Gunlock Groundwater Study

Characterizing the Aquifer Recharge & Defining Actual Sustainable Yield for Water Supply Optimization

Washington County Water Conservancy District

Category A Applicant Contact Information

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Table of Contents

Executive Summary

Date:	10/17/2023
Applicant:	Washington County Water Conservancy District 533 E Waterworks Dr St. George UT 84770
Applicant Category:	A

WCWCD, with the support of the Virgin River Program and the USGS, will conduct a thorough groundwater study around the Gunlock Reservoir of Washington County, Utah to characterize the aquifer recharge and determine the actual sustainable yield. The study will involve compiling and reviewing available information and previous studies, characterizing groundwater and surface water, identifying trends, and creating a groundwater model. The project will be outsourced to an engineering firm specializing in hydrogeology, who may determine a need to drill observation wells. The tools and data collected will inform water managers and local conservation groups, and support the WCWCD's 20-Year Plan in addressing the projected water imbalance due to growth, droughts and floods. The project is estimated to take approximately 1.5 years with a completion date of no later than December 31st, 2026.

Note: this project is not located on a Federal facility.

Technical Project Description

As a water district, the WCWCD meets the definition of a "Category A" applicant. This project (study) will be contracted by an engineering firm specializing in hydrogeological studies. The activities identified include the following:

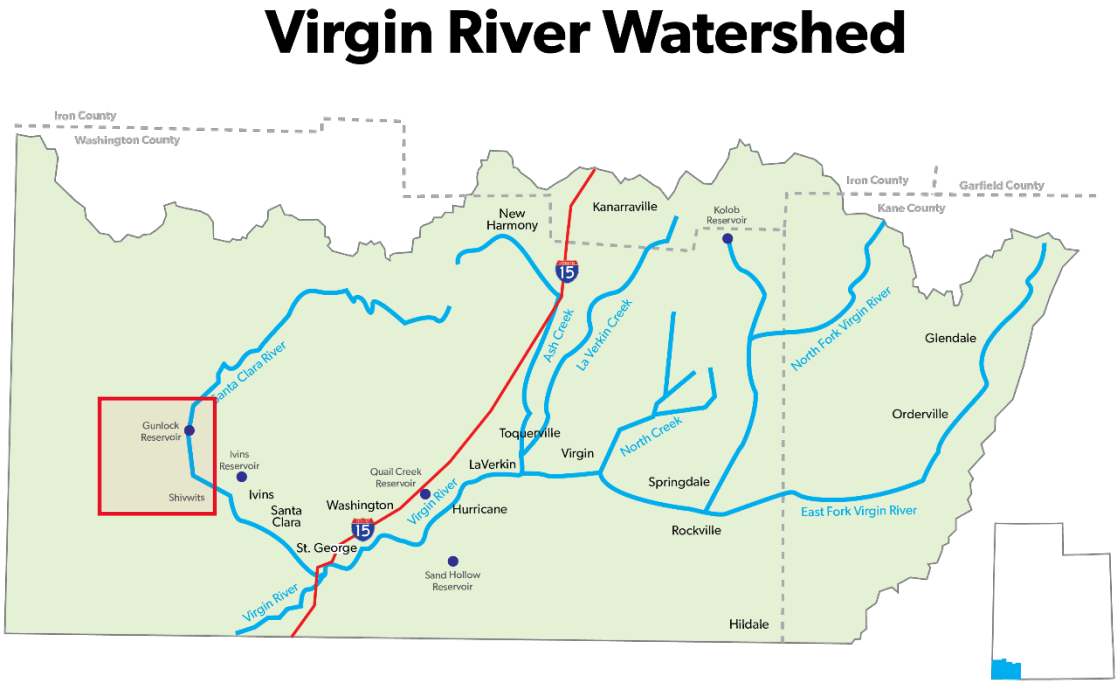
1. Compile & Review Available Information & Previous Studies
2. Characterize Surface Water System
3. Characterize Groundwater System
4. Create Conceptual Groundwater Model
5. Inventory and Assess Approved Water Right Applications
6. Inventory Historic and Current Water Diversions
7. Characterize and Identify Trends in Groundwater Levels
8. Characterize and Identify Trends in Surface Water Flows
9. Create Water Budget
10. Identify Data Gaps
11. Prepare for and Attend Meetings
12. Prepare Phase 1 Report - Estimate of Sustainable Yield
13. Consider the potential need to drill observation wells

