deviation from the turbine operating order will be provided, should a deviation occur.

##### **4.1.2 Enhancements to the West Channel Downstream of Parr Shoals Dam Adaptive Management Plan**

DESC plans to implement the West Channel AMP (Exhibit E-4 of Exhibit E of the FLA) during the first 5 years of the new license. The objective of the AMP is to improve water quality year-round (specifically to meet state standards for DO and to improve DO levels in the West Channel during summer/fall periods), to provide a more natural water temperature profile, and to improve water depth and velocity. DESC will work with stakeholders throughout the 5-year

term of the AMP to accomplish this objective. The AMP details several methods for water quality improvement and habitat enhancement including: determining a flow target that will maintain DO levels in the west channel, increased minimum flows, limited channel modifications, and low inflow pulses. During each year of the AMP, monitoring will be conducted from May 15 to September 30. Water temperature and DO will be continuously monitored at three sites along the west channel. In addition, random samples of temperature and DO will be collected every 2 weeks in the west channel. DESC will meet annually with a Review Committee to review monitoring results and an annual report will be filed with FERC. At the end of the 5-year AMP period, the Review Committee will provide final recommendations to FERC on extension or completion of the AMP.

#### **4.1.3 Erosion Monitoring Plan**

The fluctuations of Parr Reservoir and Monticello Reservoir, caused by the operation of the Fairfield Development, do contribute to some localized shoreline erosion and siltation in each reservoir. DESC currently monitors the shorelines of Parr and Monticello reservoirs regularly for signs of erosion as part of their Dam Safety, Surveillance and Monitoring Report (DSSMR). As part of this new license application process, DESC developed a formal Erosion Monitoring Plan for Monticello and Parr reservoirs (Exhibit E-3 of Exhibit E of the FLA). Monitoring will continue to occur on an annual basis for Parr Reservoir and a bi-annual basis for Monticello Reservoir and will be reported to the FERC- Atlanta Regional Office on the annual DSSMR. The Erosion Monitoring Plan will be implemented upon issuance of a new license.

The plan sets forth and defines survey methods, the erosion repair procedure, and a monitoring schedule as well as documentation and reporting standards. Erosion repair is triggered when an identified erosion area is found to be encroaching the project boundary, project infrastructure, or significant natural or cultural resources. The erosion repair steps are as follows:

- **Verification:** Take measurements or install reference pins and evaluate rate and severity of active erosion quantitatively.
- **Plan:** Meet with DESC management to determine the extent of repairs. Develop plan to repair. Acquire cost estimates.
- **Notification:** Notify FERC of DESC's intent to repair.
- **Budget:** Budget money and time to perform the work.

- **Permit:** Determine what permits are required and prepare applications. Coordinate access with landowners if there is no DESC or public access to gain entry to the site.
- **Repair:** Mobilize workforce, material and equipment to make the repairs. Dam safety personnel will monitor the work.
- **Prepare:** Close out report and notify all necessary agencies of project completion.

#### **4.1.4 Minimum Flows Downstream of Parr Shoals Dam AMP**

DESC will pass a new set of higher minimum flows in the Broad River downstream of Parr Shoals Dam. These flows are detailed in the Minimum Flows Downstream of Parr Shoals Dam AMP (Exhibit E-5 of Exhibit E of the FLA) and include a high spring spawning, a medium transition, and a summer/fall low flows. Each of these flows was selected by the Fisheries and Instream Flows TWCs based on study results. The AMP also includes a target flow and a compliance limit for each set of flows. DESC's ability to meet these flow values will be evaluated as part of the AMP, which is anticipated to last for the first 5 years of the new license. The AMP also includes a series of low flow scenarios within each flow period that would allow for operations during low flow periods. This recommendation provides the basis for a Low Inflow Protocol. The minimum flows will also provide depths in the Broad River downstream of the Parr Shoals Dam sufficient for upstream and downstream fish passage in the river. These minimum flows should also insure that water quality remain at the current levels or are improved during the new license. Recommended minimum flows are shown in Table 4-6.

