



June 28, 2023

Electronically Filed

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street N.E.
Washington, DC 20426

Subject: **Bad Creek Pumped Storage Project (P-2740-053)
Relicensing Study Progress Report No. 2**

Dear Secretary Bose:

Duke Energy Carolinas, LLC (Duke Energy or Licensee) is the Licensee, owner, and operator of the 1,400-megawatt (MW) Bad Creek Pumped Storage Project (FERC Project No. 2740) (Project), located in Oconee County, South Carolina, approximately eight miles north of Salem. The Bad Creek Reservoir (or upper reservoir) was formed from the damming of Bad Creek and West Bad Creek and serves as the Project's upper reservoir. Lake Jocassee serves as the lower reservoir and is licensed separately as part of Duke Energy's Keowee-Toxaway Hydroelectric Project (FERC Project No. 2503).

The existing (original) license for the Project was issued on August 1, 1977 by the Federal Energy Regulatory Commission (FERC or Commission) and expires on July 31, 2027. Accordingly, Duke Energy is pursuing a new license for the Project pursuant to the Commission's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5.

Relicensing Studies

Duke Energy developed a Proposed Study Plan (PSP) in consultation with agencies and stakeholders and filed it on August 5, 2022. After the filing of the PSP, Duke Energy held a site visit and Project tour on August 16, 2022, and the PSP meeting on September 7, 2022. Duke Energy also continued to consult with agencies and other stakeholders regarding its proposed studies.

Duke Energy evaluated the comments submitted by the Commission and stakeholders in response to the PSP. Based on Duke Energy's review of these comments, FERC criteria for study requests under the ILP, and readily available information (i.e., associated with the previous licensing effort or resulting from ongoing monitoring activities), Duke Energy proposed six resource studies in the Revised Study Plan (RSP) filed with FERC on December 5, 2022. The Commission approved the RSP with modifications on January 4, 2023.

The six studies in the RSP will support evaluation of the potential effects of continued operation of the Project as well as potential effects of construction and operation of the proposed Bad Creek II Complex. These studies are:

- Water Resources Study
- Aquatic Resources Study;
- Visual Resources Study;
- Recreational Resources Study;
- Cultural Resources Study; and
- Environmental Justice Study.

Duke Energy is filing this Study Progress report with the Commission electronically and is distributing this letter to the parties listed on the attached distribution list. For parties listed on the attached distribution list who have provided an email address, Duke Energy is distributing this letter via email; otherwise, it will be distributed via U.S. mail.

Duke Energy looks forward to continuing to work with Commission staff, resource agencies, Indian Tribes, local governments, non-governmental organizations, and interested members of the public throughout the relicensing process. If there are questions regarding this filing, please contact me at Alan.Stuart@duke-energy.com or via phone at 980-373-2079.

Sincerely,



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Enclosure

cc (w/enclosure): Jeff Lineberger, Duke Energy

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Bad Creek Pumped Storage Project
Relicensing Study Progress Report No. 2
June 28, 2023

1.0 BACKGROUND

Duke Energy Carolinas, LLC (Duke Energy or Licensee) is the Licensee, owner, and operator of the 1,400-megawatt (MW) Bad Creek Pumped Storage Project (FERC Project No. 2740) (Project), located in Oconee County, South Carolina, approximately eight miles north of Salem. The Bad Creek Reservoir (or upper reservoir) was formed from the damming of Bad Creek and West Bad Creek and serves as the Project’s upper reservoir. Lake Jocassee serves as the lower reservoir and is licensed separately as part of Duke Energy’s Keowee-Toxaway Hydroelectric Project (FERC Project No. 2503).

The existing (original) license for the Project was issued on August 1, 1977, by the Federal Energy Regulatory Commission (FERC or Commission) and expires on July 31, 2027. Accordingly, Duke Energy is pursuing a new license for the Project pursuant to the Commission’s Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5.

2.0 STUDY PLAN DEVELOPMENT

In accordance with 18 CFR §5.11, Duke Energy developed a Proposed Study Plan (PSP) in consultation with agencies and stakeholders and filed it on August 5, 2022. After the filing of the PSP, Duke Energy held a site visit and Project tour on August 16, 2022, and the PSP meeting on September 7, 2022. Duke Energy also continued to consult with agencies and other stakeholders regarding its proposed studies.

Duke Energy evaluated the comments submitted by the Commission and stakeholders in response to the PSP. Based on Duke Energy’s review of these comments, FERC criteria for study requests under the ILP, and readily available information (e.g., associated with the previous licensing effort or resulting from ongoing monitoring activities), Duke Energy proposed six resource studies in the Revised Study Plan (RSP) filed with FERC on December 5, 2022. The RSP includes copies of and summarizes comments received and Duke Energy’s responses.