There are several historical studies such as the 2003 USGS Geological Survey, "Planning, monitoring, and data interpretation regarding groundwater / surface water interaction along the Santa Clara River below Gunlock Reservoir" and other technical publications that will be reviewed, along with available historic data of water rights, water diversions, water levels, and flows. The preliminary goals of the project are to develop a Water Budget and to identify gaps in the available data, and the overall objective is to

define a more accurate sustainable yield of that source.

Project Location

Washington County is in the southwest corner of Utah. It is approximately 300 miles southwest of Salt Lake City and approximately 122 miles northeast of Las Vegas. The elevation varies from 2,178 to 10,365 feet. Washington County is made up of three major geographic areas, the Colorado Plateau in the east-northeast, the Great Basin in the northwest and the Mojave Desert in the south-southwest. The Gunlock Reservoir and surrounding area are located in the western part of the county along the Santa Clara River that runs north-south.



E.1.1. Evaluation Criterion A – Water Management Challenge(s) (30 points)

Describe the water management challenge(s). Describe in detail the water management challenge that is occurring within your project area. Describe the severity of the challenge to be addressed with supporting details. For example, will your project **address water supply shortfalls or uncertainties**, the need to meet competing demands for water and the **lack of reliable water supplies for municipal, agricultural, tribal, environmental or recreational water uses**, complications arising from drought, conflicts over water, or other water management issues?

Washington County Water Conservancy District's (District) 2022 Master Plan water supply analysis determined that, as of 2028, the District will not have enough water to meet the demands of the area's growing population without immediate action. We will need an additional 2,296 AFY to meet the 2028 projected ERC count of 97,557—an increase of more than 12,000 ERCs from today. Population growth, requests for water from mining companies, cities fulfilling construction contracts, and water requirements for local wildlife and conservation agreements impact water demand. Concurrently, climate change is threatening supply with diminishing snowpack depths and reduced spring runoff, and more intense, less frequent rainfall. Furthermore, an abnormally dry year would create a deficit for the

following year. If water supply remains unchanged over the years, demand is still projected to outpace supply in 4 years. While regional conservation efforts are successfully reducing per capita water use, those efforts are projected to be insufficient for offsetting the increasing demand.

Washington County's sole source of water is the Virgin River Basin comprised of the Virgin River and several of its tributaries. Among the tributaries of the Virgin River within the basin, the Santa Clara River runs north to south in the western portion of the county. Along the Santa Clara River, the District constructed an on-stream reservoir—Gunlock Reservoir, to store water and provide the public with a recreational waterbody under State Park management. Surrounding the reservoir is the Gunlock wellfield owned and operated by the City of St George. St George City pumps water from the wells and distributes within its own system for potable and secondary use and also to users of the Santa Clara Project (SCP). The SCP consists of the several stakeholders on the Santa Clara River, and is managed by the WCWCD as agreed upon in the Santa Clara Project Agreement. Stakeholders include municipalities, irrigation companies, the Utah Department of Natural Resources, the Shivwits Band of the Paiute Tribe of Utah, and the Virgin River Program. The Virgin River Program supports Virgin River Spinedace (Sensitive Species) recovery on the Santa Clara River. These competing demands for water create nuanced water management challenges on this river, and the WCWCD is responsible for managing this limited water supply.

At present, the amount of groundwater pumped, and surface water stored is determined based on assumptions of reliable yield, yet actual reliable yield and aquifer recharge characteristics are not well understood. The City of St George currently pumps based on an assumed baseline reliable annual yield of approximately 9,800acre-feet from the Gunlock wells. This assumption is based on approved water rights. However, due to seasonal variations in source availability, the reliable yield of municipal supplies was estimated to be less than the total paper water rights associated with those supplies. As a result, it is unclear how much water can be pumped from the Gunlock wellfield without depleting supplies.