**TABLE 4-4 PARR MINIMUM FLOW RECOMMENDATION**

	<b>Net Inflow*</b>	<b>Minimum Target Outflow*</b>	<b>Compliance Outflow*</b>
High Flow Period Feb 1 – April 30	> 2300	2300	2100
	≤ 2300 and > 2200	net inflow	2100
	≤ 2200 and ≥ 600	net inflow	(net inflow minus 100 cfs) or 550 cfs whichever is greater
	< 600	net inflow	net inflow minus 50 cfs
Transitional Flow Periods Dec 1 – Jan 31; May 1 – May 31	>1500	1500	1300
	≤ 1500 and > 1400	net inflow	1300
	≤ 1400 and ≥ 600	net inflow	(net inflow minus 100 cfs) or 550 cfs whichever is greater
	< 600	net inflow	net inflow minus 50 cfs
Low Flow Period June 1 – Nov 30	> 1000	1000	900
	≤ 1000 and ≥ 600	net inflow	(net inflow minus 100 cfs) or 550 cfs whichever is greater
	< 600	net inflow	net inflow minus 50 cfs

\*cfs

Key:

> greater than

< less than

cfs cubic feet per second

## **5.0 SUMMARY**

DESC, with substantial stakeholder collaboration, has developed very comprehensive Protection, Mitigation, and Enhancement (PME) programs that will protect water quality, aquatic, and terrestrial resources within the Project area.

The Turbine Venting Plan was designed to minimize dissolved oxygen (DO) excursions downstream of the dam. The plan is expected to protect and enhance water quality downstream of the Project powerhouse specifically during the low DO season. DESC will report directly to SCDHEC any DO excursions below the standard within 10 days of occurrence.

DESC is also implementing an adaptive management approach for enhancing water quality downstream of the Project area. The West Channel AMP and the Downstream Minimum Flows AMP will both be implemented during the first 5 years of the new license. During this time, operational changes will be examined to determine the best course of long-term action regarding improved water quality downstream of the Project. This adaptive management approach will ensure that government agencies and other stakeholders have an opportunity to continue working with DESC after the license is issued to address water quality concerns. Both plans allow for the extension of the AMP past the initial 5 years if deemed necessary by involved parties. The proposed higher minimum flows downstream of the Parr Shoals Dam will provide higher river flows than currently experienced in the existing license. These higher flows should increase the likelihood of water quality that continues to meet state standards. In addition, these flows will improve habitat for aquatic resources in the Broad River.

DESC developed a formal Erosion Monitoring Plan that covers both reservoirs. The Erosion Monitoring Plan will provide annual monitoring of shoreline erosion at both reservoirs and will monitor and mitigate for shoreline erosion into Project waters.

DESC's monitoring programs and other PMEs contained in the CRSA demonstrate a high level of commitment to the Parr Project and to those resources affected by Project operation. The monitoring and enhancement programs often contain adaptive management strategies which allow for continued public and stakeholder input and the ability to make adjustments during the new FERC license term of up to 50 years. DESC believes that issuing a 401 WQC for

continued operation of the Parr Hydroelectric Project is in the public's best interest and the best interest of the environmental resources, specifically the water resources, contained within the Project boundary and downstream of the Project. DESC, state and federal resource agencies, and Non-Governmental Organizations (NGO) devoted an extensive number of hours on studies, data analyses and plans for the protection, mitigation, and enhancement of the Project's aquatic resources, all completed through a very collaborative process. Mitigation proposed as part of the continued operation of the Parr Project will protect all designated uses of Project waters, enhance water and aquatic resources, allow DESC to continue providing low cost power to its customers and contribute to the economic viability of South Carolina for years to come.

## 6.0 REFERENCES

- Federal Energy Regulatory Commission (FERC). 2011. Environmental Inspection Report for Parr Shoals Hydroelectric Project (FERC No. 1894). Accession No.: 20110628-4016. Filed June 28, 2011.
- Kleinschmidt Associates. 2018. Parr Shoals Dam Turbine Venting Memorandum 3: 2018 Turbine Venting Test Results. October 25, 2018.
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**ATTACHMENT A-1**

**2018 TURBINE VENTING MEMO**

**PARR HYDROELECTRIC PROJECT – FERC No. 1894**  
**PARR SHOALS DAM TURBINE VENTING – MEMORANDUM 3**

**TO:** Water Quality Technical Working Committee  
**FROM:** Kleinschmidt Associates  
**DATE:** October 25, 2018  
**RE:** 2018 Turbine Venting Test Results

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**INTRODUCTION**

South Carolina Electric & Gas Company (SCE&G) is the Licensee for the Parr Hydroelectric Project (FERC No. 1894) (Project). The Project consists of the Parr Shoals Development and the Fairfield Pumped Storage Development. Both developments are located along the Broad River in Fairfield and Newberry Counties, South Carolina.

