



Request for Proposals:

Grant Administration for Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

The Colorado River Authority of Utah
60 East South Temple, Suite 850
Salt Lake City, UT 84111

Release Date: June 24, 2024
Close Date: July 22, 2024, 4:00 PM MT

THE COLORADO RIVER AUTHORITY OF UTAH



1 BACKGROUND

Water users in Utah — one of the driest states in the nation — and fellow Colorado River Basin (Basin) states face future water supply gaps due to increasing demand and uncertain future hydrologic conditions. As pressure builds on Utah and the Basin's limited water supply, employing the best available science, tools, and data will become increasingly important to support drought mitigation and resilience.

Snowpack contributes 95% of Utah's water supply, making accurate measurement of snowpack necessary for both short-term system operations and long-term planning. Snowpack data collected by Airborne Snow Observatories, Inc. (ASO) is currently the most spatially robust snow data available. The ASO Inc. suite generates spatially complete maps of snow depth, snow water equivalent (SWE), and snow albedo through remotely-sensed data, and snowpack and runoff modeling frameworks to provide the best possible water resources data. ASO Inc. is the sole licensee from the National Aeronautics and Space Administration/Jet Propulsion Laboratory/California Institute of Technology (NASA/JPL/Caltech) to commercialize snow surveys with this software suite. ASO products have been tested and operationalized in other Western states but have not yet been tested in Utah.

In March 2023, the Bureau of Reclamation (Reclamation) announced a funding opportunity through the Snow Water Supply Forecasting Program for emerging snow monitoring technologies. In response to the funding opportunity, the Colorado River Authority of Utah (Authority) as the lead applicant partnered with Central Utah Water Conservancy District (CUWCD) and the Utah Division of Water Resources (DWR) to propose and provide matching funds for the project Flakes, Flights, and Forecasts: Snow Measurement Enhancements in the Uinta Mountain Headwaters (Pilot Project; Attachment 1), to test ASO in Utah. Horrocks Engineering provided grant proposal preparation management, funded by CUWCD. The Nature Conservancy, Jordan Valley Water Conservancy District, Duchesne County Water Conservancy District, and four of Utah's US House of Representatives members provided letters of support for the project.

The proposed Pilot Project received a Notice of Grant Award (NGA) from Reclamation on January 16, 2024 (Attachment 2) that supports the project through September 30, 2026. With the grant award, this Pilot Project will enable the best-available ASO snow measurement and modeling to provide reliable water supply forecasting to a previously underserved Basin state for 1) optimized flood control operations of federal facilities 2) short- and long-term water management decisions, 3) environmental protection, 4) drought mitigation and resilience, and 5) dissemination of results to other watersheds throughout Utah.

To ensure the success of the Pilot Project, a Grant Administration technical consulting firm is being procured by the Authority and funded through the grant budget to support coordination, evaluation, and reporting of the Pilot Project.

2 PILOT PROJECT OVERVIEW

This Pilot Project will provide remotely sensed snowpack data over a 3-year pilot period to evaluate the improvements in accuracy and reliability of water supply forecasts and the commensurate benefits to water management operations. A snow-free survey plus three snow-on surveys per year will be conducted over the study area by ASO (Figure 1). The Pilot Project study area (Figure 1) is relatively small in scale, but has an oversized impact on Utah's water supply, as the area provides water to the largest metropolitan region in Utah. Streamflow predictions will be calculated using a combination of remote sensing (aerial lidar and hyperspectral data), distributed snowpack modeling, and hydrologic modeling by ASO.

Where appropriate, ASO snow depth, SWE, and streamflow forecast products will be integrated with and compared to other available forecasts, operational models, and planning models to understand if and how ASO data complements existing tools, and what the costs and benefits of integration are. Integration will be performed by the developers of the various models, and comparison will be performed by the Grant Administrator with support from ASO and the developers of the models. Outcomes of model integration and comparison will then be evaluated and reported by the Grant Administrator relative to the Pilot Project Objectives listed below.

The Strawberry Aqueduct Collection System (SACS) model is the primary *operational* model that will ingest the ASO data in this Pilot Project. The SACS model is a RiverWare model that was developed to account for the water that is diverted and delivered from the Central Utah Project Bonneville Unit Operations in the Uinta Basin. The model performs both backward-looking water accounting and forward-looking forecasting to determine the operations of Upper Stillwater Reservoir, Currant Creek Reservoir, Strawberry Reservoir, and Starvation Reservoir along with the collection systems that divert and convey water to Strawberry Reservoir and Starvation Reservoir. The model is a daily time-step model that ingests real time Supervisory Control and Data Acquisition (SCADA) data from operations of the reservoirs and determines the water volume associated with deliveries and storage. The forecast component ingests data from the Colorado Basin River Forecast Center (CBRFC) and uses operational rules to determine the forecasted elevations and operations for the water year. Precision Water Resources Engineering (PWRE) is developing the SACS model on behalf of CUWCD and will support

the ingestion of the ASO data into the SACS model and comparison efforts.

The Utah Colorado River Accounting and Forecasting (UCRAF) model is the primary planning model that this Pilot Project will test intercomparison of ASO forecasts with. UCRAF is a multi-year, multi-phase pilot project with models under development by the Authority in the Duchesne, San Rafael, and Price River Basins. The UCRAF model is a drought mitigation planning model and models supply according to priority using a rule-based and accounting RiverWare model. This effort will help develop a comprehensive understanding of current water rights and water usage and will ultimately be used as a planning tool to evaluate how drought mitigation measures (e.g., crop types, irrigation methods, water reduction methods, water right transfer, curtailment, etc.) affect water availability and water rights. PWRE, with Follum Hydrologic Solutions as a subconsultant, are developing UCRAF on behalf of the Authority and will support the intercomparison efforts.

The outcome of this Pilot Project will help water managers make informed decisions about how to manage and invest in Utah's limited water resources. A successful project with a proven concept will serve as a model for application to other areas in the state and elsewhere in the Colorado River system.

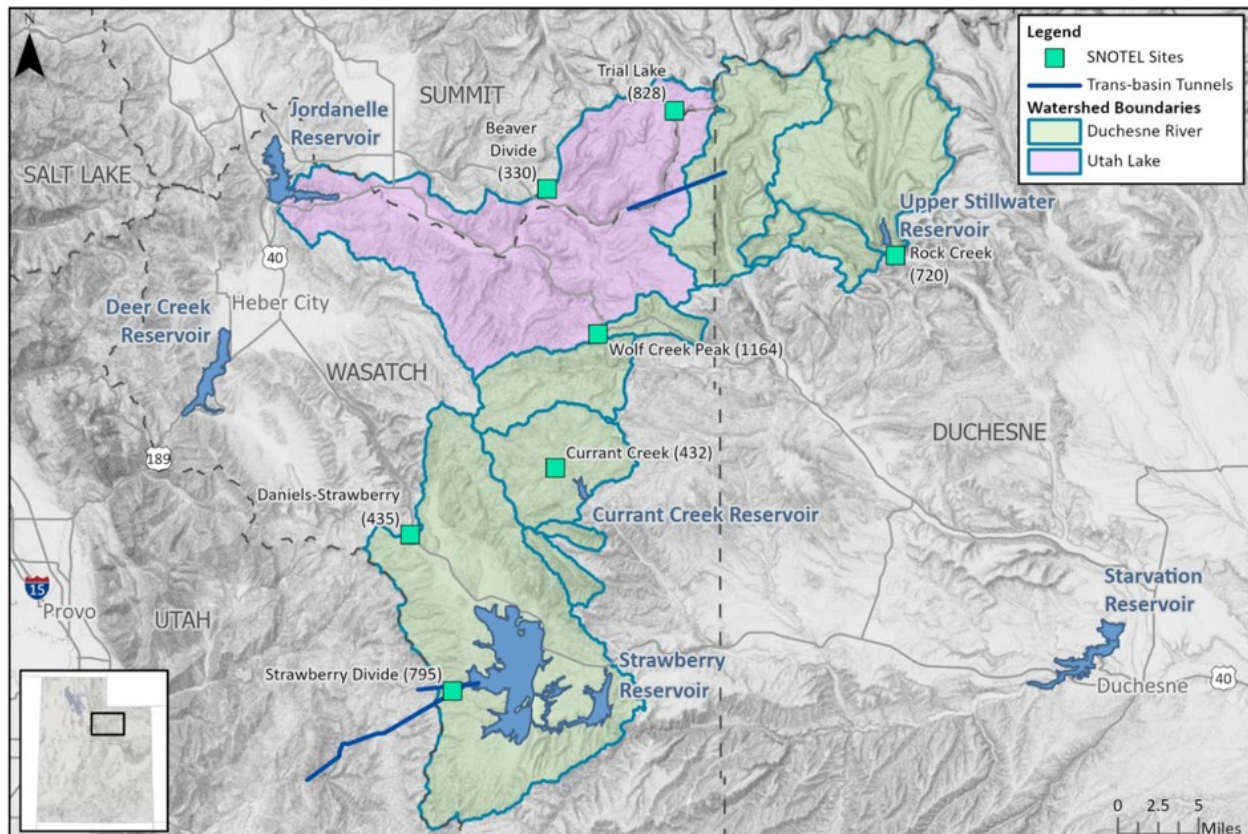


Figure 1. Pilot Project study area and key watershed infrastructure.

2.1 Purpose

The purpose of this Pilot Project is to improve snow water supply data to support water management decision-making by testing ASO data services and products in critical headwaters in Utah. At the close of the project, the Authority hopes to understand the opportunities and challenges associated with using ASO data services and products if ASO continues to be applied in the study area and other Utah headwaters.

This Pilot Project is possible only with the grant awarded to the Authority through Reclamation's Snow Water Supply Forecasting Program. Grant Administration support from a technical consulting firm is needed to ensure the Pilot Project outcomes are properly and effectively achieved, documented, evaluated, and reported, and compliance with Reclamation's NGA terms is maintained. Both technical analysis and administrative work will be required of the Grant Administration consultant to ensure these outcomes, as outlined in the Scope of Work. The Pilot Project budget includes funding to contract with a technical consulting firm for Grant Administration.

2.2 Objectives

The Pilot Project will expand an established snow measurement and water supply forecasting method into Utah, identify the strengths and weaknesses of existing snow water supply measurement and forecasting methods, and support real-time water management while considering opportunities to extend ASO data collection in future years and other watersheds. The Pilot Project will support the Authority's mission and Management Plan, along with the missions of CUWCD and DWRe in coordination with the numerous other entities working on snow water supply measurement and forecasting.

The Pilot Project will incorporate the following five objectives:

1. Optimize flood control operations of federal facilities by increasing confidence in snow-water supply location, volume, and runoff timing;
2. Support short- and long-term water management decisions by demonstrating ASO data integration into CUWCD's Strawberry Aqueduct Collection System Model (SACS) and intercomparison with the Authority's Utah Colorado River Accounting and Forecasting (UCRAF) Model and other relevant water management models;
3. Protect the environment by enabling confident planning for optimal fish flows below study area reservoirs;
4. Mitigate drought and build resilience by supporting prioritization of projects based

on water supply;

5. Disseminate results to other watersheds throughout the state by comparing results to CBRFC and NRCS forecasting, identifying instrumentation needs, considering the feasibility of additional flights, and reporting project outcomes.

Grant Administration will enable the Authority to achieve the five objectives and adhere to NGA terms compliance through tasks that bridge the technical elements of the Pilot Project performed by ASO and PWRE on behalf of the Authority and CUWCD with quality written reporting.

