AQ 1 – HYDROLOGY
TECHNICAL STUDY PLAN

Kern River No. 1 Hydroelectric Project
FERC Project No. 1930

February 2024

TECHNICAL STUDY PLAN
AQ 1 – Hydrology

POTENTIAL RESOURCE ISSUES

- Modification of Kern River hydrology.

PROJECT NEXUS

- Project operations modify the hydrology in the bypass reach[1].

RELEVANT INFORMATION

The following information is available to characterize hydrology in the vicinity of the Kern River No. 1 Project. See Pre-Application Document (PAD) Section 3.3, Water Use and Hydrology for a summary of water use and hydrology information.

- California Regional Water Quality Control Board (CRWQCB), Central Valley Region, Water Quality Control Plan for the Tulare Lake Basin (CRWQCB 2018)
- FERC's Order Issuing New License, Kern River No. 1 Hydroelectric Project (FERC 1998)
- United States Army Corps of Engineers (USACE) Isabella Situation Report (USACE 2022)
- United States Geological Survey (USGS) Surface-Water Data for the Nation (USGS 2022)
    - Kern River near Democrat Springs (USGS Gage 1192500; SCE Gage 409) (daily, sub-daily)
    - Kern River No. 1 Conduit near Democrat Springs (USGS Gage 11192000; SCE Gage 410) (daily, sub-daily)
    - Kern River near Democrat Springs + Conduit (USGS Gage 11192501)

POTENTIAL INFORMATION GAPS

- Model of the Project operations under different flow regimes.
- Hydrologic alteration analyses of the flow regime with and without the Project.

[1] A bypass reach is a segment of a river downstream of a diversion facility where Project operations result in the diversion of a portion of the water from the river.

STUDY OBJECTIVES

- Develop a model of the Project operations with and without the Project diversion and refine (as needed) the analysis of hydrology presented in the PAD Section 3.3, Water Use and Hydrology.

- Perform a hydrologic alteration analysis of flows related to Project diversions.

EXTENT OF STUDY AREA

The study area includes the bypass reach on the Kern River from Democrat Dam to the Kern River No. 1 Powerhouse Tailrace.

STUDY APPROACH

The following describes the study approach for developing the Project Operations Model, conducting a hydrologic alteration analysis, and reporting.

HYDROLOGY DEVELOPMENT

- Conduct stakeholder hydrological modeling meetings to review and help guide the hydrological modeling approach.

- Use the 1998–2021 period of record (POR) for hydrological modeling based on data availability (historical gage data).

- Develop and use a spreadsheet operations model to characterize Project operations daily average flow hydrology for the POR. If there are issues identified in the historical hydrology / project operations that require sub-daily resolution, then in collaboration with stakeholders SCE will identify / implement a modeling approach to address sub-daily flow changes.

- SCE does not propose to independently model the effect of climate change on inflow hydrology. Project inflow is controlled by operations of Lake Isabella by the Army Corps of Engineers (ACOE) and schedule flow releases by the Kern River Water Master. If existing climate change modeling for Lake Isabella releases (inflow to the Kern No. 1 Project) is available over the Kern No. 1 POR, then SCE will incorporate the existing climate change inflow data into the Project hydrology model.

- Coordinate with other study plans / analyses (e.g., recreation, riparian) to ensure the model addresses their needs.

HYDROLOGIC ALTERATION ANALYSIS

- Analyze and compare hydrology using the following data and approaches (e.g., Richter et al. 1996):

    - Monthly flow exceedance plots / tables for the POR.

- Time-series plots for the POR.
- January to December (annual) plots / tables showing mean daily and 95%, 90%, 75%, 50% (median), 25%, 10%, and 5% exceedance flows.
- Tables and summary analysis showing differences in the following:
    - Monthly timing and magnitude of mean and median flow conditions (e.g., high and low flows).
    - Magnitude, duration, and timing of annual high flow and low flow conditions (1-day, 3-day, 7-day, monthly, etc.), including the presence of pulse flow events.
    - Rate, timing, and frequency of hydrograph changes (e.g., rate and timing of the declining limb of the spring high flow hydrograph). Use the gage data that is available electronically to characterize flow changes on a sub-daily basis (depending on data availability).

REPORTING

- The study methods and results will be documented in an AQ 1 – Hydrology Technical Study Memo (TSM). The TSM will include summary tables and maps, as appropriate. Stakeholder review and comment period for the TSM is identified below in the schedule.
- Upon request, data will be provided to resource agencies and interested stakeholders in an Excel spreadsheet (electronic format).

SCHEDULE

This is a one-year study to be conducted during the first year of the study period with the study results reported in the Initial Study Report (ISR).

Date	Activity
April 2024–August 2024	Collaborate with stakeholder on the approach for refining the hydrology, as appropriate, and developing the Project Operations Model.
July 2024–October 2024	Refine the Project hydrology and associated operations model
October 2024–December 2024	Complete the hydrologic alteration analysis
July 2024–January 2025	Prepare draft technical memo
January 2025	Distribute draft technical memo to stakeholders
February 2025–April 2025	Stakeholders review and provide comments on draft technical memo (90 days)
May 2025–July 2025	Resolve comments and prepare final technical memo
December 2025	Distribute final technical memo in the Draft License Application

REFERENCES

CRWQCB (California Regional Water Quality Control Board). 2018. Water Quality Control Plan for the Tulare Lake Basin. Central Valley Region. Third Edition. Revised May 2018.

FERC (Federal Energy Regulatory Commission). 1998. Order Issuing New License (Major Project), Project No. 1930-014. 83 FERC ¶ 62,241. June 16.

Richter, B.D., J.V. Baumgartner, J. Powell, and D.P. Braun. 1996. A method for assessing hydrologic alteration within ecosystems. Conservation Biology 10:1163-1174.

USACE (U.S. Army Corps of Engineers). 2022. Isabella Situation Report. November. Accessed: November 2022. Available online at: https://www.spk.usace.army.mil/Portals/12/documents/civil_works/Isabella/SitReps/2022/Isabella_SitRep_NOV2022.pdf?ver=iISuUIb07gIqZoZKE8OPYg%3d%3d.

USGS (U.S. Geological Survey). 2022. Surface-Water Data for the Nation. Accessed: November 2022. Available online at: https://waterdata.usgs.gov/nwis/sw.