The Project recently completed a relicensing process which involved cooperation and collaboration between SCE&G, as licensee, and a variety of stakeholders including state and federal resource agencies, state and local government, non-governmental organizations (NGO), and interested individuals. In the early stages of the relicensing process, SCE&G established several Technical Working Committees (TWC's) whose members included interested stakeholders. The TWC's objectives included the evaluation of relicensing issues and making recommendations to address these issues in the new license.

Following the completion of the Parr Hydroelectric Project Baseline Water Quality Report, there were questions regarding occasional low dissolved oxygen (DO) in the tailrace downstream of Parr Shoals Dam. At a Water Quality TWC meeting on February 4, 2014, the TWC noted that the Baseline Water Quality Report identified periodic excursions of dissolved oxygen (DO) levels less than 4.0 mg/l in the Parr Shoals Dam tailrace, as reported by the USGS station 02160991. SCE&G consolidated historic USGS data to examine these excursions and issued an addendum to the Baseline Water Quality Report in June 2014. At the request of the Water Quality TWC, SCE&G collected additional water quality data in the summer of 2014 in the tailrace and forebay of Parr Shoals Dam to determine whether project operations are causing these excursions. These results were summarized in a memo issued on March 2, 2015. SCE&G

followed up this effort by collecting another series of water quality data in the Parr forebay from May through mid-October 2015. The results of that data collection effort were summarized in the October 2016 Parr Shoals Dam Turbine Venting Report. The same study was completed for a third time during 2016, and these results were summarized in the November 2017 Parr Shoals Dam Turbine Venting Report.

Additionally, SCE&G tested each of the Parr turbines for their ability to self-vent and potentially increase the dissolved oxygen in the tailrace during specific periods of the year. An initial test of the turbines' capacity to vent was performed in August 2014; a second test to determine which turbines had the most significant impact on increasing DO was performed in July 2015. The results of the testing, along with the findings published in the Baseline Water Quality Report, were used to develop a Turbine Venting Plan. SCE&G conducted additional testing of the Turbine Venting Plan during 2016 and 2017 and shared those reports with the Water Quality TWC.

During 2018, SCE&G operated the Parr Development according to the Turbine Venting Plan from June 15 to August 31. This memo provides information from an additional venting season and compares DO levels measured at the USGS gauge in the tailrace to generation data during this period to determine how successful the Turbine Venting Plan was during 2018.