To address the larger, regional challenge of meeting demand, the WCWCD created a 20-Year Plan to optimize water supply. The plan combines conservation methods, a regional re-use system, agricultural conversion, and groundwater optimization. The groundwater optimization component includes the Gunlock Groundwater Study for improving water management practices and decisions along the Santa Clara River. The Gunlock Groundwater Study, along with other actions in the 20-year plan must be successfully executed to secure water for the immediate and long-term future.

Describe the concerns or outcomes if this water management challenge is not addressed?

With additional studies of Gunlock groundwater supplies, it may be possible to determine that some or all of this water is in fact reliably available from year to year or could be reliable with additional investment in infrastructure. On the other hand, studying the aquifer recharge characteristics may suggest a smaller reliable yield. Commissioning such studies on the Gunlock aquifer would help refine these estimates on reliable yield and improve water management overall. As we look at the effect of climate change and long-term drought, and continued growth, it is essential to have a baseline understanding of the Gunlock groundwater aquifer and a clear understanding of the reliability of that source.

Consequently, there are at least 2 major concerns/outcomes if this water management challenge is not addressed:

1. the assumed baseline reliable annual yield has been overestimated and the City of St George might pump more water than can be recharged—ultimately depleting the source, and
2. the assumed baseline reliable annual yield was underestimated, and more water could be sourced to help meet the demand.

Explain how your project will address the water management issues identified in your response to the preceding bullets and provide support for your response. For example, will your project improve water management by supporting: **water supply reliability for** municipal, agricultural, tribal, environmental or recreational water uses, management of **water deliveries**, **drought management** activities, **conjunctive use** of ground and surface water, **water rights** administration, ability to meet **endangered species requirements**, **watershed health**, **Restore a natural feature** or use a nature-based feature to reduce water supply and demand imbalances, the risk of drought or flood, or to increase water supply reliability for ecological values, **conservation and efficiency**, or **other improvements** to water supply reliability.

Given the diversity of stakeholders in the Santa Clara River and Gunlock wellfield, the project will address water management issues by defining and quantifying the actual sustainable yield of the well field, which will provide essential information for best management of the water supply. As such, the data collected with the Gunlock Groundwater Study will support water supply reliability, management of water deliveries, drought management, conjunctive use of surface and groundwater, water rights administration, and watershed health. Accurate data will clarify the relationship between the groundwater aquifer and the river channel, and will allow for the calculation of an actual baseline reliable annual yield. With accurate data and a more complete understanding of the aquifer characteristics, the District can achieve the following:

1. Recalibration of previous studies and forecasts to more accurately define current and future water needs compared to supply,
2. Better maintain sufficient reservoir levels to recharge the aquifer with consideration to pumping rates and in-stream water requirements,
3. Accurately fulfill water rights without over- or under-delivering,
4. More confidently balance water uses with habitat requirements, specifically for the Virgin Spinedace which is found upstream and downstream of Gunlock Reservoir. The species was proposed to be listed, but is managed by the state and partners (including the District) as a state conservation species.
5. Improve watershed health by exploring options for managed (trench, etc.) aquifer recharge in the Gunlock area to maximize water in years of excess.

E.1.2. Evaluation Criterion B—Project Benefits (30 points)

Describe how the need for the project was identified. Was the proposed project identified using a collaborative process with input from multiple and diverse stakeholders?

While working to update the District's 2022 Master Plan and engaging with local stakeholders (Regional Water Supply Technical Advisory Committee meetings), an urgent need for additional water supplies was identified. The comparison of current and projected water demand with current and projected water supply resulted in the determination that demand will exceed supply in 5 years. In response, the District established a 20-year Plan with the assistance of Bowen Collins & Associates that identifies projects to increase supply. These projects include seeking additional water supplies as well as gathering

data to better understand the reliability of existing water supplies. The data or information will be used in hydrological models that will illustrate the groundwater aquifer recharge characteristics needed to make improved water management decisions now and for the future. This data will be shared with the USGS, the City of St George, the Virgin River Program (VRP), and other interested entities. The USGS, local municipalities, and the VRP all have a direct and continued interest in the reliability/sustainability of the groundwater and surface water in the area.

