COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan

Water Project Summary

Name of Applicant	San Luis Valley Water Conservancy District
Name of Water Project	Project-01890 Rio Grande Basin Snow Measurement Enhancement
Grant Request Amount	**$45,000.00**
Primary Category	$45,000.00
Agricultural Projects	
Total Applicant Match	**$45,000.00**
Applicant Cash Match	$40,000.00
Applicant In-Kind Match	$5,000.00
Total Other Sources of Funding	**$45,000.00**
San Luis Valley Water Conservancy District	$35,000.00
Conejos Water Conservancy District	$2,500.00
Conejos Water Conservancy District	$5,000.00
San Luis Valley Water Conservancy District	$2,500.00
Total Project Cost	**$135,000.00**

Applicant & Grantee Information

Name of Grantee: San Luis Valley Water Conservancy District
Mailing Address: 623 Fourth Street Alamosa CO 81101
FEIN: 846,027,307

Organization Contact: Matt Hildner
Position/Title: Office Manager
Phone: 719-589-2230
Email: matt@slvwcd.org

Organization Contact - Alternate: Heather Dutton
Position/Title:
Phone: 719-589-2230
Email: heather@slvwcd.org

Grant Management Contact: Matt Hildner
Position/Title: Office Manager
Phone: 719-589-2230
Email: matt@slvwcd.org

Grant Management Contact - Alternate: Heather Dutton
Position/Title:
Phone: 719-589-2230
Email: heather@slvwcd.org

Engineering Contact: Clinton Phillips
Position/Title:
Phone:
Email: clinton@daveng.com

Description of Grantee/Applicant

The San Luis Valley Water Conservancy District (SLVWCD) was formed in 1949 to operate a reservoir at Wagon Wheel Gap, which was never built. The SLVWCD now operates an augmentation program within five San Luis Valley counties. Through the program, the SLVWCD replaces depletions to the Rio Grande and Closed Basin caused by domestic, commercial, municipal, and agricultural wells. This program ensures senior water rights are protected while allowing for economic growth in the San Luis Valley. The SLVWCD also works with partners to address issues such as groundwater sustainability, compliance with the Rio Grande Compact, water supply protection, and river health.

Type of Eligible Entity

- ☐ Public (Government)
- ■ Public (District)
- ☐ Public (Municipality)
- ☐ Ditch Company
- ☐ Private Incorporated
- ☐ Private Individual, Partnership, or Sole Proprietor
- ☐ Non-governmental Organization
- ☐ Covered Entity
- ☐ Other

Category of Water Project

- ■ Agricultural Projects
  Developing communications materials that specifically work with and educate the agricultural community on headwater restoration, identifying the state of the science of this type of work to assist agricultural users among others.
- ☐ Conservation & Land Use Planning
  Activities and projects that implement long-term strategies for conservation, land use, and drought planning.
- ☐ Engagement & Innovation Activities
  Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website.
- ☐ Watershed Restoration & Recreation
  Projects that promote watershed health, environmental health, and recreation.
- ☐ Water Storage & Supply
  Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap.

Location of Water Project

Latitude	37.469400
Longitude	-105.866630
Lat Long Flag	Water provider location: Coordinates based on address of water provider
Water Source	Rio Grande and Conejos River
Basins	Rio Grande
Counties	Alamosa; Rio Grande; Saguache; Hinsdale; Mineral; Conejos
Districts	21-Alamosa La Jara; 22-Conejos Creek; 20-Rio Grande

Water Project Overview

Major Water Use Type	Agricultural
Subcategory	Construction
Scheduled Start Date - Design	2/1/2022
Scheduled Start Date - Construction	7/1/2022

Description

The project will allow a group of local, state, and federal partners in the San Luis Valley to install five new SnoLite stations in Division 3 to continue to improve streamflow forecasting. The stations will tie into the existing data collection network that includes the San Luis Valley Weather Radar, Conejos River SnoLite sites, and NRCS SnoTel sites. Data collected will include snow depth, temperature, humidity, wind speed and direction, soil moisture and temperature, and incoming solar radiation. The data will measure conditions in areas of the watershed with low data density and inform the WRF-Hydro streamflow forecast models by the National Center for Atmospheric Research. Further, the partners will use existing and new data to better understand the relationship between soil moisture and realized streamflow.