## **METHODS**

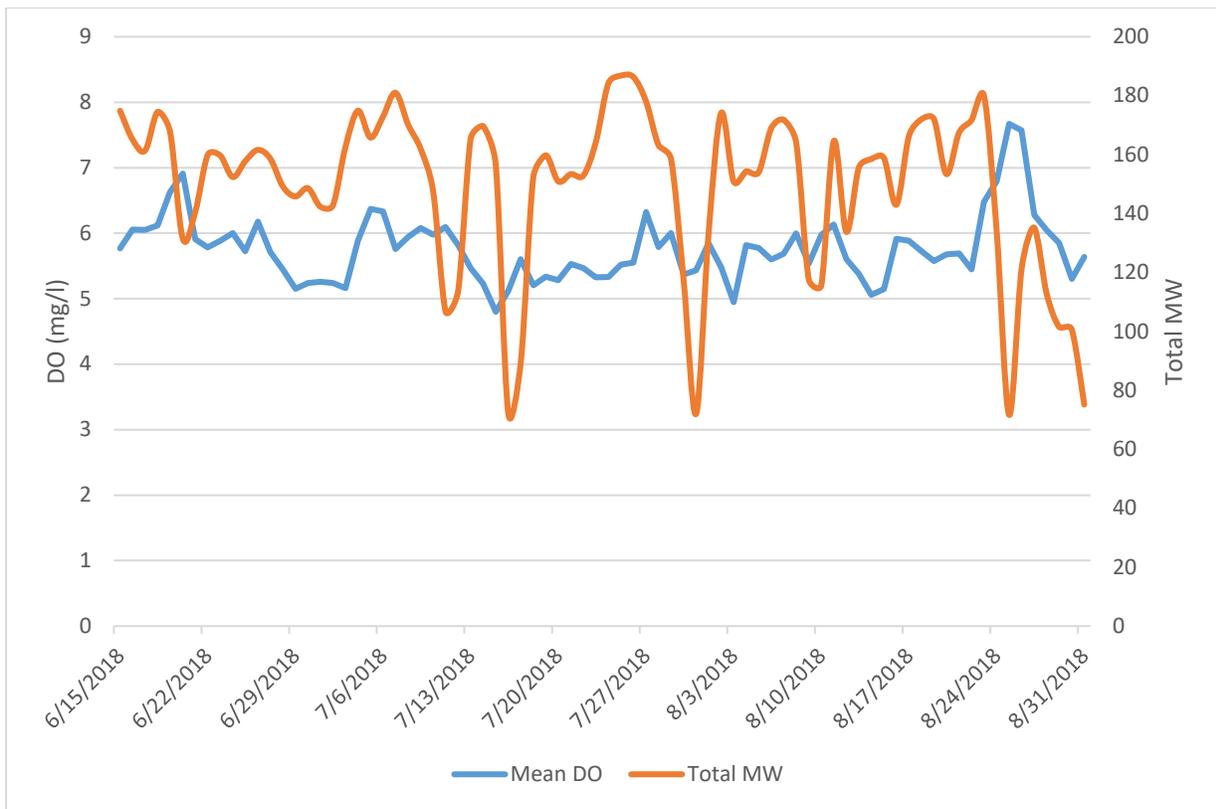
Dissolved oxygen data was obtained from the Jenkinsville river gage (USGS 02160991; USGS 2018) and generation data was provided by SCE&G. Dissolved oxygen and generation data were compared from June 15 to August 31, 2018, during the period when SCE&G operated Parr according to the Turbine Venting Plan. Hourly and daily mean dissolved oxygen levels were compared to hourly and daily mean generation, which was described by total megawatts produced (MW).

## **RESULTS**

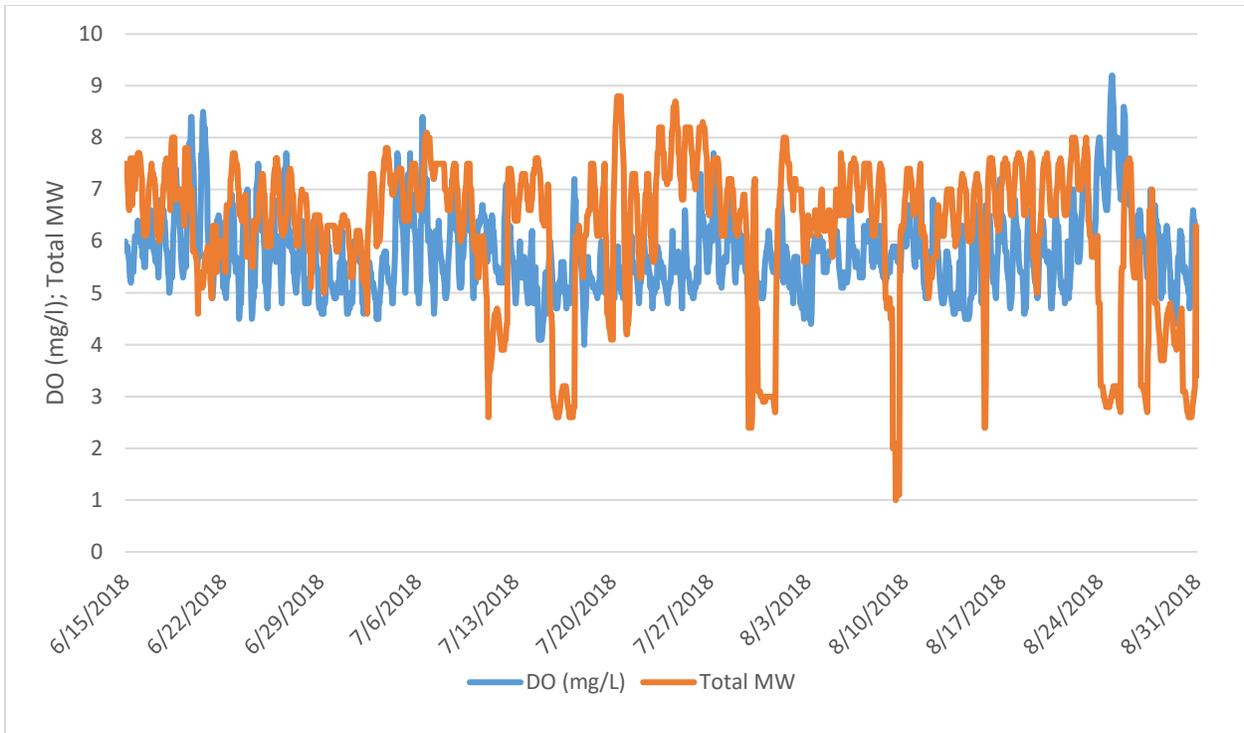
Daily mean DO levels between June 15 and August 31, 2018 ranged from 4.8 to 7.7mg/l. A total of 2 days (July 15 and August 3) had mean DO levels below 5.0 mg/l, and 76 days had a daily