3 SCOPE OF WORK

The selected consulting firm will support Grant Administration tasks in accordance with the NGA terms by 1) establishing a Work Plan for the Pilot Project duration based on the existing Pilot Project Scope of Work in the NGA, 2) coordinating project steps between the four funding entities and ASO, 3) analyzing results and reporting progress on the Pilot Project's timeline, finances, and five objectives, 4) developing a Final Report at the conclusion of the Pilot Project, and 5) any other Grant Administration tasks required to meet Pilot Project objectives and maintain compliance with the NGA terms. ASO will perform the data collection, analysis, modeling, forecasting, and evaluation of forecasts (Attachment 3). The Authority and CUWCD will perform integration of ASO outputs into the UCRAF and SACS models under existing agreements with PWRE. ASO, supported by the Authority, will continue the work initiated in neighboring states with agency staff at NRCS and CBRFC to explore the integration of ASO data with their forecast systems. The selected Grant Administration firm will identify and provide an evaluation of Pilot Project outcomes, including comparison of results from various forecasting, operational, and planning models in collaboration with the other project team members. Thus, a range of expertise including project administration, federal grant administration and reporting, technical communication to a variety of audiences, snow measurement and water supply forecasting science and engineering, and water management science and engineering will be required. All work will be conducted at the direction of the Authority.

As a Pilot Project, questions that will be addressed through this work are inherently in the applied research space, meaning that analyses must be adaptable to new information as it becomes available.

3.1 Task Order 1

As part of Task Order 1, the selected consulting firm will be required to provide services consistent with the subtasks outlined below, in accordance with Section 5.1.2 of the NGA, Task 2 – Grant Administration:

Subtask 1. Pilot Project Work Plan

- Develop Pilot Project Work Plan for approval by Reclamation, communicated through the Authority
- Support application of any changes to the Work Plan requested by Reclamation

Subtask 2. Pilot Project Coordination Between Contractors and Funding Entities

- Facilitate general coordination of Pilot Project activities between Reclamation, the Authority, CUWCD, DWRe, ASO, and subcontractors of ASO
- Facilitate regular coordination meetings between relevant Pilot Project parties and external collaborators, such as NRCS and CBRFC
- Ensure Pilot Project activities align with NGA, objectives, timeline, and budget in collaboration with the Authority

Subtask 3. Pilot Project Analysis and Reporting

- Compare forecast results and outcomes between ASO forecasts and other water supply forecasts provided by CBRFC and NRCS.
- Evaluate results from PWRE’s comparison between UCRAF planning outputs and ASO-informed UCRAF planning outputs, in consultation with ASO and PWRE.
- Evaluate results from PWRE’s integration of ASO data into SACS forecast modeling, in consultation with ASO and PWRE.
- Analyze and evaluate Pilot Project deliverables progress relative to the Pilot Project objectives, and identify opportunities and challenges in using ASO products and services in Utah
- Develop Administrative Performance Reports on Pilot Project progress in accordance with NGA terms (see NGA Section 10.4, semi-annual reports required)
- Support development of Federal Financial Reports on Pilot Project in accordance with NGA terms (see NGA Section 10.4, annual reports required)
- Support intrastate reporting as needed
- Ensure that analysis and reporting is performed in collaboration with the Authority and other relevant project parties

Subtask 4. Pilot Project Final Report

- Analyze and evaluate final Pilot Project deliverables relative to the Pilot Project objectives at the conclusion of the Pilot Project (see NGA Section 10.4), in addition to lessons learned and recommendations for future related work in Utah

- Develop a Final Report in accordance with NGA terms
- Support application of any changes to the Final Report requested by Reclamation
- Support final intrastate reporting as needed
- Ensure that analysis and reporting is performed in collaboration with the Authority and other relevant project parties

3.2 Key Deliverables

- Pilot Project Work Plan
- Pilot Project Coordination Meetings documentation
- Evaluation of ASO forecasts compared to other water supply forecasts and planning models in Utah
- Evaluation of ASO integration into the SACS model
- Pilot Project Administrative Performance Reports
- Federal Financial Reports
- Pilot Project Final Report
- Intrastate reports as needed
- Any related tasks to be determined by the Authority and consultant

3.3 Contract Period

Under this contract, the Authority envisions a single Task Order with the option for additional Task Orders, as needed, through the Pilot Project Period (through September 30, 2026), plus the Final Report period (through January 28, 2027). The Authority will evaluate the consultant on an annual basis and reserves the right to terminate the contract in accordance with contract terms.

3.4 RFP and Contract Schedule

The Authority reserves the right to cancel, delay, or postpone the evaluation of proposals and the award of the contract for any reason. The RFP and contract schedule is shown in Table 1.

Table 1. RFP and contract schedule.

Contract Milestone	Milestone Date
RFP Released	June 24, 2024
RFP Advertised	June 24, 2024
Questions and Clarifications Due	4:00 PM, July 8, 2024
Proposals Due	4:00 PM, July 22, 2024
Presentations by Select Consulting Firms (if needed)	August 5-8, 2024
Contract Award Target	August 15, 2024
Contract Completion	January 28, 2027

4 SUBMISSION GUIDELINES

4.1 Proposal Content

1. Cover Letter (*not included in the page count for the proposal*)
2. Organizational Profile (Table 2 and text)
 - a. Introduction of the consulting firm and description of experience, capabilities, and availability
 - b. Team organization chart with names and titles of project team members, experience, and availability (Table 2)
 - c. Name and show any sub-consultants on the organization chart
 - d. Provide any related experience on similar projects that have been completed
3. Technical Approach to Completing the Project
 - a. Discuss and describe your understanding of the Project
 - b. Describe the methods and approach for completing the Project based on the activities described in the Scope of Work
 - c. Describe potential risks and issues that may delay the completion of the Project
4. Schedule
 - a. Provide a timeline of milestones and discuss any critical schedule issues and possible items that could impact the schedule
5. Resumes (*not included in the page count for the proposal*)
 - a. Provide key personnel resumes in an appendix to the proposal
6. Cost Proposal (*not included in the page count for the proposal, and only provided in a separate, password-protected PDF document*)

4.2 Minimum Qualifications

The Consultant’s team shall be capable of providing all professional services as described in this RFP and maintain those capabilities until notification that the Consultant’s proposal was unsuccessful or, if the proposal is successful, until the project has been successfully completed. Exclusion of any service needed for the project may serve as cause for rejection of the proposal.

Specifically identify Key Personnel and their roles in Table 2, who would be assigned to the project, including qualifications, experience in related or relevant projects, and background of each. Only projects on which Key Personnel were participants should be listed. Projects may be listed for participants when they were working for a firm different from their current firm. Note that Key Personnel identified in the responding proposal may not be changed without the advance, written approval of the Authority.

Table 2. Example table for identifying key project engineering personnel.

Key Project Personnel*	Name	Office Location	Education	Professional Licensure/ Certifications (if applicable)	Years of Experience		Summary of Relevant Experience and Related Projects <ul style="list-style-type: none"> • Project name, completion date, brief description • Project role • Project owner and contact information
					<i>With Firm</i>	<i>Total</i>	
<i>Principal in Charge</i>							
<i>Project Manager</i>							
<i>Others As Needed</i>							
<i>Others As Needed</i>							
<i>Others As Needed</i>							

** Insert or modify rows and columns as needed*

4.3 Cost Proposal

Consultants are required to prepare a cost proposal to complete the Project as described in the Scope of Work, to be submitted at the same time as their proposal. The cost proposal must be provided in a separate, password-protected PDF document from the technical proposal content. The cost proposal will not be used in the technical evaluation of proposals but will be factored into the consultant's overall score.

The cost of Grant Administration must be within the Pilot Project total budget of \$1,999,999. \$1,886,799 has been budgeted for ASO services, thus \$113,200 remains for Grant Administration. Cost estimates may be lower than, but may not exceed \$113,200.

4.4 Proposal Submission

To be responsive to this RFP, interested consultants must submit two PDF documents (one document with all proposal content compiled except the cost proposal, and one password-protected document of only the cost proposal) via email to Lily Bosworth (lbosworth@utah.gov) no later than 4:00 PM MT, on July 22, 2024. The written proposal shall not exceed 8 single-sided pages in length, not including the cover letter, resumes, or Table 2. Fonts shall be 10-point or greater. Horizontal pages are allowed where appropriate (tables, figures). Wherever possible, proposal content should be generated electronically directly from the native document software rather than scanned copies.

4.5 Modifications to, or Withdrawal of, a Submitted Response

A responder may modify or withdraw the responder's proposal, at any time before the Submission Deadline, by providing a written modification or a written statement withdrawing the proposal to the RFP contact. Modifications or letters of withdrawal received by the RFP contact after the Submission Deadline will be rejected as invalid.

The Authority may: (i) allow a responder to correct an immaterial error in a responder's proposal, as provided in §63G-6a-114, Utah Code Annotated, and/or (ii) request a responder to clarify information contained in a proposal, as provided in §63G-6a-115, Utah Code Annotated.

4.6 Cost of Responding to RFP and Contract Negotiations

All expenses related to responding to this RFP, including, but not limited to, preparing, submitting, and presenting a proposal; attending meetings in relation to this RFP; discussions; and all travel, dining, lodging, and communication expenses will be borne

solely by the responder. The Authority assumes no liability for any costs incurred by a responder in responding to this RFP.

All expenses of the successful responder relating to conducting contract negotiations, including, but not limited to, drafting, research, legal review, preparation, attending meetings, site visits, travel, dining, lodging, and communication expenses will be borne solely by the responder. The Authority assumes no liability for any costs incurred by a responder relating to contract negotiations. No responder shall bill the Authority for any expense that was incurred prior to the time that the contract is signed by all parties.

4.7 Contact

Questions and clarifications regarding this RFP should be provided in writing to Lily Bosworth at lbosworth@utah.gov no later than 4:00 PM, July 8, 2024.

Any unsolicited communication from your firm or anyone on behalf of your firm concerning this RFP to any employee or board member of the Authority not listed as the contact before award of contract is grounds for disqualification from this procurement.

5 EVALUATION OF PROPOSALS

5.1 Selection Criteria

The selection committee will evaluate submitted proposals based on the qualifications presented as they relate to the Selection Criteria below in Table 3.

Table 3. Proposal Selection Criteria and weighting.

Selection Criteria	Points
Technical Criteria (Scores Determined by the Technical Evaluation Committee)	
<p>1. Evaluation of Proposal and Approach (0-5 with a weight of 6 for a maximum total of 30 points)</p> <ul style="list-style-type: none"> • Responsiveness to the RFP's Purpose, Objectives, and Scope of Work described herein • Description and adequacy of engineering methods and approach • Familiarity with the Authority's mission, Management Plan, and Work Plans • Familiarity with the Authority's role • Familiarity with Colorado River issues and policy and Utah water regulations • Familiarity with snow measurement and water supply forecasting methods and entities, water supply planning, project analysis and evaluation, federally-funded project administration, etc. • Potential schedule showing key dates, program milestones, and critical path issues 	30
<p>2. Evaluation of Experience (0-5 with a weight of 6 for a maximum total of 30 points)</p> <ul style="list-style-type: none"> • Demonstration of consulting firm's experience and knowledge in developing and implementing work similar to the Pilot Project Grant Administration requested, including prior experience performing work for the Authority, if applicable • Demonstration of experience with projects that included technical analysis of snow water supply, management, and planning, federally-funded project management, and effective technical communication to a range of audiences • Project Team Profile provided with Table 2 completed 	30
<p>3. Evaluation of Resources (0-5 with a weight of 2 for a maximum total of 10 points)</p> <ul style="list-style-type: none"> • Demonstration of resources and availability to complete contract requirements within the schedule • Identification of a quality control and quality assurance plan 	10
Cost Criteria	
<p>4. Evaluation of Cost Proposal (Score = 30*(Lowest Proposed Price/Proposed Price))</p> <ul style="list-style-type: none"> • Cost proposal is within the budget described in Section 4.3 	30
Total Points Possible	100

5.2 Evaluation Process

The evaluation process shall be in compliance with the Colorado River Authority's Procurement Rule. To determine which proposal provides the best-qualified services with the best value to the Authority, a Technical Evaluation Committee (TEC) shall evaluate the proposals submitted in conformance with the applicable requirements of the Colorado River Authority's Procurement Rule, using a staged evaluation process as follows:

Stage 1. The TEC will review all proposals that are received in a timely manner. Respondents that are determined to be not responsive, and proposals that are not responsive, or do not comply with the requirements of this RFP and the requested submission format, will be eliminated from consideration. A written notice will be sent to those responders who are eliminated from consideration.