Continuing to improve the streamflow forecasts will help water users and managers in Division 3 as the streamflow forecasts inform planning throughout the basin. For example, the San Luis Valley Water Conservancy District uses the forecast to estimate water rights yields and plan reservoir storage. The Rio Grande Water Conservation District and ground water management subdistricts base their annual operations, including conservation incentives and river replacements on the forecast. Farmers and ranchers review the forecast to make decisions about crop types and acreages, grazing plans, hay sales, and livestock management. Arguably the most important user of the forecast is the Division Engineer, who uses the streamflow forecast, weather data, information from the historical record, various models, and his intuition to predict the flows in the major rivers and the associated annual delivery obligation to New Mexico under the Rio Grande Compact. The annual delivery obligation increases or decreases from year to year depending on the actual flow of the Rio Grande and Conejos River. A lot rests on the streamflow forecast. When it is incorrect, the adjustments that must be made at the district, farm, or administration level have direct impacts on the flows in the river and to the water users' bottom line. When the forecast is low and there is more water in the river than anticipated, water users in the basin can be curtailed (not allowed to divert water) during the height of the growing season in order to send the required amount of water downstream. When the forecast is high and there is less water in the river than planned, the water users are often curtailed early in the growing season, but allowed to divert later when the error in the forecast becomes apparent. Either scenario has great impacts on the water users and local farming operations, and is difficult for the Division Engineer to manage. Inaccuracy in the forecast has become the case more frequently as changes in climate, precipitation patterns, and the timing of runoff have impacted the accuracy of the annual forecast.

Incredible strides have been made to improve the “crystal ball." A robust coalition of partners, including the CWCB, brought a permanent radar unit to the Rio Grande Basin, established new snow measuring sites which expanded the network of data used to ground truth the radar data and populate the forecast models, and supported LiDAR flights to refine snowpack data during the winter months. These methods have provided unprecedented coverage and clarity in the Rio Grande Basin, leading to models that are more adaptive and accurate in the face of changing conditions. Finally, these efforts have highlighted key areas with data gaps and shortcomings. Therefore, the project will allow stakeholders to further refine data collection and continue to improve the streamflow forecast for the benefit of all water managers and users.

Measurable Results

New Storage Created (acre-feet)

New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive

	Existing Storage Preserved or Enhanced (acre-feet)
	New Storage Created (acre-feet)
	Length of Stream Restored or Protected (linear feet)
	Efficiency Savings (dollars/year)
	Efficiency Savings (acre-feet/year)
	Area of Restored or Preserved Habitat (acres)
	Quantity of Water Shared through Alternative Transfer Mechanisms or water sharing agreement (acre-feet)
40,000	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning
	Number of Coloradans Impacted by Engagement Activity

Water Project Justification

Chapter 10 of the Colorado Water Plan outlines measurable objectives and implementation actions. The project will protect the Rio Grande Basin's water users, namely the basin's robust agriculture economy by better quantifying the forecasted streamflow, which helps the Division of Water Resources better manage Compact deliveries and curtailment. The result is improved opportunity for farmers and ranchers to utilize Colorado's water resources. This directly supports the Colorado's Water Plan's objective that, "agricultural economic productivity will keep pace with growing state, national, and global needs, even if some acres go out of production."