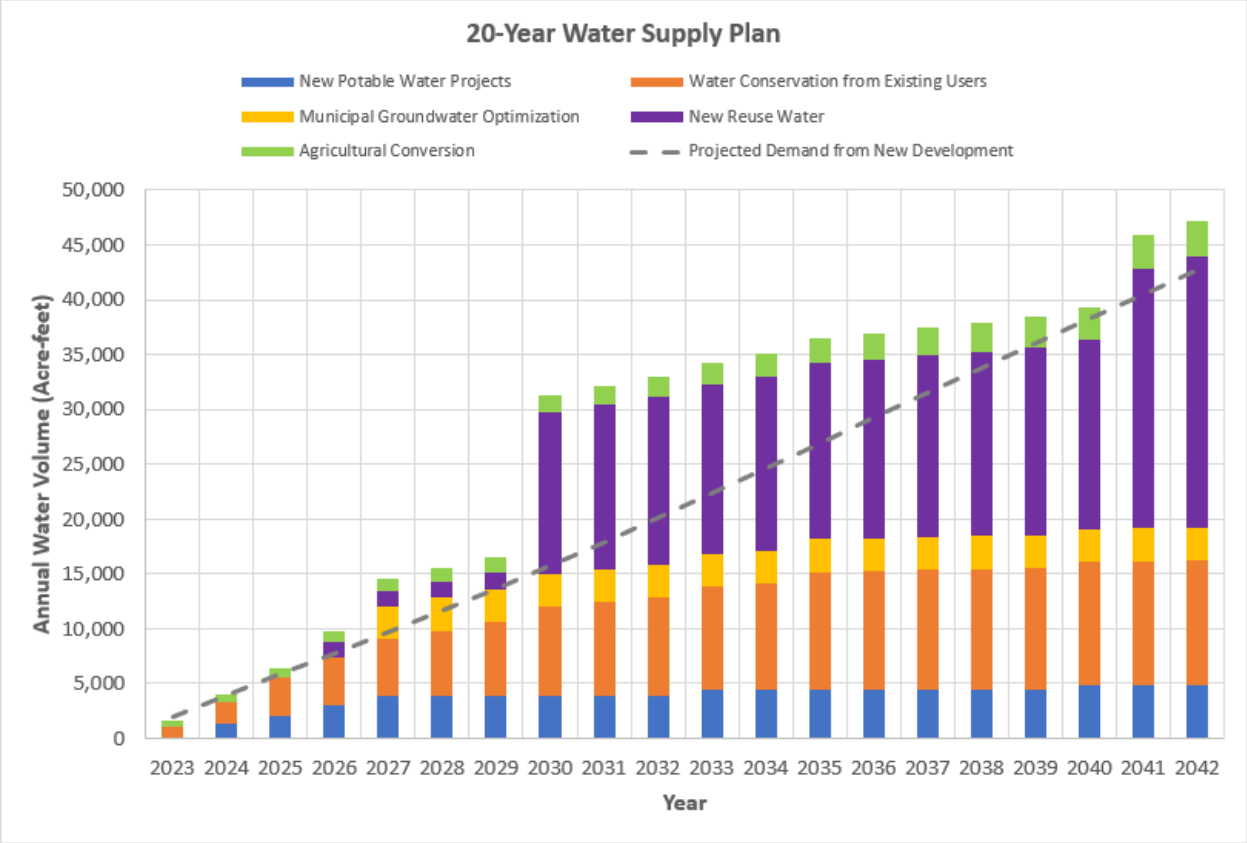


Figure 1. Total Projected Water Supply Need vs. Future Water Supply.

Describe how the tool, method, or information will be applied and when will it be applied.

As soon as the information is determined, the data will be used to recalibrate models projecting future supply. With more accurate data, the City of St George will be able to analyze their pumping practices and adjust for sustainable use. The District will be able to more accurately operate the Santa Clara Project Agreement, and the USGS will have new data for their own hydrologic models of the area. The information gathered will be one step toward fulfilling the District's 20-year plan to enhance drinking water reliability.