The six studies in the RSP will support evaluation of the potential effects of continued operation of the Project as well as potential effects of construction and operation of the proposed Bad Creek II complex. These studies are:

- Water Resources Study;
- Aquatic Resources Study;
- Visual Resources Study;
- Recreational Resources Study;
- Cultural Resources Study; and
- Environmental Justice Study.

In FERC’s Study Plan Determination (SPD) letter on January 4, 2023, FERC approved the proposed studies as submitted in the RSP except the Recreational Resources Study which was approved with modifications. The Recreational Resources Study was modified to include the following:

- An additional traffic counter was added at the Laurel Valley Trail Access¹
- Revisions to the Recreation Site Inventory Form to include the number and height of bear cables and number of latrines

In addition, Duke Energy provided the following clarifications regarding the Discussion and Staff Recommendations included in the SPD in Study Progress Report No. 1:

- FERC recommended that Duke Energy modify the Recreation Study Plan to include the additional counties that will be used during the future recreation use analysis. Duke Energy will include Oconee and Pickens counties, SC and Jackson and Transylvania counties, NC and additional counties in SC, NC, and GA that are reported on the recreation user surveys. Since recreation user surveys have not been completed yet, Duke Energy is unable to list what counties will be reported at this time.
- FERC recommended that Duke Energy include the 14.8 miles of trail that follows logging and access roads in the Conditions Assessment. Duke Energy is evaluating the entire 43 miles of trail, including 28.2 miles of single-track trail segments and 14.8 miles of trail that follow logging and access roads in the Conditions Assessment.

¹ Although the SPD referenced “Laurel Fork Gap”, Duke Energy assumes the Foothills Trail Conservancy and FERC meant to reference the Laurel Valley Trail Access.



- FERC recommended that the RUN Study include detail boxes and labels for all spur trails within the 43-mile portion of trail to be studied by Duke Energy. Duke Energy will prepare detailed maps of the Duke Energy-maintained, 43-mile portion of the Foothills Trail that identify parcel boundaries, current property owner(s), access locations, spur trails, structures, and facilities/amenities. Two traffic counters have been installed at the Bad Creek Hydro Project Trail Access (i.e., Bad Creek Parking Access Area and Bad Creek Road) and user surveys are being collected at this site.
- FERC requested additional details on the standards used to define the minimum acceptable values of the indicator variables used to estimate the trail’s carrying capacity. Duke Energy held a Recreational Resources Study Resource Committee (RC) meeting on March 28, 2023, to discuss the carrying capacity methodology.

The following sections summarize progress implementing the relicensing studies since Study Progress No. 1 was filed.

3.0 POTENTIAL TEMPORARY ACCESS ROAD

Duke Energy is evaluating the development of a temporary access road to the Fisher Knob community for use during Bad Creek II construction. The gravel service road would be approximately 3.7 miles long, primarily follow an existing unmaintained logging road on property owned by Duke Energy, and would only be maintained during construction of Bad Creek II. The current routes under consideration are shown on Figure 1.

The study areas for the Water Resources, Aquatic Resources, Visual Resources, and Cultural Resources studies have been modified to assess the potential effects of the temporary access road as further discussed below. In addition, Duke Energy will be conducting a natural resources assessment of the proposed route to identify potential terrestrial and aquatic resources requiring additional evaluation. The results of this assessment will be shared directly with the Wildlife and Botanical Resources RC.

