Legislation Text

File #: 2026-0700, **Version:** 1

To: Board of Directors, Sonoma County Water Agency
Department or Agency Name(s): Sonoma County Water Agency
Staff Name and Phone Number: Grant Davis 707-547-1911, Stephen Maples 707-836-6132
Vote Requirement: Majority
Supervisorial District(s): Countywide

Title:
Water Resources Investigations and Modeling Studies to Evaluate Streambed Clogging Impacts on Riverbank Filtration & Vulnerability to Streambed Clogging Under Hydrologic Variability

Recommended Action:
A) Authorize Sonoma County Water Agency's General Manager to execute an agreement with United States Geological Survey, in substantially the form presented to this Board, for water resources investigations from July 1, 2026, to June 1, 2028, in the not-to-exceed amount of $187,500.
B) Authorize Sonoma County Water Agency's General Manager to execute an agreement with Lawrence Berkeley National Laboratory, in substantially the form presented to this Board, for water resources investigations and modeling studies from July 1, 2026, to June 30, 2027, in the not-to-exceed amount of $210,000.
C) Authorize Sonoma County Water Agency's General Manager to terminate or amend the agreements with approval of County Counsel, and authorize the General Manager to extend the term, make modifications to the scope of work, and increase costs provided amendments do not cumulatively increase the total cost to Sonoma County Water Agency beyond $375,000 and $420,000 for USGS and LBNL, respectively.

Executive Summary:
Sonoma County Water Agency (Sonoma Water) uses riverbank filtration (RBF) as a low-cost and sustainable alternative to traditional drinking water treatment. RBF relies on maintaining the natural hydraulic connection between surface water and groundwater across the streambed of the Russian River. Extreme hydrologic events have been shown to alter hydraulic connectivity between surface water and groundwater and potentially impact the water-withdrawal efficiency of Sonoma Water's RBF system. Climate projections suggest increasing intensity of both droughts and floods in the future. Sonoma Water, the United States Geological Survey (USGS), and Lawrence Berkeley National Laboratory (LBNL) have a continued interest in collaborating on studies that provide data to better understand how extreme hydrologic events may impact water withdrawal efficiency and operational reliability of Sonoma Water's RBF facilities. This item requests authorization for Sonoma Water's General Manager to execute joint funding agreements with USGS and LBNL to collaboratively conduct data analysis, modeling, and studies.

Discussion:
HISTORY OF ITEM/BACKGROUND
Sonoma Water serves over 600,000 residents in portions of Sonoma and Marin counties, using RBF as a low-

cost and sustainable alternative to traditional drinking water treatment. Sonoma Water's RBF system draws water from the Russian River through underlying alluvial sediments using six radial collector wells adjacent to the river. Because Sonoma Water's RBF operations rely on natural streambed processes to provide filtration benefit, they are affected more directly by changes in environmental conditions (e.g., droughts, floods, nutrients) than conventional systems. Thus, careful and ongoing study is needed to evaluate operational vulnerabilities. Past research has shown that Sonoma Water's RBF system can be vulnerable to streambed clogging, which reduces the capacity of the streambed to transmit water to collector wells and reduces RBF efficiency. Streambed clogging can be caused by a combination of physical, mechanical, biological, and chemical processes in the streambed.

Sonoma Water's RBF system has been observed to be especially vulnerable to streambed clogging during drought conditions. The vulnerabilities were highlighted most recently during the 2020-2022 drought, when water levels in Collector 6 dropped below operational thresholds for an extended period. Past research suggests that a combination of low summer flows and associated elevated water temperatures, as well as prolonged inflation of the seasonal dam, accelerate streambed biomass growth, while the absence of rainy-season high-flow events, which typically scour and redistribute riverbed sediments, likely increases the duration and magnitude of streambed clogging. However, more research is needed to understand the roles river velocities, temperatures, water quality, microbial activity, and riverbed scouring have on the relationship between streambed clogging and collector-well water-withdrawal efficiencies.

Results from research efforts by USGS and LBNL will inform RBF operations of potential vulnerabilities and explore opportunities to improve water production efficiency and overall system resiliency.

Sonoma Water, LBNL, and USGS began collaborating on this work under prior agreements; however, additional time is required to complete the work, and a new scope is also required.

AGREEMENTS

Agreement with USGS:

Sonoma Water will coordinate with USGS to leverage Sonoma Water's extensive monitoring datasets to determine the primary drivers influencing RBF operational vulnerabilities under hydrologic extremes. Data sources include a combination of (1) surface water discharge, (2) surface water, groundwater, and streambed pore-water chemistry and microbiology metrics, and (3) streambed infiltration, bathymetry and saturation estimates. Goals of the study are to identify environmental drivers (winter storms, temperature, water quality) related to variability in abundance, structure, and persistence of microbial biomass within the hyporheic zone at Sonoma Water's RBF sites. USGS will perform an integrated analysis to improve understanding of streambed connectivity, surface water-groundwater interactions, and RBF capacity during hydrologic extremes; identify key indicators of system vulnerability; and develop predictive thresholds to inform operational decision-making. Study findings will be summarized in a peer-reviewed journal article.