Will the tool or information be used immediately, or will additional work need to be done before the tool will be used?

The 20-Year plan assumes that studies like the Gunlock Groundwater Study could conclude that an additional 3,000 AFY of reliable yield is available in municipal groundwater supplies. This 3,000 AFY would be considered the additional supply under the 50th percentile yield scenario. While the

information will be immediately available to improve water management decisions, it is likely that the groundwater studies may identify a need for additional infrastructure to increase system reliability.

Describe, in detail, the extent of benefits that can be expected to occur upon implementation of the project, and provide support for your responses.

The WCWCD will make the data available to any interested entities, though it is expected to provide beneficial information to the WCWCD and St George City, the Virgin River Program (VRP), and The USGS Utah Water Science Center. In letters of support, both the USGS and VRP identified that having this data will be relevant and useful in understanding and managing groundwater and surface water resources. The VRP specified that the data would improve their watershed models and water management decisions, particularly relating to the protection of native and petitioned fish species in the Santa Clara River basin. The USGS stated that the data would improve their watershed models and water management decisions as well. The project/study will offer more conclusive and accurate data that will ultimately dictate the best management for long-term water optimization in the face of increasing demands and possibly diminishing supplies on a regional level.

Explain how your project complements other similar efforts in the area where the project is located. Will your project complement or add value to other, similar efforts in the area, rather than duplicate or complicate those efforts? Are there other similar efforts in the area that have used a similar methodology successfully which can be complimented?

This project will complement the WCWCD's 20-Year Plan to secure new water supplies for Washington County. The Plan incorporates a combination of 5 initiatives: 1- Water Conservation, 2- Regional Reuse System, 3- Water Development Projects, 4- Agricultural Conversion, and 5- Municipal Groundwater Optimization. The Gunlock Groundwater Study falls under "municipal groundwater optimization." According to the 20-Year Plan, optimization of municipal groundwater may add another 3,000 AFY to the water supply if it is determined that the area's groundwater rights may reliably generate more supply than current working estimates. The municipalities combined have about 6,624 AFY in water rights that are not utilized due to uncertainty about the reliability of the groundwater sources. Hydrologic studies such as the Gunlock Groundwater Study may conclude that some of that water is reliably available.

Applicants should make a reasonable effort to explore and briefly describe related ongoing projects. Consider efforts by any Federal, state, local agency, or non-governmental organizations.

As stated in the WCWCD's 20-Year Plan, water conservation is expected to generate about 11,400 acre feet per year (AFY) of additional supply, primarily through the district's lawn replacement program plus a variety of other measures, including reducing system loss, improving existing water conservation rate structures, and installing Advanced Metering Infrastructure (AMI) meters. The Regional Reuse System will produce about 24,200 AFY of additional supply, through the construction of new treatment facilities, pipelines, and storage reservoirs to capture reuse water and put it to use for agricultural and irrigation purposes, freeing up water for drinking. Potable Water Development Projects will add about 4,800 AFY of additional water. These projects include the new Toquer Reservoir, expansion of the Sullivan/Cottom Wells, Cove Reservoir in Kane County, redevelopment of the Ence Wells, and a well in Diamond Valley. Lastly, Agricultural Conversion may generate 3,215 AFY of available water as land historically used for farming or ranching converts into land for municipal development. However, the success of the Plan

requires collaboration and commitment to developing projects, conducting studies, and conservation.

E.1.3. Evaluation Criterion C—Project Implementation (20 points)

Up to 20 points may be awarded based upon the extent to which the applicant is capable of proceeding with the project upon entering into a financial assistance agreement. Applicants that describe a detailed work plan (e.g., estimated schedule that shows the stages and duration of the proposed work and identifies major tasks, milestones, and dates) and a budget that is appropriate for the work proposed and has a reasonable level of detail will receive the most points under this criterion. Your responses should reflect an understanding of the tasks required to complete the project within the required 2-year timeframe. Please respond and provide support for your responses to each of the following sub-criteria.