Stage 2. The TEC will evaluate proposals that are not eliminated in Stage 1 in accordance with Criteria 1 - 3 listed above. The TEC will give each of the three Criteria a score of 1 – 5 as follows, then each score will be weighted to achieve a maximum potential technical score of 70.

- 0 – No response or information
- 1 – Inadequate, and/or fails to meet requirements
- 2 – Fair, and/or only partially responsive
- 3 – Average, and/or meets the minimum requirements
- 4 – Above average and/or exceeds minimum requirements
- 5 – Superior

The TEC may decide to request presentations from the top-ranked proposals. If presentations are requested by the TEC, they will be conducted virtually on August 5-8, 2024, after which TEC members may adjust their scores as needed. If presentations are deemed unnecessary, proposals may be accepted without a presentation.

Stage 3. After completion of the evaluation and scoring of proposals, the TEC will submit their individual evaluation scores, and collectively identify the highest-scoring proposal based on the technical criteria to the issuing procurement unit (Authority administrative staff).

Stage 4. The issuing procurement unit will request passwords to PDF cost proposals, review and score the cost of each proposal. The lowest cost proposal will receive 100% of the price points while the other proposals will receive a portion of the total cost points based on what percentage higher their proposal is than the lowest cost proposal. The

issuing procurement unit will then calculate a total combined technical and cost score for each proposal, and submit final scores to the Executive Director.

5.3 Award of Contract

After all proposals have been evaluated and scored, the highest-scoring consultant will receive a written Notice of Award and the Authority will enter into negotiations with the consultant as soon as practicable to prepare an agreement. If an agreement cannot be reached, the award will be rescinded and Authority will immediately notify and enter negotiations with the second highest scoring firm.

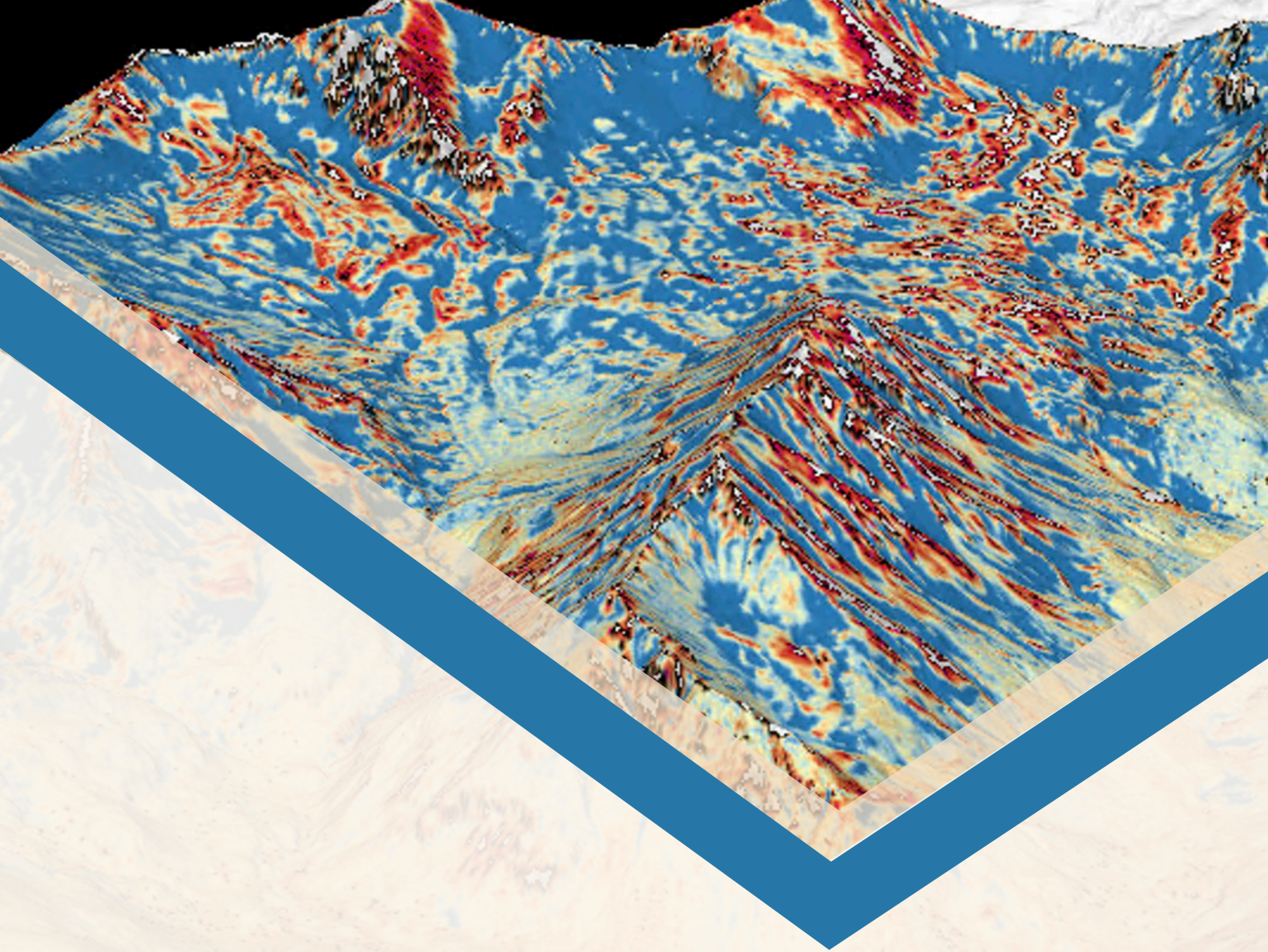
Notice of Award. The Authority will make public the final Notice of Award to both the responders and the public as soon as practicable after the awarding of a contract(s) has been made.

5.4 Accuracy of Proposals

All proposals will be relied upon as true and accurate. The selection committee will rely on this information when evaluating each submission by the selection criteria. Any proposal failing to clearly present all the requested information or failing to be in the requested format may be considered non-responsive and rejected.

In accordance with Utah State Law, proposals are a public record and are subject to public review upon request. However, a consultant may request that any part of its proposal be designated as a protected record and not available for public release by complying with the requirements of §63G-2-309(1), Utah Code Annotated. To do this, firms must provide the Authority with a written claim of business confidentiality and a concise statement of reasons supporting this claim. This information must be submitted together with the proposal to be considered.

The Authority reserves the right to request a consultant clarify any part of the submitted proposal. Response to such requests must be made in writing and will become part of the proposal. Supplementary information and materials received after the deadline, that are not expressly solicited by the Authority, will not be considered in the evaluation. All firm proposals, including electronic media, will become and remain property of the Authority.



Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

Snow Water Supply Forecasting Program
Bureau of Reclamation

Fiscal Year 2023 | NOFO: R23AS00079

Applicant:

The Colorado River Authority of Utah
60 East South Temple,
Suite 850
Salt Lake City, Utah 84111



THE COLORADO
RIVER AUTHORITY
OF UTAH

Project Manager:

Lily Bosworth
Colorado River Authority
(801) 824-9037
lbosworth@utah.gov

May 12, 2023



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APPENDIX A - Letters of Support

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APPENDIX C - OMB 4040-0019 Project Abstract Summary



MANDATORY FEDERAL FORMS

See the following pages for the following forms:

SF-424: Application for Federal Assistance

SF-424A: Budget Information– Non-Construction Programs

SF-424B: Assurances – Non-Construction Programs

UNIQUE ENTITY IDENTIFIER AND SYSTEM FOR AWARD MANAGEMENT

SAM UEI Number: **EPFYHEUPNNZ4**, Colorado River Authority of Utah, State of Utah

Application for Federal Assistance SF-424

* 1. Type of Submission: <input type="checkbox"/> Preapplication <input checked="" type="checkbox"/> Application <input type="checkbox"/> Changed/Corrected Application	* 2. Type of Application: <input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision	* If Revision, select appropriate letter(s): <input type="text"/> * Other (Specify): <input type="text"/>
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* 3. Date Received: <input type="text" value="05/12/2023"/>	4. Applicant Identifier: <input type="text"/>
--	--

5a. Federal Entity Identifier: <input type="text"/>	5b. Federal Award Identifier: <input type="text"/>
--	---

State Use Only:

6. Date Received by State: <input type="text" value="04/14/2023"/>	7. State Application Identifier: <input type="text"/>
--	---

8. APPLICANT INFORMATION:

* a. Legal Name:

* b. Employer/Taxpayer Identification Number (EIN/TIN): <input type="text" value="87-6000545"/>	* c. UEI: <input type="text" value="EPFYHEUPNNZ4"/>
--	--

d. Address:

* Street1:
Street2:
* City:
County/Parish:
* State:
Province:
* Country:
* Zip / Postal Code:

e. Organizational Unit:

Department Name: <input type="text" value="Colorado River Authority of Ut"/>	Division Name: <input type="text" value="Colorado River Authority of Ut"/>
---	---

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: * First Name:
Middle Name:
* Last Name:
Suffix:

Title:

Organizational Affiliation:

* Telephone Number: <input type="text" value="801-824-9037"/>	Fax Number: <input type="text"/>
---	----------------------------------

* Email:

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Bureau of Reclamation

11. Catalog of Federal Domestic Assistance Number:

CFDA Title:

*** 12. Funding Opportunity Number:**

R23AS00079

* Title:

Snow Water Supply Forecasting Program FY 2023

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment

Delete Attachment

View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

Attach supporting documents as specified in agency instructions.

Add Attachments

Delete Attachments

View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant

* b. Program/Project

Attach an additional list of Program/Project Congressional Districts if needed.