The Rio Grande Basin Implementation Plan highlights the need for continued measurement and monitoring to improve streamflow forecasts and Compact administration. One of the five basin goals is, "Water administration that is adaptive, flexible, and creative while complying with state statutes and the doctrine of prior appropriation, and fully utilizing Colorado's compact entitlements under the Rio Grande and Costilla Creek compacts." Through the project, the stakeholders will utilize proven technology to gain a better understanding the dynamics between snowpack, soil moisture, albedo, temperature, and water supply. This will support continued improvement of models and streamflow forecasting, which allows water managers to better plan and utilize the basin's limited water for the benefit of agriculture, municipal, recreation, and environmental interests.

Related Studies

Gochis, David. 2016. Upper Rio Grande Basin Snowfall Measurement and Streamflow (RIO-SNO-FLOW) Forecasting Improvement Project. National Center for Atmospheric Research.

Taxpayer Bill of Rights

The SLVWCD will receive the grant funds through its Augmentation Enterprise. Therefore, TABOR restrictions will not apply.

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that: (1) Summarizes the project and how the project was completed. (2) Describes any obstacles encountered, and how these obstacles were overcome. (3) Confirms that all matching commitments have been fulfilled. (4) Includes photographs, summaries of meetings and engineering reports/designs. The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions. Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following: (a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in the Budget & Schedule Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment. (b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment. (c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary. (d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Last Updated: May 2021

Colorado Water Conservation Board
Water Plan Grant – Statement of Work – Exhibit A

Statement Of Work	
Date:	**December 1, 2021**
Name of Grantee:	**San Luis Valley Water Conservancy District**
Name of Water Project:	**Rio Grande Basin Snow Measurement Enhancement**
Funding Source:	**Agriculture**

Water Project Overview:

The project will allow a group of local, state, and federal partners in the San Luis Valley to install five new SnoLite stations in Division 3 to continue to improve streamflow forecasting. The stations will tie into the existing data collection network that includes the San Luis Valley Weather Radar, Conejos River SnoLite sites, and NRCS SnoTel sites. Data collected will include snow depth, temperature, humidity, wind speed and direction, soil moisture and temperature, and incoming solar radiation. The data will measure conditions in areas of the watershed with low data density and will be incorporated into WRF-Hydro streamflow forecast models by the National Center for Atmospheric Research. Further, the partners will use existing and new data to better understand the relationship between soil moisture and realized streamflow. Continuing to improve the streamflow forecasts will help water users and managers in Division 3 as the streamflow forecasts are used to inform administration of the Rio Grande Compact. When forecasted flows vary from observed flows, water managers and users grapple with the challenges that accompany over or under curtailment, which results in thousands of dollars of impacts (quantified through the NCAR RIO-SNO-FlO project).

Project Objective:

The objective of the project is to continue to improve steamflow forecasting for the benefit of Rio Grande Compact administration and Colorado water users by identifying data gaps in snowpack and weather measurement, installing new SnoLite sites in priority areas, and using data from the new and existing data collection network to further refine streamflow forecast models.

Last Updated: May 2021

Tasks
Task 1 – Determine Priority Locations for Additional Weather Measurement
Description of Task:
Stakeholders from the Division of Water Resources, National Center for Atmospheric Research, Natural Resources Conservation Service, Colorado Water Conservation Board, San Luis Valley Water Conservancy District, Conejos Water Conservancy District, and Rio Grande Water Conservation District will review existing weather and snowpack data collection in Division 3, identify data gaps, and prioritize locations for additional data development within the context of improving streamflow forecasting.
Method/Procedure:
Stakeholders will compile and review the current suite of data collected and utilized to create streamflow forecasts in the Upper Rio Grande Basin (Division 3). This will include reviewing the location of data collection sites (SnoTels, SnoLite, and dust on snow study sites), the coverage by the San Luis Valley Weather Radar, and the data variables collected through each method. The stakeholders will consider where gaps in data exist and develop a prioritized list of potential new SnoLite sites that will have the greatest contribution toward streamflow forecasting by providing ground truthing for models.
Deliverable:
The outcome of this task will be a summary of existing weather and snowpack measurements, relationship of existing data to streamflow forecasts, and description of observed data gaps. The stakeholders will produce a prioritized list of locations for new SnoLite sites. The San Luis Valley Water Conservancy District will provide information about existing data and gaps in data coverage, as well as priority sites for SnoLite installation to Colorado Water Conservation Board.