mean DO at or above 5.0 mg/l (Figure 1). No measurements recorded DO levels below 4.0 mg/l during the study period (Figure 2). Daily generation ranged from 71.7 MW to 186.8 MW (Figure 1).

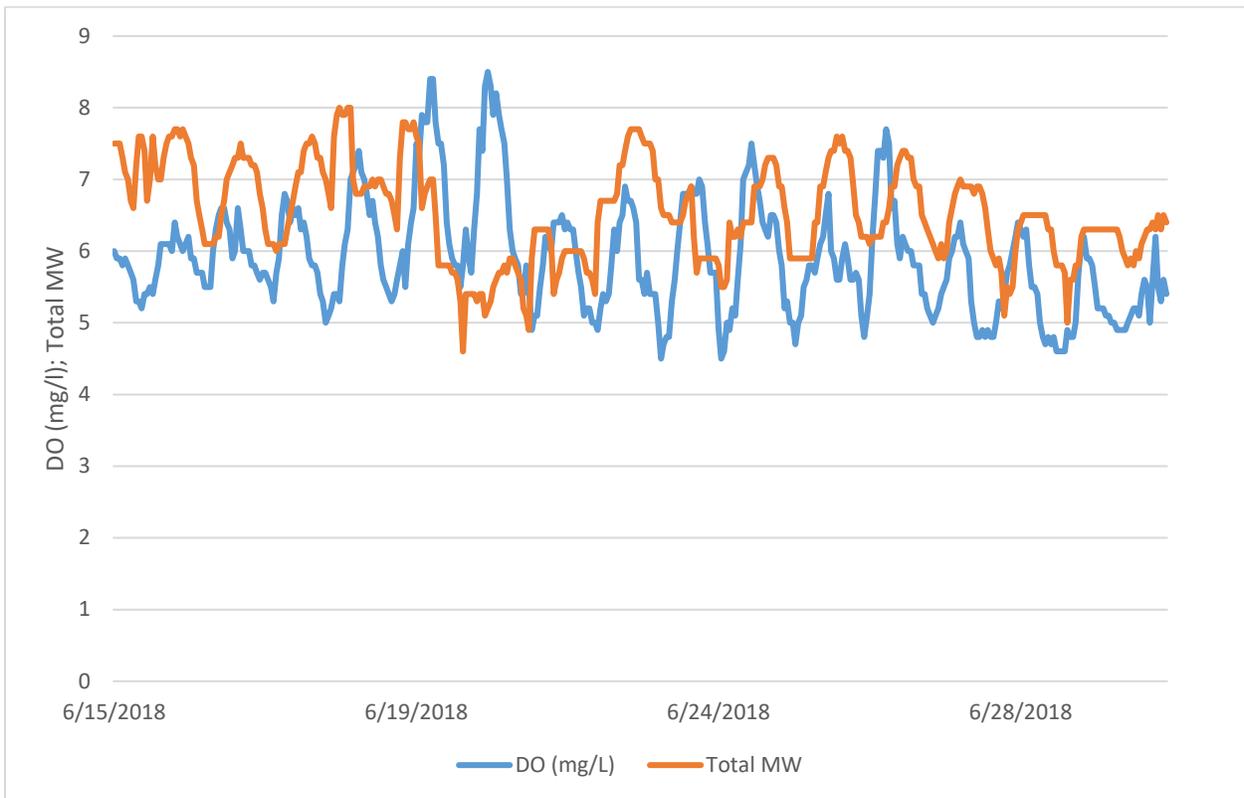
Instantaneous DO levels generally remained above 5 mg/l during June, except for seven days (June 22-25 and June 28-30) where DO dropped below 5 mg/l for short periods of time (Figure 3). DO levels continued to fall below 5 mg/l for brief periods during days in July (22 days) and August (16 days), but these excursions only lasted several hours and at no point did DO levels fall as far as 4.5 mg/l (Figures 4 and 5). DO levels never dropped below 4 mg/l during the entire venting period.