		Plan Estimates			Estimated Total Cost
Task #	**Task Description**	**Hours**	**Start Date**	**End Date**	
1	Compile & Review Available Information & Previous Studies	150	3/1/2024	5/15/2024	$31,000
2	Characterize Surface Water System	80	3/15/2024	6/1/2024	$16,500
3	Characterize Groundwater System	120	3/15/2024	7/1/2024	$24,500
4	Create Conceptual Groundwater Model	160	7/1/2024	11/1/2023	$34,000
5	Inventory and Assess Approved Water Right Applications	80	11/1/2024	3/1/2025	$16,500
6	Inventory Historic and Current Water Diversions	40	11/1/2024	2/1/2025	$8,500
7	Characterize and Identify Trends in Groundwater Levels	120	2/1/2025	6/1/2025	$25,000
8	Characterize and Identify Trends in Surface Water Flows	40	2/1/2025	3/1/2025	$9,000
9	Create Water Budget	120	3/1/2025	7/1/2025	$26,000
10	Identify Data Gaps	80	6/1/2025	8/1/2025	$16,500
11	Prepare for and Attend Meetings	80	7/1/2025	8/1/2025	$21,000
12	Prepare Phase 1 Report - Estimate of Sustainable Yield	40	8/1/2025	9/1/2025	$13,000
	Totals	**1110**		**6939900**	**$241,500**

Provide a summary description of the products that are anticipated to result from the project. These may include data, metadata, digital or electronic products, reports, and publications. Note: using a table to list anticipated products is suggested.

Products anticipated to result from the project may include hydrologic models and electronic reports that characterize the aquifer and define its actual sustainable yield. Furthermore, the data should provide spreadsheets and graphics to describe the relationship between the groundwater and surface water.

Who will be involved in the project as project partners? What will each partner or stakeholder's role in the project be? How will project partners and stakeholder be engaged in the project and at what stages?

The project will be conducted by an engineering firm that may solicit information from the City of St George, WCWCD, USGS, the Virgin River Program and the Santa Clara Project. The engineering firm selection will begin with a notice for a Request for Statement of Qualifications for Hydrologic Modeling. The evaluation of firms submitting a Statement of Qualifications will be based on several qualifications that include relevant experience, experience on similar projects, specializations, a management plan, availability of staff, references, and more. The submissions will be reviewed by an evaluation committee consisting of no less than three individuals.

E.1.4. Evaluation Criterion D—Dissemination of Results (10 Points)

Up to 10 points may be awarded for proposals that can articulate how the results will be disseminated, transferred, and communicated directly with partners and resource managers within the Western United States. Please respond and provide support for your responses to each of the following sub-criteria. Note: All applicants whose projects are selected for funding will be expected to participate in at least one Reclamation-sponsored webinar to disseminate deliverable(s) and discuss ways to apply deliverables to management questions. Under this criterion, proposals will be evaluated based on other efforts, beyond the required webinar, that they will take to disseminate the results of their project.
Explain how project results will be disseminated, including:
Describe how the tools, frameworks, or analyses developed under the proposed scope of work will be disseminated, communicated, or made available to water resources managers who may be interested in the results.

The WCWCD will make the results publicly available, and the data may also be presented to municipal partners in the Regional Water Supply Agreement. The data will also be specifically provided electronically to the Virgin River Program, the USGS, and the City of St George. As a public agency, this information will further be available to anyone that requests it.

Though the WCWCD is managing this study and incurring costs, the project benefits a number of stakeholders on the Santa Clara River, as well as water users in the entire county. The results will be presented to stakeholders in the regularly scheduled meetings that are organized for the purpose of sharing information among regional water managers. It is likely that the engineering firm will be asked to facilitate presentations to explain their findings to such groups.

E.1.5. Evaluation Criterion E—Presidential and Department of the Interior Priorities (10 points)

Up to 10 points may be awarded based on the extent that the project demonstrates support for the Biden-Harris Administration's priorities, including **E.O. 14008: Tackling the Climate Crisis at Home and Abroad and E.O. 13985: Advancing Racial Equity and Support for Underserved Communities Through**

the Federal Government, and the President's memorandum, Tribal Consultation and Strengthening Nation-to Nation Relationships.