Last Updated: May 2021

Tasks
Task 2 – Installation of SnoLite Sites
Description of Task:
The project partners will install five new SnoLite sites in priority watersheds in Division 3. The sites will be placed in areas where existing data density is low and there is a high need for data collection to inform models for streamflow forecasting. The sites will measure snow depth, temperature, humidity, wind speed and direction, soil moisture and temperature, and incoming solar radiation. Stakeholders will also consider where albedo measurements might add value. Data from the sites will be compiled and managed by the National Center for Atmospheric Research.
Method/Procedure:
The project partners will install five new SnoLite sites in priority watersheds in Division 3. The SLVWCD and CWCD will obtain permits from the United States Forest Service as needed. Staff from National Center for Atmospheric Research will assist in the construction of the SnoLite sites and installation of sensors to measure snow depth, temperature, humidity, wind speed and direction, soil moisture and temperature, incoming solar radiation, and potentially, albedo. Data from the sites will be compiled and managed by the National Center for Atmospheric Research and incorporated into the WRF-Hydro model for the Rio Grande and Conejos River. The information will be provided to the Division Engineer and water managers.
Deliverable:
Five SnoLite sites will be installed in priority areas in the Upper Rio Grande Basin. The sites will measure snow depth, temperature, humidity, wind speed and direction, soil moisture and temperature, incoming solar radiation, and potentially, albedo. Data from the sites will be compiled and managed by the National Center for Atmospheric Research, incorporated into the WRF-Hydro model for the Rio Grande and Conejos River, and provided to the Division Engineer and water managers. Stakeholders will use data to inform water management and Rio Grande Compact administration. The data will benefit water users in Division 3. The San Luis Valley Water Conservancy District will provide invoices, pictures, and data summaries to Colorado Water Conservation Board.

Last Updated: May 2021

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit C. Per Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
(b) Accountability: Per Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.

(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
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Water Plan Grant - Exhibit C
Budget and Schedule

Prepared Date: December 1, 2021

Name of Applicant: San Luis Valley Water Conservancy District

Name of Water Project: Rio Grande Basin Snow Measurement Enhancement

Project Start Date: February 1, 2022

Project End Date: December 31, 2023

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Determine Priority Locations for Additional Weather Measurement	2/1/2022	6/15/2022	$ -	$ 2,500.00	$ 2,500.00
2	Install SnoLite Sites	7/1/22	12/31/23	$ 45,000.00	$ 42,500.00	$ 87,500.00
			Total	$ 45,000.00	$ 45,000.00	$ 90,000.00

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Detailed Budget Estimate

Fair and Reasonable Estimate

Prepared Date: December 1, 2021

Name of Applicant: San Luis Valley Water Conservancy District

Name of Water Project: Rio Grande Basin Snow Measurment Enhancement

	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds
Task 1 - Determine Priority Locations for Additional Weather Measurement						
Determine SnoLite Locations	LS	1	$ 2,500	$ 2,500	$ -	$ 2,500
Task 2 - Install SnoLite Sites						
Install SnoLites and Sensors	LS	5	$ 17,500	87500	45000	42500
TOTAL				**$ 90,000.00**	**$ 45,000**	**$ 45,000**

Conejos Water Conservancy District
P. O. Box 550
Manassa, CO 81141
Cwcd1971@hotmail.com
Phone 719-843-5261 fax 5452

November 30, 2021

Becky Mitchell and CWCB Board of Directors
Colorado Water Conservation Board
1313 Sherman St., Rm. 721
Denver, CO 80203

Re: CWP Application for the Rio Grande Basin Snow Measurement Enhancement Project

Dear Ms. Mitchell,

I am writing on behalf of the Conejos Water Conservancy District (CWCD) to express our support and commitment to participate in the Rio Grande Basin Snow Measurement Enhancement Project.