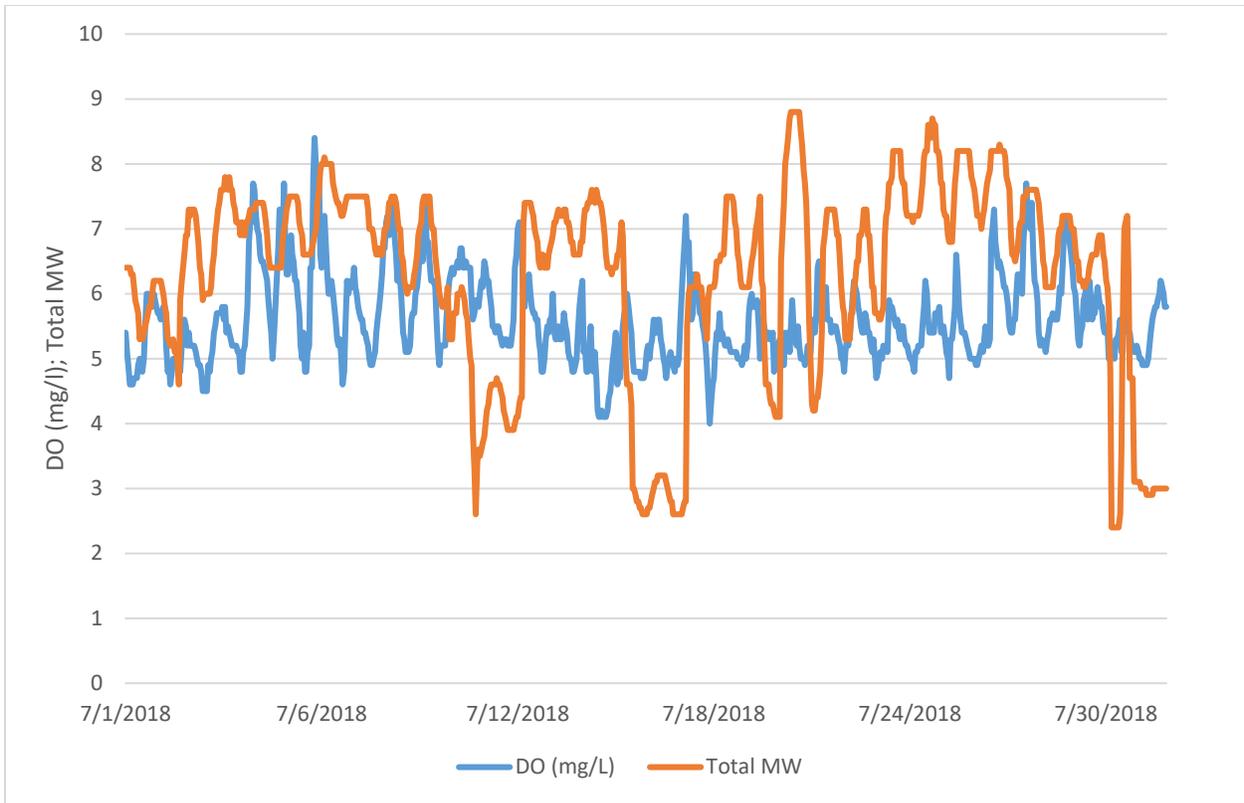
**FIGURE 6-1. TOTAL DAILY GENERATION AND DAILY MEAN DO AT THE JENKINSVILLE GAGE LOCATED DOWNSTREAM OF PARR SHOALS DAM**