The cost of services for the agreement with USGS will not exceed $187,500. This agreement covers services rendered from July 1, 2026, to June 1, 2028.

Agreement with LBNL:

The goal in the scope of work under this agreement is to simulate biogeochemical and hydrologic processes and feedbacks in an integrated fashion to identify threshold conditions that signal vulnerabilities in the RBF

system performance (e.g., critical reductions in collector well efficiency from streambed clogging events). This phase of research builds on previous data collection and modeling efforts to develop a calibrated/validated variably-saturated, multi-phase flow model, that incorporates Bayesian geostatistical methods to represent subsurface hydrogeologic heterogeneity and streambed bathymetry, to better understand streambed clogging phenomena and its impacts on RBF water production. This aims to develop a mechanistic predictive capability of the RBF system to extreme hydrologic variability. LBNL will integrate all available geophysical data into a 3D model structure and use Bayesian Inversion to derive a final model with structural and parametric identifiability.

The cost of services for the agreement with LBNL will not exceed $210,000. This agreement covers services rendered from July 1, 2026, to June 30, 2027.

REQUEST FOR SONOMA WATER GENERAL MANAGER AMENDMENT AND TERMINATION AUTHORITY

Consistent with other agreements, staff recommend that the Board authorize Sonoma Water's General Manager to amend or terminate the agreement with approval of County Counsel. Staff recommend that the Board authorize Sonoma Water's General Manager to amend the agreements to extend the term, make modifications to the scope of work, and increase costs provided amendments do not cumulatively increase the total cost to Sonoma Water beyond $375,000 and $420,000 for USGS and LBNL, respectively. These agreements augment Sonoma Water's longstanding research collaborations with USGS and LBNL to better understand the natural processes contributing to RBF. Given that these agreements fund research activities, it can be challenging to define all the outcomes prescriptively. As research findings emerge, additional phases of work may be identified that warrant continued collaboration. The flexibility to amend the agreements to provide additional funding, modify the scope of work, and extend the term helps ensure the studies can fully achieve their stated objectives.

County of Sonoma Strategic Plan Alignment:

N/A

Sonoma Water Strategic Plan Alignment

Goal: Planning and Infrastructure

Strategy: Conduct planning that integrates and balances operational, maintenance, and infrastructure priorities.

Action: Continue to engage in planning efforts and partnerships to protect and enhance our water supply.

Brief Description: Results from these studies will inform RBF operations of potential vulnerabilities and explore opportunities to improve water production efficiency.

Goal: Climate Change

Strategy: Develop and implement practices to understand and minimize vulnerability to climate change impacts.

Action: Ensure alignment with the Board-approved Climate Adaptation Plan by establishing interdisciplinary climate resilience teams.

Brief Description: Climate projections suggest increasing intensity of both droughts and floods in the future. Results from these studies will help identify potential vulnerabilities of RBF to hydrologic extreme events.

Racial Equity:

Was this item identified as an opportunity to apply the Racial Equity Toolkit?
No

Prior Board Actions:
12/13/2022: Board authorized the General Manager of Sonoma Water to enter into agreements with USGS and LBNL for water resources investigations to evaluate streambed clogging impacts on the riverbank filtration.

FISCAL SUMMARY

Expenditures	**FY26-27 Adopted**	**FY27-28 Projected**	**FY28-29 Projected**
Budgeted Expenses			
Additional Appropriation Requested	$397,500		
Total Expenditures	**$397,500**		
Funding Sources			
General Fund/WA GF			
State/Federal			
Fees/Other	$397,500		
Use of Fund Balance			
General Fund Contingencies			
Total Sources	**$397,500**		

Narrative Explanation of Fiscal Impacts:
Additional appropriations in the amount of $397,500 from the Water Transmission Fund are required to process this expense. With board approval, unused appropriations in the amount of $397,500 will be rolled forward to FY 26/27 in Sonoma Water's Q1 consolidated budget adjustments.

Staffing Impacts:			
Position Title (Payroll Classification)	**Monthly Salary Range (A-I Step)**	**Additions (Number)**	**Deletions (Number)**

Narrative Explanation of Staffing Impacts (If Required):
N/A

Attachments:
Attachment 1: Draft Agreement with USGS
Attachment 2: Draft Agreement with LBNL

Related Items "On File" with the Clerk of the Board:

None.