Add Attachment

Delete Attachment

View Attachment

17. Proposed Project:

* a. Start Date:

* b. End Date:

18. Estimated Funding (\$):

* a. Federal	<input type="text" value="999,999.00"/>
* b. Applicant	<input type="text"/>
* c. State	<input type="text" value="1,000,000.00"/>
* d. Local	<input type="text" value="0.00"/>
* e. Other	<input type="text" value="0.00"/>
* f. Program Income	<input type="text" value="0.00"/>
* g. TOTAL	<input type="text" value="1,999,999.00"/>

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

a. This application was made available to the State under the Executive Order 12372 Process for review on

b. Program is subject to E.O. 12372 but has not been selected by the State for review.

c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

Yes No

If "Yes", provide explanation and attach

Add Attachment

Delete Attachment

View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name:

Middle Name:

* Last Name:

Suffix:

* Title:

* Telephone Number: Fax Number:

* Email:

* Signature of Authorized Representative:

* Date Signed:

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2025

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Snow Water Supply Forecasting Program FY 23		\$ 999,999.00	\$ 1,000,000.00	\$	\$	\$ 1,999,999.00
2.						
3.						
4.						
5. Totals		\$ 999,999.00	\$ 1,000,000.00	\$	\$	\$ 1,999,999.00

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total (5)
	(1)	(2)	(3)	(4)	
	Snow Water Supply Forecasting Program FY 23				
a. Personnel	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
b. Fringe Benefits	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c. Travel	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
d. Equipment	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
e. Supplies	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
f. Contractual	1,999,999.00	<input type="text"/>	<input type="text"/>	<input type="text"/>	1,999,999.00
g. Construction	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
h. Other	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
i. Total Direct Charges (sum of 6a-6h)	1,999,999.00	<input type="text"/>	<input type="text"/>	<input type="text"/>	\$ 1,999,999.00
j. Indirect Charges	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	\$ <input type="text"/>
k. TOTALS (sum of 6i and 6j)	\$ align="right">1,999,999.00	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ align="right">1,999,999.00
7. Program Income	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program		(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8.	Snow Water Supply Forecasting Program FY 23	\$ 999,999.00	\$ 1,000,000.00	\$	\$ 1,999,999.00
9.					
10.		0.00			0.00
11.					
12. TOTAL (sum of lines 8-11)		\$ 999,999.00	\$ 1,000,000.00	\$	\$ 1,999,999.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 700,000.00	\$	\$	\$ 700,000.00	\$
14. Non-Federal	\$				
15. TOTAL (sum of lines 13 and 14)	\$ 700,000.00	\$	\$	\$ 700,000.00	\$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS)			
	(b)First	(c) Second	(d) Third	(e) Fourth
16. Snow Water Supply Forecasting Program FY 23	\$ 700,000.00	\$ 650,000.00	\$ 649,999.00	\$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	\$ 700,000.00	\$ 650,000.00	\$ 649,999.00	\$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: 0	22. Indirect Charges: 0
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23. Remarks: There will be no direct or indirect charges for the grant.

ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee- 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.
10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.
15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.
16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.
19. Will comply with the requirements of Section 106(g) of the Trafficking Victims Protection Act (TVPA) of 2000, as amended (22 U.S.C. 7104) which prohibits grant award recipients or a sub-recipient from (1) Engaging in severe forms of trafficking in persons during the period of time that the award is in effect (2) Procuring a commercial sex act during the period of time that the award is in effect or (3) Using forced labor in the performance of the award or subawards under the award.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL Lily Bosworth	TITLE Staff Engineer
APPLICANT ORGANIZATION Colorado River Authority of Utah	DATE SUBMITTED 05/12/2023



TECHNICAL PROPOSAL

Executive Summary

Date: May 12, 2023

Project Timeline: 36 months

Estimated Completion Date: August 2026

Applicant Name: The Colorado River Authority of Utah

Co-Applicant: Utah Division of Water Resources

Co-Applicant: Central Utah Water Conservancy District

City, County and State: Salt Lake City, Salt Lake County, Utah

Project Location: Wasatch and Uinta Mountains: Utah, Wasatch, Summit, and Duchesne Counties, Utah

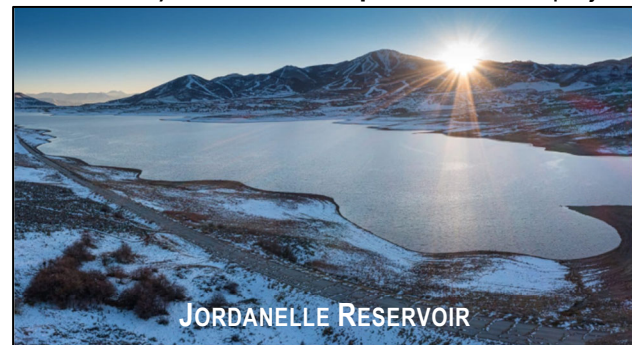
Reclamation Projects: Bonneville Unit of the Central Utah Project, Strawberry Valley & Provo River Projects

Water users in Utah — one of the driest states in the nation — and fellow Colorado River Basin (Basin) states face future water supply gaps due to increasing demand and uncertain future hydrologic conditions, which will likely result in water supply shortage and conflict between municipal, industrial, and agricultural water users. As pressure builds on Utah and the Basin's limited water supply, cooperation between the stakeholders involved will become both more critical and challenging, calling for the best available data to support drought mitigation.

The Colorado River Authority of Utah (The Authority) is a state agency formed in 2021 to protect, preserve, conserve, and develop Utah's Colorado River system interests. The Authority works collaboratively on interstate efforts between the Bureau of Reclamation, the Upper Colorado River Commission (UCRC), and peer agencies in the other six Basin states. The Authority also coordinates intrastate efforts in Utah with sister agencies, water districts, water users, and environmental groups. The Authority, Utah Division of Water Resources (DWR), and Central Utah Water Conservancy District (CUWCD), co-applicants, herein referred to as Applicants, routinely work together facilitating cooperative water planning, resource sharing, and investigation of potential Demand Management programs for resilient and sustainable water supplies.

As snowpack contributes 95% of Utah's water supply, accurate measurement of snowpack is necessary for short-term system operations and long-term planning. Snowpack data collected by Airborne Snow Observatories, Inc. (ASO) is currently the most robust snow data available, and projects have already been funded in two peer Basin states, but not in Utah. **Thus, this project will fund the best-available ASO snow measurement and modeling to provide reliable water supply forecasting to an underserved Basin state for 1) short- and long-term water management decisions, 2) drought mitigation and resiliency, 3) optimized flood control operations of federal facilities, and 4) environmental protection.** The project area is relatively small in scale, but has an oversized impact on Utah's water supply, as the area provides water to the largest metropolitan region in Utah. A successful project with a proven concept will serve as a model for application to other areas in the state and elsewhere in the Colorado River system.

This project will provide remotely sensed snowpack data over a 3-year pilot period to evaluate the improvements in accuracy and reliability of water supply forecasts and the commensurate benefits to water management operations. National Resources Conservation Service (NRCS) Snowpack Telemetry (SNOTEL) data has been historically used to forecast the amount of water available to water users along Utah's Wasatch Front and the Duchesne River, a tributary to the Colorado River. SNOTEL sites only represent the area immediately adjacent to the monitoring equipment as opposed to airborne remote sensing that captures the entirety of the watershed under consideration. Streamflow predictions will be calculated using a combination of remote sensing (aerial lidar and hyperspectral data), distributed snowpack modeling, and hydrologic modeling. Project results will be analyzed against conventional and open loop forecasts to examine vulnerabilities in current methods and if





ASO-informed forecasting can provide similar decision-support benefits as demonstrated in neighboring states. Resulting information will provide water managers with better verified data to make informed decisions regarding timing of runoff and volume of runoff, allowing for optimized operational decision-making, incorporation into models, and contract management to enable the best use of Utah's limited water resources.

If funded, the project will create the foundation for the first airborne snowpack monitoring capacity in Utah, benefiting Utah's municipal, industrial, and agricultural water users. Improved water management of Utah's Colorado River supply is beneficial to Utah, fellow Basin states, and other stakeholders including the federal government, tribal nations, the environment, and recreationists. **The Applicants recognize that if successful, they will be in a unique position to further reliable water supply forecasting throughout Utah and the Colorado River Basin, ultimately improving the State's drought resiliency.**

Project Location

The proposed project area includes portions of the Duchesne River and Utah Lake Watersheds, focusing on the eastern slope in the middle stretch of the Wasatch Mountains, and the southern slope in the western stretch of the Uinta Mountains. The proposed area spans Utah, Wasatch, Summit, and Duchesne Counties, and the area spans from about 40 to 100 miles from Salt Lake City. There are numerous Reclamation facilities within the project area including Deer Creek and Jordanelle Reservoirs in the Utah Lake drainage and Upper Stillwater, Currant Creek, Strawberry, and Starvation Reservoirs in the Duchesne River drainage. Additionally, there are two major trans basin diversions that convey water from the eastern Uinta Mountains to the Wasatch Front through the Duchesne and the Syar Tunnels. Figure 1 shows the project location within Utah, the headwaters that are the subject of this pilot program, the SNOTEL sites within the project boundaries, and the Reclamation facilities. The area of the Utah Lake headwaters is approximately 231 square miles. The project area of the Duchesne River headwaters is approximately 516 square miles.

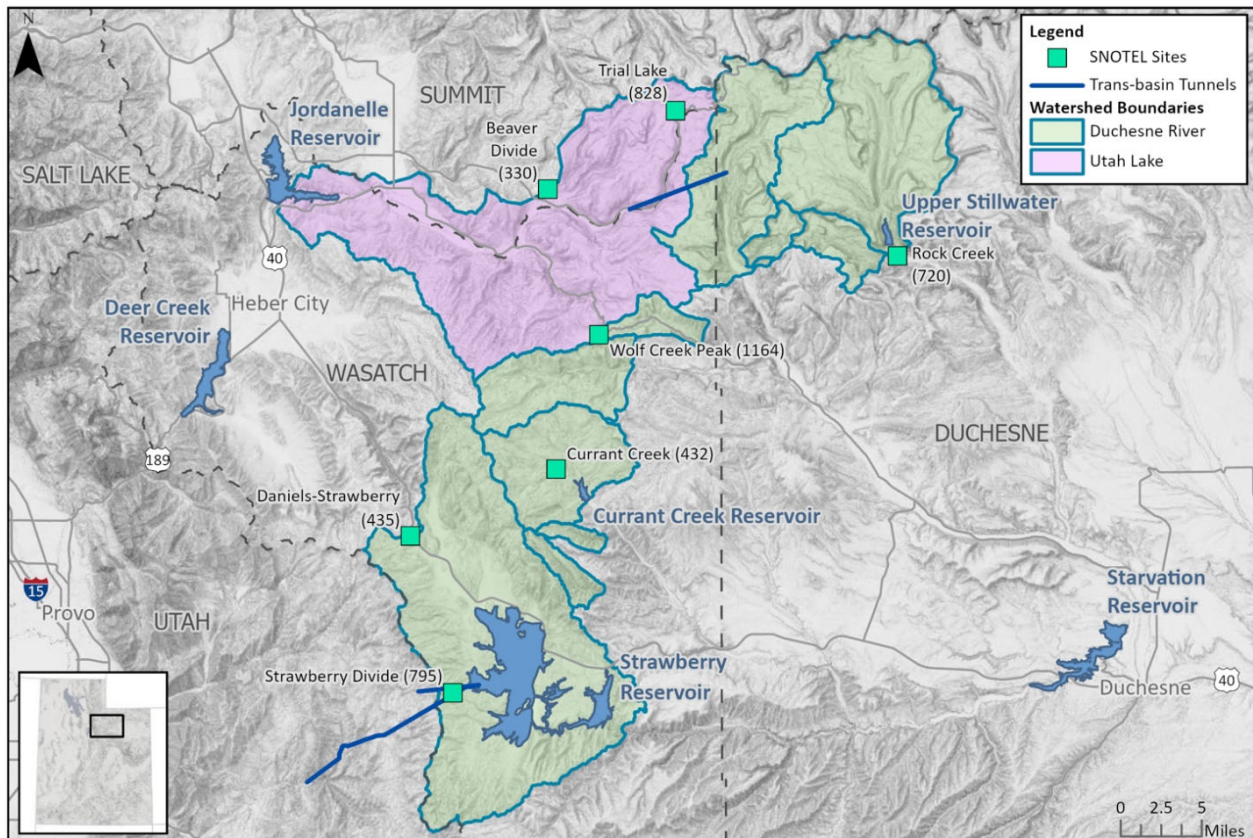


FIGURE 1. PROJECT LOCATION AND KEY INFRASTRUCTURE.



Motivation/Problem Statement

The Applicants recognize that effective water management and conservation efforts begin with careful and accurate supply measurement and forecasting. **Utah can better manage its water supply, increase its resiliency to drought, optimize operation of Reclamation facilities, and better support in-stream flows for vibrant habitats by improving our ability to predict Utah’s available water supplies.** This will become ever more important as new Colorado River Operating Guidelines are negotiated and implemented starting in 2026, and tools for reduced consumptive use are made available.