CWCD operates Platoro Reservoir, which provides water to farms and ranches on the Conejos River. We have facilitated projects to improve the condition of gaging and diversion structures throughout the river system, resulting in improved flow management and Rio Grande Compact administration. Additionally, in recent years we have partnered with Colorado Parks and Wildlife and Trout Unlimited to increase winter flows from Platoro Reservoir to benefit downstream fisheries. Finally, we partnered with CWCB and NCAR to study the potential for a permanent radar and SnoLite sites to inform a WRF-Hydro model and improve streamflow/Compact forecasting. After proving the value of this emerging science, we worked with state, local, and federal stakeholders to bring a permanent weather radar to the San Luis Valley.

Through these studies and project, we have improved the ability to measure snowpack and more accurately forecast streamflow. We have also pinpointed additional data gaps, which this proposed project will help fill and further refine our streamflow forecasting models.

CWCD is excited to partner with the San Luis Valley Water Conservancy District on this effort and continue to work toward improved water administration for the benefit of our water users. We have committed $5,000 of cash match and $2,500 of in-kind match to support project implementation. Thank you for your consideration of this project and we hope you will look fondly on the grant request.

Sincerely,

N. Coombs

Nathan Coombs, Manager

COLORADO
Division of Water Resources
Department of Natural Resources
Water Division 3 – Main Office

December 1, 2021

To: Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203

Re: CWP Application for the Rio Grande Basin Snow Measurement Enhancement

Dear CWCB Board of Directors,

It is my pleasure to write a letter supporting the request for funding to enhance snow measurement in the Rio Grande Basin. As you may know, Colorado's delivery obligations under the Rio Grande Compact are based upon streamflow estimates, which are based mainly upon snowpack readings. Therefore it is critical that Colorado have a robust system of snow measurement monitoring.

This grant request will enhance the snow measurement system and allow the collection of snowpack and snow water information in certain areas of the drainage basin that have in the past not been measured. The increased information will enable my office to more accurately determine Colorado's compact obligations to the downstream states, and will assist in our administration of the Rio Grande and Conejos Rivers for compact purposes.

On behalf of the Colorado Division of Water Resources, Division 3, I am pleased to be able to provide this letter of support for this proposal. Thank you for your consideration of funding for this worthwhile program.

Sincerely,

Craig W. Cotten
Division Engineer, Division 3

623 Fourth Street
Alamosa, CO 81101
(719) 589-2230
Heather@slvwcd.org

December 1, 2021

Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203

Re: Rio Grande Basin Snow Measurement Enhancement Project

Dear CWCB Board of Directors,

The San Luis Valley Water Conservancy District (SLVWCD) is pleased to submit an application to the Colorado Water Plan grant program for the Rio Grande Basin Snow Measurement Enhancement Project. The SLVWCD operates an augmentation program within five counties in the San Luis Valley. Through our operations, we replace injurious depletions to the Rio Grande caused by pumping of domestic, commercial, and municipal wells. Additionally, the SLVWCD is a leader in the local and state water communities, working with partners to address timely issues such as groundwater sustainability, compliance with the Rio Grande Compact, and water supply protection.

The project will result in additional snow and weather measurement in the Upper Rio Grande Basin, which will support continued efforts to improve streamflow forecasting and Rio Grande Compact administration. The SLVWCD has committed $35,000 of cash and $2,500 of in-kind match to the project.

I appreciate CWCB's continued support of water monitoring and measurement projects in the Rio Grande Basin. Thank you for the opportunity to apply for funding.

Sincerely,

Heather R. Dutton

Heather R. Dutton