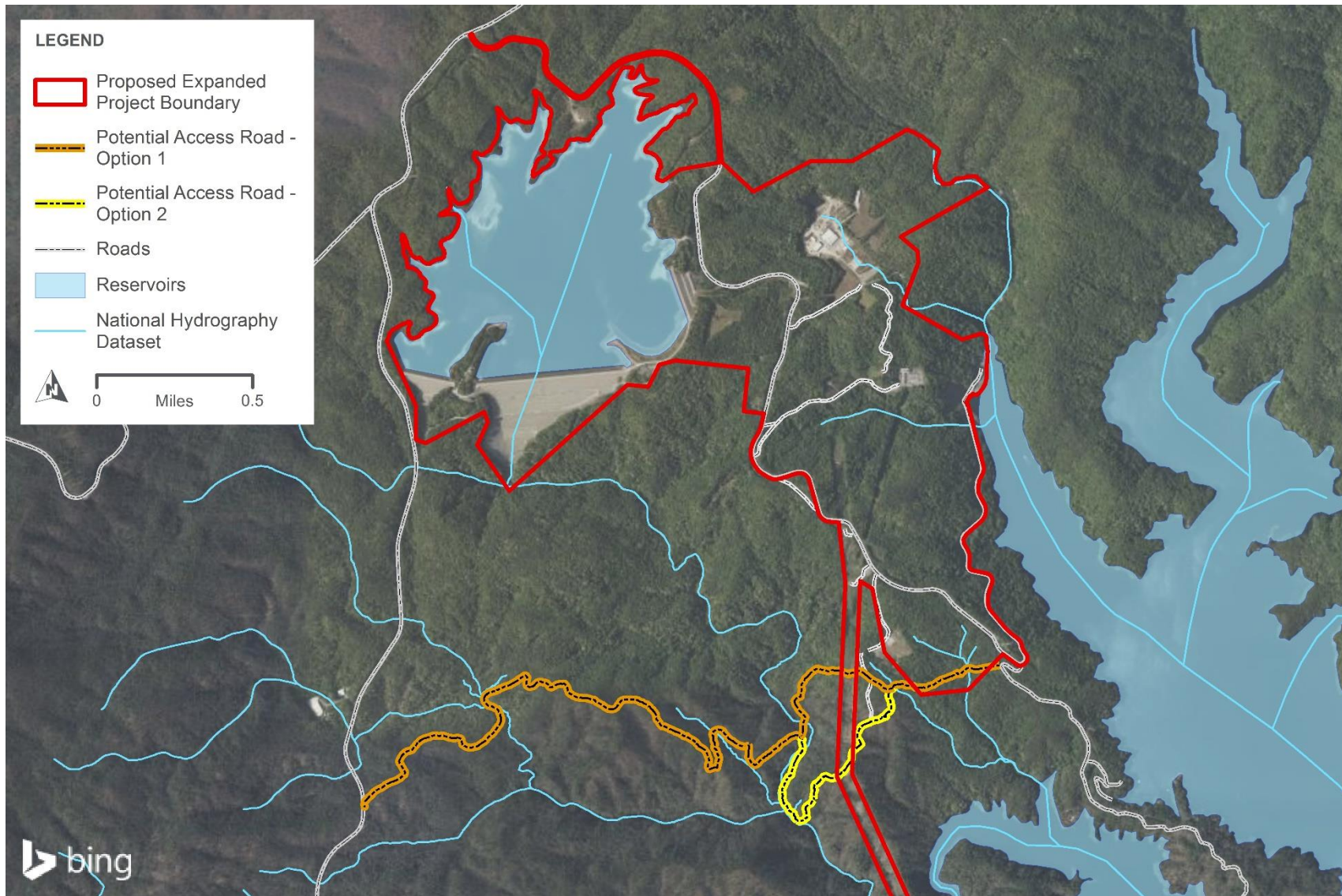


Figure 1. Potential Temporary Access Road

4.0 WATER RESOURCES STUDY

The components of the Water Resources Study and status of each are provided below:

- **Summary of Existing Water Quality Data and Standards:** Historical Lake Jocassee and Howard Creek water quality data collected by Duke Energy and Clemson University have been compiled and summarized. A virtual meeting was held on May 16 with the Water Resources Study RC to discuss findings of the existing water quality study effort; the draft report will be distributed to the Committee by June 30.
- **Water Quality Monitoring in the Whitewater River Arm:** Water quality instrumentation was deployed at three locations in the Whitewater River arm of Lake Jocassee, May 22-23, 2023. Data collection began in June 2023 and will extend through September 2023.
- **Computational Fluid Dynamics (CFD) Modeling of Velocity Effects and Vertical Mixing in Lake Jocassee Due to a Second Powerhouse:** Development of the 2D model to estimate the downstream boundary of velocity effects from the Project is complete, and Duke Energy is currently performing CFD model runs under various water level elevations and Project operational scenarios. Additional flow and temperature data will be collected in the Whitewater River cove to support model validation. Model output is projected to be available in third quarter 2023. A hybrid in-person/virtual meeting with the Water and Aquatic Resources RCs is scheduled for July 27, and the agenda for this meeting includes an update by Duke Energy on the CFD model development and results.
- **CHEOPS Modeling of Water Exchange Rates and Lake Jocassee Reservoir Levels:** The CHEOPS model will be used to evaluate potential effects of Bad Creek II on the frequency, timing, and range of Lake Jocassee reservoir level fluctuations. Generation and pumping dispatch curves are being updated for the model and work has begun to develop performance measures. Initial model results are anticipated to be available in the third quarter of 2023. As noted above, Duke Energy will provide an update on CHEOPS modeling activities to the relevant RCs at the upcoming July 27 meeting.
- **Future Water Quality Management Plan (WQMP) Development:** Work to develop the WQMP will begin in 2024.

Variance from Approved Study Plan

The study is proceeding in accordance with the approved study plan except the study area has expanded to incorporate a temporary access road (Figure 1). Potential water quality effects associated with the temporary access road would be addressed in the WQMP.

5.0 AQUATIC RESOURCES STUDY

The Aquatic Resources RC met on April 6, 2023. During that meeting, Duke Energy was asked to modify the methodology for the desktop entrainment study and mussel and stream habitat quality surveys.