Demands for water in Utah, a semi-arid state, continue to increase with population and industry growth. Additionally, extreme weather events are creating issues with balancing flood control operation management and drought mitigation. Utah watersheds provide water not only to water users within the state but also to downstream users in the Colorado River Basin, which provides water to more than 40 million people in seven states and Mexico. In 2015, the State of Utah called for 25% water conservation from 2,000 Municipal and Industrial water uses by the year 2025. In 2022, the Utah Legislature directed the DWRe to develop and implement an integrated water assessment for the Great Salt Lake (GSL) Watershed. DWRe was awarded funding for a basin study through Reclamation’s WaterSMART program. These two efforts will be fully integrated to develop tools to better understand the current and future hydrology of the GSL Watershed and help water managers protect and preserve the water resources of the watershed and Great Salt Lake. In the 2023 legislative session, Utah allocated \$200 million dollars for water conservation initiatives and recently initiated the first statewide turf removal program. Collectively, these actions along with many others demonstrate Utah’s commitment to proactive water management.



In April 2022, the Colorado River Authority of Utah board approved its first 5-year Management Plan, identifying three priority areas: measurement, hydrology and operations, and drought mitigation. Improved snow water supply monitoring and forecasting provide the unique benefit of supporting all three priority areas. Within drought mitigation efforts like Demand Management, The Authority is heavily invested in the development of support tools necessary to establish, implement, and evaluate such programs. Thus, drought mitigation necessitates expanded measurement infrastructure and continued development of the novel Riverware model called the Utah Colorado River Accounting and Forecasting model (UCRAF). UCRAF evaluates water supply distribution by inflow, water right priority, and

depletion, and supports optimization of flood control operations to balance the capture of storage with flood control risk management.

Current Approaches

The Applicants are working on the ground to conserve water by developing and implementing water use optimization plans that incorporate drought mitigation measures. These programs currently use forecasting methods that are based on a limited number of SNOTEL stations that are representative of only the areas immediately adjacent to the instrumentation that, when extrapolated to include large, heterogenous, mountainous areas, can produce inaccurate results. There are 138 SNOTEL sites in Utah but only seven within the project area, at elevations from 7886 – 9992 feet. Regressions on or extrapolations from snow water equivalent (SWE) and precipitation measurements at the SNOTEL sites form the basis of operational snowmelt runoff forecasts by the USDA NRCS and NOAA/NWS Colorado Basin River Forecast Center (CBRFC). In contrast, forecasts constrained by full-watershed ASO measurements can produce significantly more accurate forecasts even under unusual climatic or watershed conditions. One example of the impact of limited forecasting confidence is lower drawdown elevations in flood control reservoirs like Jordanelle than prudent risk management, and the United States Army Corp of Engineers (USACE) may require. Accurate snow volume measurement and subsequent improved forecast reliability can minimize the uncertainty-driven need to favor flood risk over water supply risk management, or vice versa.





Facility Operations

To best operate water storage facilities, water managers must balance maximizing collection of runoff for late-season water supply with making space for excess runoff to control flooding. This project will provide operators with more accurate runoff streamflow predictions that will enable an improved balance of water storage and flood control. Jordanelle Reservoir in particular will directly benefit from improved predictions, as will the other five reservoirs within the project area.

Alignment with Reclamation’s Objectives

This project aligns with all three of the Snow Water Supply Forecasting Program objectives:

Reclamation Objectives	Project Objectives
Enhance snow information by deploying existing snow monitoring technologies in underserved areas,	ASO snowpack mapping is being used in other states. This project would be the first airborne snow mapping and forecast integration in Utah - benefitting Utah and fellow Basin states.
Enhance snow information by demonstrating or deploying emerging snow monitoring technologies or improvements to existing technologies,	The use of aerial lidar and hyperspectral-derived snowpack data to improve runoff forecasts is an emerging technology which was pioneered to produce decision-support water supply data on operational time scales.
Improve water supply forecast skill through improved use of snow information.	This will be the first implementation of airborne snow mapping and forecast integration in Utah, which could redefine how water supply forecasting is predicted into the future benefitting the project objectives for 1) short- and long-term water management decisions, 2) drought mitigation and resiliency, 3) optimized flood control operations of federal facilities, and 4) environmental protection.

The project complements the commitment of the Seven Basin States to develop and test tools “to provide additional security and certainty in the water supply of the Colorado River System for the benefit of the people served by water from the Colorado River System.” It also supports UCRC’s 5-Point Plan for additional actions and tools to help protect the Upper Basin’s critical infrastructure.

Prior Work and Results

Airborne Snow Observatories, Inc., based in California and Colorado, pioneered the integration of airborne lidar and imaging spectrometer mapping of mountain snow cover to produce decision-support water supply data on operational time scales. ASO began as an applied research mission at the NASA Jet Propulsion Laboratory in 2012, achieving significant accomplishments including the first complete remote sensing for snow water equivalent in mountains and marked improvements in streamflow forecasting. Armed with this knowledge, ASO’s industry-leading technologies, applications, and innovative leadership were developed in close partnership with water managers in the Western United States (US) to modernize water supply monitoring and modeling and became operations-critical for water management decision support. ASO has established a strategic partnership with the global geographic information systems leader ESRI, whose products are used extensively in water and natural resource management, and with the Weather Research and Forecasting Hydrological modeling system (WRF-Hydro) runoff forecasting development team at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado.

ASO has considerable experience acquiring lidar and spectrometer data for seasonal snowpack around the Western US. Through Water Year 2023, ASO’s 11th snow season, **the team has conducted over 500 flights in the mountains of Colorado, California, Oregon, Washington, and Idaho providing reliable high accuracy streamflow forecasting that has benefitted water management agencies, irrigation districts, and municipalities.** A testament to ASO’s work, each year the program has doubled in scope. ASO continues to scale their capacities to meet new obligations while maintaining their core commitments to respond to stakeholder needs accurately and timely. The ASO team uniquely has the required comprehensive expertise with snow hydrology and snow science, lidar and hyperspectral remote sensing, snow density modeling, optical

ASO is, without a doubt, the most significant development in the history of snow surveys.”

– Frank Gehrke, 30-year Chief California Cooperative Snow Survey Program.



retrievals, and geospatial processing to meet the requirements dictated by high-resolution snow depth, snow-water equivalent (SWE), and snow albedo mapping in mountainous, snow-dominated watersheds.

ASO is supported by NCAR, which has developed the WRF-Hydro hydrologic modeling system, a multi-scale, physics-based, high resolution (10s m – 1 km spatial resolution), spatially-distributed modeling framework. The WRF-Hydro model ingests real-time weather and hydrologic information to create rapidly updated analyses and predictions of hydrologic conditions including soil moisture, snowpack, shallow groundwater, evapotranspiration, flood inundation, and streamflow all on high resolution terrain grids, vectorized channel networks or reservoir water body objects. A strength of the WRF-Hydro modeling system is its robust capability to provide full water and energy budget accounting and constraint as well as its ability to rapidly assimilate a wide stream of operational and novel observations into its forecasting workflow.

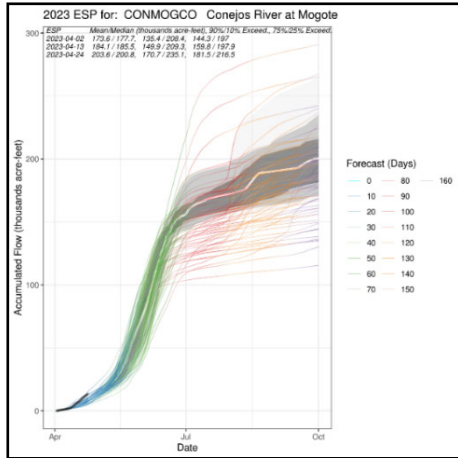


FIGURE 2. EXAMPLE SEASONAL WATER SUPPLY FORECASTING PLOT

With origins and applications extending back to 2003, WRF-Hydro serves as a world leading hydrologic forecasting system serving as one of the official water forecasting models for the U.S. National Weather Service as well as many other countries around the world. Since 2009, the WRF-Hydro model has been used in a series of seasonal water supply forecasting studies to examine the role of experimental observations, like the ASO snowpack products, on the skill of seasonal water supply forecasts into managed lakes and reservoirs. Moving beyond a multi-year research collaboration, starting in 2020, NCAR entered into a strategic partnership with ASO to streamline and formalize water supply forecasting activities first for the state of Colorado and more recently in California. Presently, the WRF-Hydro team at NCAR provides real-time ASO-assimilated snowpack and water supply forecasts to over 30 entities within the states of Colorado and California. This work is done in a joint operations-research capacity, providing water managers with critical snowpack and runoff forecast information using ASO data while also engaging in long term research to

quantify the benefits of ASO snowpack observations on snowpack and water resources forecasting and decision making.

Technical Approach and Project Activities

ASO generates spatially complete maps of snow depth, SWE, and snow albedo (reflectivity, which controls snowmelt rates) through coupled remote sensing, snow energy balance, and snowmelt runoff modeling frameworks to provide the best possible water resources data. The uniqueness of ASO comes from the experience of the team and their exclusive licensed software products developed, applied, advanced, and adopted by our customers over the last ten years.

The ASO data production process, from flight through data processing and modeling to data delivery and service, builds on a backbone of commercially available airborne sensors, utilizes flight optimizations refined throughout the ASO legacy, implements an exclusive, purpose-built, and fast processing pipeline, to deliver data products designed in concert with operational water and land management partners.

After selecting a watershed boundary, ASO will obtain baseline (snow-free) elevation data. Subsequent snow-on flight surveys subtract these baseline elevations from snow surface elevations to produce a 3m resolution snow depth map. Run in parallel, the iSnobal snowpack energy balance model is constrained by ASO snow depth measurements and produces a snow density map at 50m resolution. The product of depth and density produces a 50m SWE map. Coincident imaging spectrometer data provides broadband, visible, and near-infrared snow surface albedo measurements, which are used to constrain melt rates in iSnobal. This data is then assimilated into the WRF-Hydro model, updating the model states, and refining the ensemble of seasonal runoff predictions. The turnaround time from measurement to delivery of snowpack data is three days or less, and subsequent streamflow forecasts will be produced about three days thereafter, giving water managers reliable information within a timeframe that is needed for critical water management



decisions. This process and the resulting products have been applied in operational settings throughout California and Colorado with notable successes.

This project will provide more accurate and reliable snowpack data for the 3-year pilot period and will test the application of ASO-informed WRF-Hydro runoff forecasts within the Applicants respective operations. Tools such as targeted streamflow infrastructure and UCRAF will directly benefit from the improved forecasting. Finally, these improved tools will inform development and implementation of contracts for drought mitigation programs by expanding our ability to predict and monitor the sensitivities of water rights to water supply.

Potential Challenges and Mitigation

Operation of aircraft and optical remote sensing instruments in mountain terrain requires benign weather conditions with minimal cloud cover. Weather patterns in the Intermountain West, particularly in the spring season, can produce extended periods of unsuitable flight weather. The ASO team works diligently to take advantage of flight weather windows where available and will work closely with the Applicants to schedule flight operations. This project will incorporate lessons learned from other aerial snow observation projects that have been undertaken in other states and watersheds.

Task 1 – Team Kick-off/Preparation

The Applicants will work with ASO and the Reclamation team to initiate the project. This meeting will establish the team member's roles and responsibilities, and Reclamation procedures to adhere to. The project team will coordinate the implementation of the project, when the first-year flights will be flown, software coordination and output models for integration into the UCRAF model.