- Climate Change: E.O. 14008 emphasizes the need to prioritize and take robust actions to reduce climate pollution; **increase resilience to the impacts of climate change**; protect public health; and **conserve our lands, waters, oceans, and biodiversity**.

Water supply optimization studies and projects in Washington County have been identified as part of a solution to increase reliable yield to the stakeholders of the Santa Clara River, which consequently frees up more water for the rest of the county. In the southwest of Utah where the climate is defined by long dry spells and short, intense monsoonal rains, climate change poses a significant threat to water supply in the region. If periods of drought lengthen and more intense flooding occurs, water supple will be diminished by both lack of precipitation and the inability to capture water when it comes.

- Tribal Benefits: The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal trust responsibilities. The President's memorandum, Tribal Consultation and Strengthening Nation-to Nation Relationships, asserts the importance of honoring the Federal government's commitments to Tribal Nations.

The Shivwits Band of the Paiute Tribe (Shivwits) has a substantial water right (approximately 1,900 ac-ft per year) on the Santa Clara River. Its water right, along with other water rights on the river, is operated by the District under the Santa Clara Project Agreement (SCPA). As a participant in the SCPA and user of the water source, the Shivwits will also benefit from the availability of more accurate data, and thus improved water management.

The federal government entered into a water settlement agreement with the Shivwits, the WCWCD and other water users on the Santa Clara River. That settlement states that the Shivwits shall receive a specific allotment of water from the Santa Clara River every year, but that allotment is subject to reductions in dry years and reduced proportionally with other water users of the same priority date. Improved groundwater data may increase system reliability and enhance supply forecasts used to determine annual allocations.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Utah Water Science Center
2329 Orton Circle
Salt Lake City, Utah 84119-2047

To Whom It May Concern,

The United States Geological Survey Utah Water Science Center is pleased to offer support for the Washington County Water Conservancy District's (WCWCD) Gunlock Groundwater Study.
The USGS will benefit from this study since the data will be relevant and useful to ongoing collaborative projects between WCWCD and USGS in Washington County related to groundwater availability which serves to better understand water resources in the area. Currently, there is a lot of missing data and thus many assumptions made regarding water reliability in the area. With several stakeholders and their water rights in this water source, the development of more conclusive and accurate data will improve our watershed models and improve water management decisions.
The Gunlock Groundwater Study offered by WCWCD will benefit our organization, as well as the Santa Clara Project members and water customers throughout the county.

We are eager to receive the final product (data) of the Gunlock Groundwater Study and look forward to continued relations with the WCWCD.

Regards,

Tom Marston
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VIRGIN RIVER
PROGRAM

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October 16, 2023

To Whom It May Concern:

The Virgin River Program (VRP) is pleased to offer support for the Washington County Water Conservancy District's (WCWCD) Gunlock Groundwater Study.
The VRP will benefit from this study since the data will be relevant and useful for managing groundwater and surface water resources which serves to help us protect native and petitioned fish species in the Santa Clara River basin in southwestern Utah. Currently, there is a lot of missing data and thus many assumptions made regarding water reliability in the area. With several stakeholders and their water rights in this water source, the development of more conclusive and accurate data will improve our watershed models and improve water management decisions.
The Gunlock Groundwater Study offered by WCWCD will benefit our organization, as well as the Santa Clara Project members, the environment and water customers throughout the county.

I am eager to receive the final product (data) of the Gunlock Groundwater Study and look forward to continued relations with the WCWCD.

Regards,

Steve Meismer

Steve Meismer
Virgin River Program, Local Coordinator

WASHINGTON COUNTY
WATER
CONSERVANCY
DISTRICT

October 17, 2023

Bureau of Reclamation
U.S. Department of Interior

Re: WaterSMART—Applied Science Grants; Gunlock Groundwater Study

I, Karen Barnum, certify that the labor rates included in the budget proposal for the Gunlock Groundwater Study represent the actual labor rates of the identified personnel/position and are consistently applied to Federal and non-Federal activities.

Respectfully,

Karen Barnum
Accounting Barnum
karen@wcwcd.org