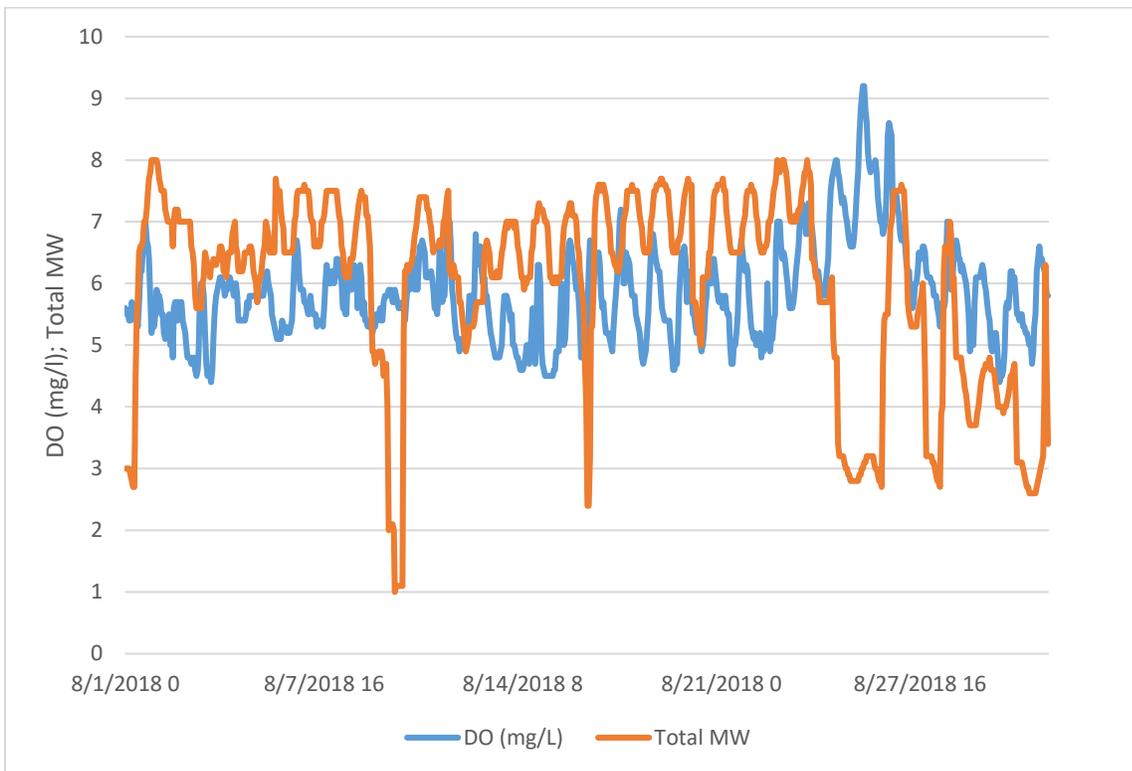
**FIGURE 6-2. HOURLY DO LEVELS AND HOURLY GENERATION (JUNE 15-AUGUST 31)**



**FIGURE 6-3. HOURLY DO LEVELS AND HOURLY GENERATION (JUNE 15- JUNE 30)**



**FIGURE 6-4. HOURLY DO LEVELS AND HOURLY GENERATION (JULY 1- JULY 31)**



**FIGURE 6-5. HOURLY DO LEVELS AND HOURLY GENERATION (AUGUST 1- AUGUST 31)**

## **DISCUSSION**

SCE&G attempted to monitor DO levels in the forebay using HOBO loggers during the study period, but fouling from extensive growth of aquatic vegetation was an issue throughout the study period and meaningful data was not collected. As such, the extent to which turbine venting increased DO levels in releases from Parr could not be accurately determined. Although a direct correlation between turbine venting and increased DO levels cannot be made, 2018 shows improved DO conditions in the tailrace. Unlike 2018, previous years showed DO levels below 4 mg/l. DO levels rarely dropped below 5 mg/l in 2018, and never dropped below 4 mg/l, suggesting that turbine venting during the study period may be a contributing factor to increased DO downstream of the Project. Mean daily DO levels remained above 5 mg/l, and hourly DO levels remained above 4 mg/l throughout the monitoring period.

SCE&G previously provided the updated Turbine Venting Plan and the results of the 2016 data as a proposed protection, mitigation, and enhancement measure in the Final License Application for continued operation of the Parr Hydroelectric Project. SCE&G will include the 2017 and 2018 test data as part of their 401 Water Quality Application to the South Carolina Department of Health and Environmental Control.

## **REFERENCES**

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