Task 2 – Grant Administration

Upon award, The Authority will manage the proposed project and may hire an external consultant to support project management and recommendations based on results. Task 3 is dedicated to ensuring the project is well managed and meets all requirements of the grant agreement with Reclamation, while connecting future work to lessons from project outcomes. Activities to be completed under Task 3 include developing a work plan for approval by Reclamation at the outset of the project, providing interim performance reports every 6 months, and developing a Final Project Report. The Report will be submitted in draft form for Reclamation review and a final Report will address comments and corrections.

Task 3 – ASO Flights

Subtask 3.1 – Measurement

The technical approach will follow the process identified above including ASO measuring the snowpack by first flying the project area without any snowpack present to provide baseline elevation data. The area will be gridded at 3-meter resolution. A flight in Fall 2023 will obtain baseline data of the mountain terrain within the watershed area. Then in Spring 2024 and for three years, three flights will be flown during the snow season (near April 1st or peak accumulation, as well as mid-to-late melt season, with actual survey timing determined in collaboration with Authority staff) to measure snow depth and albedo, and to derive SWE across all project watersheds.

Subtask 3.2 – Snowpack Modeling

ASO will conduct real-time simulation of snowpack evolution using the iSnobal energy-balance snow physics model. This system, constrained by ASO snow depth measurements, provides snow density values at 50-meter resolution, used for calculating SWE. The continuous snowpack tracking enables regular reporting on SWE and other snowpack conditions (e.g. cold content, melt volume, etc.) between and after ASO flights. SWE and albedo values then will be assimilated in the WRF-Hydro model to produce seasonal ensemble snowpack, streamflow and unregulated reservoir predictions.

Subtask 3.3 – Hydrologic Forecasting

Using existing, demonstrated, and operationally hardened capabilities, the ASO data products will be assimilated in the WRF-Hydro hydrology model to produce ensemble-based snowpack and snowmelt runoff forecasts. Additionally, ASO and the Applicants will continue the work initiated in neighboring states with agency staff at the NRCS Snow Survey and CBRFC to explore integration of ASO data with their forecast systems.



Task 4 – Forecast Evaluation

The Open Loop (OL) and ASO-assimilated WRF-Hydro forecast runs will be evaluated against total seasonal runoff and in comparison, to forecasts from operational agencies. Operational water management decisions and alternatives will be evaluated as informed by the several available forecast choices. Via connection to the UCRAF operations model, operational decision-making and Demand Management allocation scenarios will be explored to understand the additional value, resilience, and flexibility enabled by ASO snowpack mapping and ASO-informed forecasts.

Work Plan and Schedule

The project will be the first implementation of airborne snow mapping and forecast integration in Utah, which could redefine how water supply forecasting is predicted into the future. The project schedule, shown in Table 1, details each project task for the Work Plan.

TABLE 1: PROPOSED PROJECT SCHEDULE AND MILESTONES

Date	2023		2024				2025				2026		
TASKS	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Task 1: Team Kick-off/Preparation													
Task 2: Grant Administration													
Task 3: ASO Flights													
Subtask 3.1: Measurement*													
Subtask 3.2: Snowpack Modeling													
Subtask 3.3: Hydrologic Forecasting													
Task 4: Forecast Evaluation													

*Timing of flights to be determined in consultation with the project team.

Quality Assurance and Quality Control (QA/QC) Plan

The ASO data acquisition and processing pipeline is designed with several structural QA/QC elements to ensure data consistency and accuracy. Flight patterns provide at least 50% lidar swath side-lap, so that the combination of the two offset laser scans and overlap produces 4 unique look angles for every location. The swath data are aligned with each other, resulting in a spatially-homogenous relative accuracy. Snow-free areas in common between the snow-free baseline and the snow-on data sets are used to bias-correct the snow-on scan such that the elevation subtraction produces zero snow depth at these locations – this critical step ensures consistent, basin-wide snow depth accuracy, and allows quantification of depth measurement error. Because snow depth variation is the dominant component of SWE variation across the landscape, this rigorous snow depth quality control serves to minimize error in SWE calculation. In-situ data (such as from SNOTEL or manual snow course measurements) are used to validate the snow depth measurements and to constrain the snow densities produced by the iSnobal snow physics model. All validation and error calculation steps are documented and reported in the Flight Survey reports accompanying data set delivery.

Responses to Evaluation Criteria

Evaluation Criterion A: Technical Merit

This project will fund the best-available snow measurement and modeling to provide water supply measurement and forecasting to an underserved Basin state thereby achieving the primary objectives identified above. With snowpack data that covers the entire project area rather than seven SNOTEL sites, more accurate streamflow data is inevitable. The full model integration of ASO-observed snowpack into



seasonal water supply forecasts using WRF-Hydro has already been fully operationalized and demonstrated for multiple years to the California and Colorado Departments of Water Resources and numerous local water managers. The ASO team has emphatically demonstrated the technical, practical, and economic feasibility and approach with their program from which Utah will benefit. This is the only approach that will build upon Utah's current snow forecasting methods. This 3-year pilot project aligns with Reclamation's objectives for this grant opportunity.

Evaluation Criterion B: Non-Federal Cost Share

The Applicants are committed to the success and progression of this important innovative project, which moves our collective missions forward to benefit Utah. Together, the three agencies will provide a 50% cost share. Additionally, the proposed project is supported by a diverse set of stakeholders covering many aspects of water in Utah and the Colorado River Basin, including DWR and CUWCD, co-applicants, and Utah's four members of the US House of Representatives - Utah, US Senator - Utah, ASO, CBRFC, UCRC, Jordan Valley Water Conservancy District, Duchesne County Water Conservancy District, The Nature Conservancy, and Trout Unlimited.

Evaluation Criterion C: Impact/benefit of the Proposed Work

The project will apply 3-years of the best-available snowpack and water supply forecasting information to water management in a region that relies on snow for its water supply. The project will also evaluate the validity of the SNOTEL-based forecasting methods. Lessons from the obtained, application, and evaluation of data will be disseminated and translated to other watershed areas throughout the state by using existing channels of the applicants. This project aims to address the limited water resources as discussed in the motivation/problem statement. The demand for sustained and expanded ASO programs is a testament to the benefit this work provides to water managers.

Evaluation Criterion D: Tech Transfer Plan to Forecast Agency

The Applicants and ASO will build on their existing relationships with the CBRFC with the aim of conducting experimental ASO-informed forecasts in the project area, as is ongoing in neighboring states. While the incorporation of ASO data into the CBRFC forecast model comes with unique challenges, a successful integration outcome is more likely with a greater diversity of basins and environments included in the effort. Additionally, the ASO/WRF-Hydro forecast integration proposed here is an important parallel effort. WRF-Hydro is run operationally with ASO data ingestion in California and Colorado and has become a key addition to the available forecast options as it can readily accept ASO data inputs. Connection of WRF-Hydro to the UCRAF operations model is a novel component that will likely serve as a model for an improved snow observation/hydrologic forecast/operations support capacity elsewhere in Utah and the Colorado River Basin.

Evaluation Criterion E: Alignment with Program Objectives

The proposed project aligns with Reclamation's stated goals and objectives of the Snow Water Supply Forecasting grant program listed in the Notice of Funding Opportunity and above. The overall objective of the applicants is improving water supply forecasts used by Utah's water managers for the objectives outlined in the motivation statement and to validate existing methods of forecasting based on SNOTEL station data. Industry leading approaches and technologies will be utilized to improve the data accessible and our knowledge of Utah's snowpack forecasting. In evaluating the proposed project, it is important to understand that the Applicants and other interested stakeholders are committed to providing as accurate as possible water supply forecasting to secure and best manage Utah's contribution to Utah's and the lower Basin states water supply.

Evaluation Criterion F: Schedule/workplan and QA/QC

The Work Plan section above provides a Gantt chart which visually represents the tasks and milestones for the project. ASO has implemented lessons learned to refine its work plan and schedule. The QA/QC plan provides proven measures to ensure the accuracy and completeness of the work including technical/scientific integrity of the work, data verification, analysis, and testing forecast improvements using ASO data assimilation.



BUDGET PROPOSAL

Project Budget

Budget Proposal

The grant project which is the subject of this application has a total budget of **\$1,999,999**, detailed in Table 2. This grant application is requesting **\$999,999** in Federal funds for reimbursement through this WaterSMART grant application to cover nearly 50% of the project budget. The remaining 50%, equal to **\$1,000,000**, will be provided by the applicant with cost-share from two other entities.

Three entities will share the non-Federal portion of the budget: the Colorado River Authority of Utah (applicant), Central Utah Water Conservancy District, and Utah Division of Water Resources (Table 3). The Authority and DWRe receive funding as appropriations through the Utah Legislature. CUWCD receives funding through property tax revenue. No in-kind contributions are part of this project. Letters of Commitment outlining the amount of funding commitment, the date the funds will be available, and any constraints or contingencies on the funds are included in the Appendix.

TABLE 2. SUMMARY OF NON-FEDERAL AND FEDERAL FUNDING SOURCES

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Colorado River Authority of Utah	\$ 650,000.00
2. Utah Division of Water Resources	\$ 100,000.00
3. Central Utah Water Conservancy District	\$ 250,000.00
Non-Federal Subtotal	\$1,000,000.00
REQUESTED RECLAMATION FUNDING	\$ 999,999.00

TABLE 3. TOTAL PROJECT COST

FUNDING SOURCES	AMOUNT
Costs to be reimbursed with the requested Federal funding	\$ 999,999.00
Costs to be paid by the applicant	\$1,000,000.00
Value of third-party in-kind contributions	\$ 0.00
TOTAL PROJECT COST	\$1,999,999.00

Budget Narrative

Salaries & Wages

No Authority, DWRe, or CUWCD staff time will be paid from Federal funds in completing the proposed project. All requested Federal funding will be used to award contracts for the completion of the project.

Fringe Benefits

No fringe benefits are included in the project budget.

Travel

Travel costs are included in the Contractor section below. No travel costs are included in the project budget outside of travel costs included in contractor awards.

Equipment

No equipment purchases are planned as part of the proposed project or included in the project budget.



Materials & Supplies

No significant materials and supplies, beyond standard office supplies, are anticipated to be required for the planned project and no costs are included in the project budget.

Contractual

The entire project budget will be utilized for third-party contractors.

I. **Project Implementation.**

- a. The Authority will issue a Sole Source contract to Airborne Snow Observatories, Inc. (ASO). The Colorado River Authority has the authority to issue Sole Source contracts under Utah State statute 63M-14-210.
- b. ASO is the only known vendor capable of the technical work required for project implementation. The ASO budget will include aircraft mobilization, instrument calibration, survey flying, survey processing, data storage, modeling, and data intercomparison. ASO will partner with NCAR for the modeling and data intercomparison tasks. Without the technical services provided by ASO for this project, the project would not be possible.
- c. The ASO portion of the project budget will be expended over the three-year pilot, with the largest expenditure occurring in the first year to include a snow-free flight along with two snow-on flights for each water year. Data analysis and modeling expenses are distributed across the three years (see SF 424A).
- d. Of the \$1,999,999, the ASO portion will be up to about **\$1,600,000**.

II. **Project Management.**

- a. The Authority will manage the project-management contractor selection and award under a competitive procurement process as defined in Utah Code R33 – *Administrative Services, Purchasing, and General Services*. The Authority will issue an open Request For Proposals (RFP) for the contract and will include price / cost of providing services as a primary criterion for scoring proposals responding to the RFP.
- b. Project Management may include both administrative / reporting tasks and development of recommendations based on ASO-produced results and project outcomes.
- c. For the project budget, contractor billing rates and hours were estimated to be \$170 per hour for contractors. These billing rates are supported by a review of typical billing rates under the Contract Awarded Labor Category (CALC) search tool maintained by the General Services Administration (GSA). The contractor rate of \$170 per hour was applied for all contractor hours to estimate the project budget, with the understanding that each proposal responding to the Authority RFP process will represent a unique blend of job categories, positions, and billing rates.
- d. The Project Management portion of the budget will be expended over the three-year pilot.
- e. Of the \$1,999,999, the Project Management portion will be up to about **\$399,999**, including both administrative / reporting tasks and recommendations based on ASO results and project outcomes. This portion of the budget also accounts for up to 10% risk and potential adjustments to contractor rates due to market conditions.