The components of the Aquatic Resources Study and status of each are provided below:

- **Entrainment:** The updated desktop entrainment study report was provided to Aquatic Resources RC members and discussed at an Entrainment Consultation Meeting held with the Aquatic Resources RC on April 6, 2023. The outcome of this meeting was to update the entrainment analysis to include additional factors such as historical operations data, influence of operations with the addition of solar usage, pumping periods (2, 4, 6, 8, 10, and 12 hours), time period (day versus night), lake levels, and water temperature. The final report will be provided to the RC members during the fourth quarter of 2023.
- **Desktop Studies on Pelagic and Littoral Habitat Effects:** This effort will use results of the CFD and CHEOPS modeling from the Water Resources Study. CFD modeling results will be used to qualitatively evaluate potential effects to Lake Jocassee stratification, dissolved oxygen, and temperatures throughout the water column. CHEOPS modeling results will be used to assess potential effects within the littoral zone with a focus on lake level fluctuation effects. See Section 4.0 for an update on the CFD and CHEOPS modeling.
- **Mussel Surveys and Stream Habitat Quality Surveys:** Fieldwork for the surveys will begin in July 2023 to evaluate construction of the Bad Creek II Complex. In accordance with the approved study plan, stream habitat assessments for streams in potential upland spoil locations will be completed with the U.S. Environmental Protection Agency Rapid Bioassessment Protocol (USEPA RBP) Stream Habitat Assessment data form. The North Carolina Stream Assessment Method (NCSAM) will also be completed to provide additional information regarding stream quality and function. Duke Energy is currently consulting with the South Carolina Department of Natural Resources (SCDNR; calls held

on May 24 and June 21, 2023) regarding stream surveys for waters crossed by the potential temporary access road described in Section 3.0 and the spoil disposal areas.

Variance from Approved Study Plan

The study is proceeding in accordance with the approved study plan. The methodology for stream habitat and biological assessments for streams crossed by the temporary access road and spoil areas is currently under development in consultation with the SCDNR.

6.0 VISUAL RESOURCES STUDY

The viewshed model has been developed. Duke Energy has scheduled a July meeting with the Recreational Resources RC to identify potential Key Views. Photographs will be taken from the Key Views in November 2023 during leaf-off conditions.

Variance from Approved Study Plan

The study is proceeding in accordance with the approved study plan. The temporary access road route has been incorporated into the viewshed model.

7.0 RECREATIONAL RESOURCES STUDY

The Recreational Resources RC met on March 28, 2023, to discuss the Recreational Resources Study methodology and schedule. The components of the Recreational Resources Study and status of each are provided below:

- **Foothills Trail Recreation Use and Needs (RUN) Study:** Data were collected at Musterground Road between September 2022 and mid-January 2023, and again between March 20 and May 10, 2023. Data collection at the other access areas began in March 2023 and is scheduled to continue through November 2023.
- **Foothills Trail Condition Assessment:** Fieldwork began in May 2023. Duke Energy anticipates distributing a draft study report for Recreation RC review in the fourth quarter of 2023.
- **Whitewater River Cove Existing Recreational Use Evaluation:** Drone flights to capture recreational boating in the Whitewater River cove began Memorial Day weekend. Duke Energy anticipates distributing a draft study report to Recreational Resources RC members in the fourth quarter of 2023.
- **Whitewater River Cove Recreation Public Safety Evaluation:** This effort will integrate the CFD modeling velocity data developed in the Water Resources Study with the



Whitewater River cove recreational use data captured during the 2023 boating season. The draft report will be distributed to Recreational Resources RC members in the spring 2024.

Variance from Approved Study Plan

The study is proceeding in accordance with the study plan as modified by FERC.

8.0 CULTURAL RESOURCES STUDY

The archaeological survey began in March and is scheduled to be complete by August 2023. Duke Energy anticipates the draft survey report will be distributed to the South Carolina State Historic Preservation Office, federally-recognized Indian Tribes, and other consulting parties in the fourth quarter of 2023.

Variance from Approved Study Plan

The study is proceeding in accordance with the approved study plan except the geographic scope of the study area has been expanded to encompass the proposed temporary access road (Figure 1). Duke Energy will be consulting with the South Carolina State Historic Preservation Office (SCSHPO) and Tribes to formally document the change to the Area of Potential Effect, as originally conveyed via letter dated December 9, 2022.

9.0 ENVIRONMENTAL JUSTICE STUDY

Duke Energy distributed the draft study report to the Operations RC on June 6, 2023. The report identified Environmental Justice (EJ) communities within the 5-mile buffer area. However, results indicate there may be no adverse effects to EJ communities, so the public outreach meeting included in the study plan may not be warranted. The need for such a meeting will be discussed with the Operations RC during the summer of 2023 in conjunction with its review of the draft study report.

Variance from Approved Study Plan

The study is proceeding in accordance with the approved study plan.