In-Kind Contributions

No in-kind contributions will be made for the proposed project.

Environmental & Regulatory Compliance Costs

Environmental and regulatory compliance costs are estimated to be minimal.

Indirect Costs

No indirect costs are included in the project budget.

Pre-Award Costs

The proposed project does not include pre-award costs.



ADDITIONAL INFORMATION

Environmental & Cultural Resource Compliance

The proposed project is not anticipated to result in any environmental or cultural resource impacts, as detailed in the responses below. The proposed project is limited to aerial and desktop work and will not involve any ground-disturbing activities. ASO is subject to aviation regulations and flies at about 25,000 feet.

- 1) *Will the proposed Project impact the surrounding environment? Describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the project area.*
No.
- 2) *Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project?*
No.
- 3) *Are there wetlands or other surface waters inside the Project boundaries that potentially fall under CWA jurisdiction? If so, please describe and estimate any impacts the proposed project may have.*
No.
- 4) *When was the water delivery system constructed?*
No.
- 5) *Will the proposed project result in any modification of or effects to individual features of an irrigation system?*
No.
- 6) *Are any buildings, structures, or features in the proposed Project area listed or eligible for listing on the National Register of Historic Places?*
No.
- 7) *Are there any known archeological sites in the proposed Project area?*
No.
- 8) *Will the proposed project have a disproportionately high and adverse effect on low income or minority populations?*
No.
- 9) *Will the proposed Project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?*
No.
- 10) *Will the proposed project contribute to the introduction, continued existence, or spread of noxious weeds or non-native species known to occur in the area?*
No.



Required Permits & Approvals

Approval is required by the Utah State Legislature to expend funds in relation to a federal grant. This step will occur following preliminary project selection.

Overlap or Duplication of Effort Statement

The proposed project will not overlap with any other active or anticipated proposals or projects.

Conflict of Interest Disclosure Statement

No conflict of interest or potential conflict of interest exists at the time of submission.

Uniform Audit Reporting Statement

The proposed project will be reported through the Single Audit report.

Disclosure of Lobbying Activities

The applicant has not made or agreed to make payment to any lobbying entity.

Letters of Support

The Appendix contains letters from stakeholders supporting the proposed project. As shown by the letters, the project is supported by a diverse group of water users, state agencies, environmental groups, and other stakeholders.

Official Resolution

The official resolution in support of the application will be submitted prior to July 11, 2024, which is within 60 days after the application deadline. A Draft Resolution is attached.



Appendix A – Letters of Support

Utah Division of Water Resources

Central Utah Water Conservancy District

US House of Representatives - Utah

US Senate - Utah

Airborne Snow Observatories, Inc.

Colorado Basin River Forecast Center

Upper Colorado River Commission

Jordan Valley Water Conservancy District

Duchesne County Water Conservancy District

The Nature Conservancy

Trout Unlimited



State of Utah

SPENCER J. COX
Governor

DEIDRE M. HENDERSON
Lieutenant Governor

Department of Natural Resources

JOEL FERRY
Executive Director

Division of Water Resources

CANDICE A. HASENYAGER
Division Director

May 09, 2023

U.S. Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

Mr. Nowak & Selection Committee:

The Utah Division of Water Resources is very interested in the "Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters" research proposal. The division is excited to be a participant in this project and is eager to work together with the Colorado River Authority of Utah and the Central Utah Water Conservancy District to fund and execute the proposed study. The state of Utah will benefit from this research to better forecast water supply in the project area and urges the Bureau of Reclamation to provide funding for the project under the Snow Water Supply Forecasting Grant program.

As a co-applicant, the division will provide \$100,000 toward the project. The division will reimburse billable expenses up to this amount on a monthly or quarterly basis as they are accrued. There are no time restrictions for use of this funding; the funding will be available as soon as expenses are invoiced and will be available throughout the duration of the project. The only contingencies for this funding are that the division have the opportunity to review and provide input on draft reports and receive a copy of the final report once completed.

Sincerely,

Candice Hasenyager
Director, Utah Division of Water Resources



Al Mansell *Chair of the Board*
Shelley Brennan *Vice Chair of the Board*
Gene Shawcroft *General Manager / CEO*

G. Wayne Andersen
Shelley Brennan
Jon Bronson
Kirk L. Christensen
Steve Farrell
Wade E. Garner

Board of Trustees

Steve Hanberg
Max Haslem
Marvin Kenison
Kathy Wood Loveless
Al Mansell
Greg McPhie

Eldon A. Neves
Jim Riding
Jennifer Scott
Edwin Boyd Sunderland
Randy L. Vincent
Brad Wells

May 12, 2023

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

Dear Mr. Nowak and Selection Committee:

**Re: Snow Water Supply Forecasting Grant
Water Supply Forecasting Enhancements for Uinta Mountain Headwaters**

Central Utah Water Conservancy District (CUWCD, District) is pleased to support The Colorado River Authority of Utah's proposal for the Bureau of Reclamation's Snow Water Supply Forecasting Grant. The degree of interest is demonstrated by our financial support of a portion of the local funds proposed, making CUWCD a collaborating agency. As the sponsor of the Bonneville Unit of the Central Utah Project, the largest single diverter of Colorado River Water in Utah, CUWCD recognizes and supports the need for improved forecasting and snowpack measurement.

The District supports over 1.3 million residents on the Wasatch Front, and municipal and agricultural water users in the Uinta Basin. Improved understanding of the differences between current measurement of snowpack (using SNOTEL), and direct measurement using aerial LiDAR, and the potential for optimized operations and informed drought mitigation program implementation will be crucial to the District's operations and its ability to supply water to its customers, as the water supply is increasingly strained. We support this grant application and the information that will increase resilience of our Colorado River water supply.

As the first aerial snowpack forecasting project in Utah, the 3-year pilot would provide information to evaluate SNOTEL-based forecasting against forecasting developed using aerially collected LiDAR data. The project's results will be multi-faceted and used in the following beneficial applications:

- 1) Water Management Decisions – Results will inform short- and long-term planning for Utah's water resources.
- 2) Drought Mitigation and Resiliency – (1) Results will provide data for models to prioritize changes to water use. (2) Results will aid in development and implementation of Demand Management programs that require contract development and sensitivities related to runoff, timing, and water rights.
- 3) Improved Facilities Operation – Results will improve the balance between maximizing collection of runoff for water supply with making space for excess runoff to manage flood control. Improving the balance of water supply and flood control will improve our ability to operate reservoirs and ensure we optimize collection of the water supply.



4) Environmental Commitments – Results will enable improvements in forecasting through a comparison of SNOTEL and aerial measurement to optimize operations for fish flows.

I'd like to convey our support — and ask for your support as well — for evaluating potential improvement to snow water forecasting in the Duchesne and Utah Lake drainages. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Gene Shawcroft".

Gene Shawcroft, PE
General Manager/CEO

Congress of the United States
House of Representatives
Washington, DC 20515

May 8, 2023

The Honorable Camille Calimlim Touton
Commissioner
U.S. Bureau of Reclamation
1849 C Street NW, Room 7657
Washington, DC ZIP 20240

Subject: Funding Request for The Colorado River Authority of Utah (CRAU) through the Bureau of Reclamation's Snow Water Supply Forecasting Grant Program

Dear Commissioner Touton,

We respectfully request full and fair consideration of the Colorado River Authority of Utah's (CRAU) application for funding through the Bureau of Reclamation's Snow Water Supply Forecasting Grant Program. CRAU will use this funding to deploy snow monitoring technologies that will enhance the region's water supply forecasts and flood control measures as well as improve its climate change resiliency. If selected, this critical funding will provide access to important research some of which will be the first of its kind in Utah.

This funding will expand CRAU's current research capabilities, resulting in multiple important benefits, including: 1) enhanced operations that balance maximizing collection of runoff for water supply while simultaneously managing flood control, 2) increased Demand Management Planning and drought mitigation abilities, 3) optimization of operations such that instream fish flows can be improved, and 4) improved climate change resilience throughout the region.

CRAU intends to compare natural streamflow forecasting using the Airborne Snow Observatory (ASO) to forecasting using SNOTEL sites. SNOTEL sites only represent the area immediately adjacent to the monitoring equipment as compared to remote sensing, which utilizes equipment mounted to aircraft that captures the entirety of the land under consideration. Using data from the ASO flights, including a baseline flight to evaluate land surface without snow and three flights annually for the duration of the program, CRAU would be able to make these comparisons and draw important conclusions about water supply in the region. This type of research is already being done in Colorado, California, and elsewhere, but would be the first of its kind in Utah.

CRAU is seeking \$999,999 through this grant program and intends to provide a match of \$1,000,000, which will be provided in coordination with the Central Utah Water Conservancy District and other entities. This is a total of roughly \$2,000,000 for three years of critical research and improvements in forecasting.

As you begin reviewing applications, we urge your full and fair consideration of the Colorado River Authority of Utah's project request. If you have any questions, please contact our staff.

Sincerely,



John R. Curtis
Member of Congress



Chris Stewart
Member of Congress



Burgess Owens
Member of Congress



Blake D. Moore
Member of Congress

Grace Bellone (Rep. John Curtis), grace.bellone@mail.house.gov
Celeste Malloy (Rep. Chris Stewart), celeste.malloy@mail.house.gov
Miriam Harmer (Rep. Burgess Owens), miriam.harmer@mail.house.gov
Paul Johnson (Rep. Blake Moore), paul.johnson@mail.house.gov

United States Senate

WASHINGTON, DC 20510-4404

The Honorable Camille Calimlim Touton
Commissioner
U.S. Bureau of Reclamation
1849 C Street NW, Room 7657
Washington, DC ZIP 20240

Subject: Funding Request for The Colorado River Authority of Utah (CRAU) through the Bureau of Reclamation's Snow Water Supply Forecasting Grant Program

Dear Commissioner Touton,

I respectfully request your full and fair consideration of the Colorado River Authority of Utah's (CRAU) application for funding through the Bureau of Reclamation's Snow Water Supply Forecasting Grant Program. CRAU will use this funding to deploy snow monitoring technologies that will enhance the region's water supply forecasts and flood control measures as well as improve its climate change resiliency. If selected, this critical funding will provide access to important research some of which will be the first of its kind in Utah.

More specifically, according to CRAU this funding will expand CRAU's current research capabilities, resulting in multiple important benefits, including: 1) enhanced operations that balance maximizing collection of runoff for water supply while simultaneously managing flood control, 2) increased Demand Management Planning and drought mitigation abilities, 3) optimization of operations such that instream fish flows can be improved, and 4) improved climate change resilience throughout the region.

CRAU has informed us that it intends to compare natural streamflow forecasting using the Airborne Snow Observatory (ASO) to forecasting using SNOTEL sites. SNOTEL sites only represent the area immediately adjacent to the monitoring equipment as compared to remote sensing, which utilizes equipment mounted to aircraft that captures the entirety of the land under consideration. Using data from the ASO flights, including a baseline flight to evaluate land surface without snow and three flights annually for the duration of the program, CRAU would be able to make these comparisons and draw important conclusions about water supply in the region. This type of research is already being done in Colorado, California, and elsewhere, but would be the first of its kind in Utah.

CRAU is seeking \$999,999 through this grant program and intends to provide a match of \$1,000,000, which will be provided in coordination with the Central Utah Water Conservancy District and other entities. This is a total of roughly \$2,000,000 for three years of critical research and improvements in forecasting.

As you begin reviewing applications, I urge your full and fair consideration of the Colorado River Authority of Utah's project request. If you have any questions, please contact my staff.

Sincerely,

A handwritten signature in blue ink, appearing to read "Michael S. Lee". The signature is fluid and cursive, with a large initial "M" and "L".

Michael S. Lee
United States Senator

May 12, 2023

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
PO Box 25007, MS 86-69100
Denver, CO 80025

Dear Dr. Nowak and the Review Committee,

Airborne Snow Observatories, Inc. (ASO) would like to express our enthusiastic support for the Colorado River Authority of Utah's grant proposal to the USBR *Snow Water Supply Forecasting Program*. If funded, this grant will build upon the extensive work done in neighboring states to expand measurements of the seasonal mountain snowpack using ASO and to thereby support improvements in water supply forecasting.

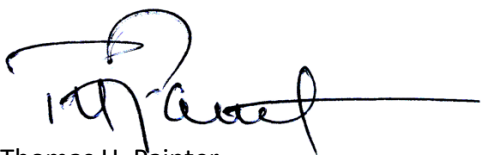
Our innovative snow measurement technologies and data products provide an invaluable new tool to all water sector stakeholders for making decisions in the increasingly complex water landscape of Utah, the Colorado River, and the western U.S. The better real-time understanding we have of mountain snowpack, the better decisions we can all make as water users and stewards. Of existing technologies, ASO provides the most accurate, real-time measurement of mountain snowpack across entire watersheds, supporting enhancements to runoff forecasting and management decision-making. As a Public Benefit Corporation, it is central to ASO's mission to engage in stakeholder-led projects like this proposal to provide the best available quantification of basin snowpack and runoff forecasts to enable a robust and resilient water management system.

Beginning in 2013, ASO has demonstrated effective coordination of snow survey flights, delivery of basin reports and relevant data, and production of updated runoff forecasts in collaboration with partner forecasting entities in an operational fashion.

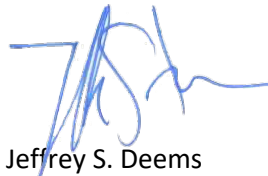
We were approached by the Colorado River Authority of Utah to deliver airborne snow survey data products and runoff forecasts that will help improve water management decisions for them and other stakeholders in the Provo and Duchesne basins. Of particular significance is the proposed project's focus on supporting administration of a demand management program to benefit management of the larger Colorado River system.

We fully support this grant application and look forward to conducting snow survey flights for the Colorado River Authority of Utah in the years to come.

Sincerely,

A handwritten signature in black ink, appearing to read 'Tom Painter', with a long horizontal flourish extending to the right.

Dr. Thomas H. Painter
Founder & CEO
Airborne Snow Observatories, Inc.

A handwritten signature in blue ink, appearing to read 'Jeff Deems', with a long horizontal flourish extending to the right.

Dr. Jeffrey S. Deems
Co-Founder, CTO, and Formulation Lead
Airborne Snow Observatories, Inc.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
Colorado Basin River Forecast Center
2242 West North Temple
Salt Lake City, Utah 84116-2919



May 11, 2023

To Whom It May Concern:

The Colorado Basin River Forecast Center (CBRFC) would like to express support for additional Airborne Snow Observatories (ASO) Inc. snow survey flights under the following USBR grant opportunity: Snow Water Supply Forecasting Program FY2023 (Funding Opportunity Number R23AS00079).

In 2022 and 2023, the CBRFC developed a series of experimental water supply forecasts in the Upper Colorado River Basin by integrating ASO's aerial lidar snowpack data into its operational snow model following an ASO flight. The CBRFC continues to investigate and identify methods to improve water supply forecasts with this data.

As ASO snow surveys expand in number and geographic coverage, we see the potential to use these data to reduce the uncertainty in our seasonal runoff forecasts. The primary barriers to widespread ASO snow survey deployment are cost and flight coordination. The CBRFC supports additional ASO snow survey flights and will continue to remain engaged with ASO efforts. The additional snow depth measurements that airborne lidar surveys provide will help us determine the extent to which that data may improve our streamflow forecasts. In addition, we see value in the distributed snow depth and accompanying data as we continue developing gridded and physically based snow modeling.

Sincerely,

A handwritten signature in blue ink, appearing to read "Michelle Stokes".

Michelle Stokes, Hydrologist in Charge

Colorado Basin River Forecast Center, NOAA



UPPER COLORADO RIVER COMMISSION

50 S. 600 E. Ste #100 • Salt Lake City, UT 84102 • 801-531-1150 • www.ucrccommission.com

May 10, 2023

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

Dear Mr. Nowak and Selection Committee:

On behalf of the Upper Colorado River Commission (UCRC), it is my pleasure to express our support of the proposal "Water Supply Forecasting Enhancements for Uinta Mountain Headwaters," submitted to the Bureau of Reclamation's Snow Water Supply Forecasting Grant program by the Colorado River Authority of Utah and the Central Utah Water Conservancy District.

Over many years, the UCRC has worked closely with the Upper Division States of Colorado, New Mexico, Utah, and Wyoming to determine how to address water supply and water use challenges that are ongoing in the Upper Colorado River Basin. Our efforts rely on additional instrumentation, measurement, and enhanced monitoring throughout the Basin, such that we can improve our management with the best available science and data. The Airborne Snow Observatory has shown promise for monitoring and measuring the accrual of precipitation and snow in higher latitudes, both in terms of fidelity and turnaround time. It may also lead to greater insight and accuracy of forecasting and infrastructure operations, understanding runoff timing, impacts on water rights, and more generally drought mitigation support in some critical regions in the Basin.

For these reasons, we support the proposers' interest in testing this new capability and determining if it would be a useful tool for their needs. We recommend a review of their proposal in light of its potential benefits to the overall Colorado River System. Thank you for your consideration and please reach out to me if we can be of further assistance.

Sincerely,

Chuck Cullom
Executive Director
Upper Colorado River Commission
801-531-1150

May 2, 2023

801.565.4300
fax 801.565.4399
jvwcd.org

8215 South 1300 West
West Jordan, UT 84088



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

**Re: Snow Water Supply Forecasting Grant
Water Supply Forecasting Enhancements for Uinta Mountain Headwaters**

Dear Mr. Nowak and Selection Committee:

Jordan Valley Water Conservancy District is pleased to support The Colorado River Authority of Utah's proposal for the Bureau of Reclamation's Snow Water Supply Forecasting Grant. As a purveyor of Colorado River water, the proposed project will help us in our role of supplying water to cities and improvement districts within Salt Lake County by optimizing runoff collection, appropriate utilization of alternative supplies, and development of drought mitigation tools. We support this grant application and the information that will increase resilience of our Colorado River water supply.

As the first aerial snowpack forecasting project in Utah, the 3-year pilot would provide information to evaluate SNOTEL-based forecasting against forecasting developed using aerially collected LiDAR data. The project's results will be multi-faceted and used in the following beneficial applications:

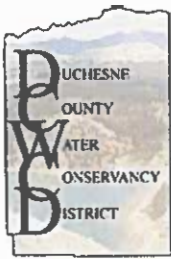
- 1) Water Management Decisions – Results will inform short- and long-term planning for Utah's water resources.
- 2) Drought Mitigation and Resiliency – (1) Results will provide data for models to prioritize changes to water use. (2) Results will aid in development and implementation of Demand Management programs that require contract development and sensitivities related to runoff, timing, and water rights.
- 3) Improved Facilities Operation – Results will improve the balance between maximizing collection of runoff for water supply with making space for excess runoff to manage flood control. Improving the balance of water supply and flood control will improve our ability to operate reservoirs and ensure we optimize collection of the water supply.
- 4) Environmental Commitments – Results will enable improvements in forecasting through a comparison of SNOTEL and aerial measurement to optimize operations for fish flows.

I enthusiastically express Jordan Valley's support — and ask for your support as well — for evaluating potential improvement to snow water forecasting in the Duchesne and Utah Lake drainages. Thank you for your consideration.

Sincerely,

A handwritten signature in blue ink that reads "Alan Packard".

Alan Packard, PE
General Manager/CEO
801-565-4300



DUCHEсне COUNTY WATER CONSERVANCY DISTRICT

275 West 800 South
Roosevelt, Utah 84066
General Manager: Clyde Watkins
Admin. Assist: Carrie Lynn Shiner

Office: (435) 722-4977
Cellular: (801) 360-0312
Email: clydedcwcd@stratanet.com
Email: carriedcwcd@stratanet.com

Board Members:

Keith Hooper – Board Chairman
Kevin Rowley – Vice Chairman
Rodger Ames - Member
Kelly Crozier – Member

Don Richards - Member
Connie Sweat - Member
Dex Winterton - Member

May 12, 2023

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

Dear Mr. Nowak and Selection Committee:

**Re: Snow Water Supply Forecasting Grant
Water Supply Forecasting Enhancements for Uinta Mountain Headwaters**

Duchesne Conservancy Water Conservancy District is pleased to support The Colorado River Authority of Utah's proposal for the Bureau of Reclamation's Snow Water Supply Forecasting Grant. As a purveyor of Colorado River water, the proposed project will help us in our role to develop and conserve water supplies for the benefit of our communities. We support this grant application and the information that will increase resilience of our Colorado River water supply.

As the first aerial snowpack forecasting project in Utah, the 3-year pilot would provide information to evaluate SNOTEL-based forecasting against forecasting developed using aerially collected LiDAR data. The project's results will be multi-faceted and used in the following beneficial applications:

- 1) Water Management Decisions – Results will inform short- and long-term planning for Utah's water resources.
- 2) Drought Mitigation and Resiliency – (1) Results will provide data for models to prioritize changes to water use. (2) Results will aid in development and implementation of Demand Management programs that require contract development and sensitivities related to runoff, timing, and water rights.
- 3) Improved Facilities Operation – Results will improve the balance between maximizing collection of runoff for water supply with making space for excess runoff to manage flood control. Improving the balance of water supply and flood control will improve our ability to operate reservoirs and ensure we optimize collection of the water supply.
- 4) Environmental Commitments – Results will enable improvements in forecasting through a comparison of SNOTEL and aerial measurement to optimize operations for fish flows.

I'd like to convey our support — and ask for your support as well — for evaluating potential improvement to snow water forecasting in the Duchesne and Utah Lake drainages. Thank you for your consideration.

Sincerely,

Clyde Watkins
General Manager
801-360-0312

May 9, 2023

Bureau of Reclamation, Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

**Re: Snow Water Supply Forecasting Grant - Water Supply Forecasting
Enhancements for Uinta Mountain Headwaters**

Dear Mr. Nowak and Selection Committee:

On behalf of The Nature Conservancy in Utah, I would like to express our support for the Colorado River Authority in Utah's application for the Bureau of Reclamation Snow Water Supply Forecasting Grant to conduct a three-year pilot of the Airborne Snow Observatory. This would allow Utah to better predict runoff volume and timing to improve water management and better support in-stream environmental flows.

The Nature Conservancy (the Conservancy) is an international conservation organization which works collaboratively to protect ecologically significant lands and waters for people and nature. Guided by science, we seek on the ground, collaborative solutions to achieve lasting conservation results. In Utah, working with partners, we have helped protect over one million acres of public and private land while earning the support of 6,000 members, an active board of 25 civic leaders, and over 500 volunteers. The Conservancy has also led and joined water projects throughout Utah to develop creative solutions to provide water to people and nature.

Water is the foundation for everything in Utah – economy, environment, and community. Because of limited and uncertain future water supplies, we need to be intentional and careful with our water resources. Having more accurate data on water supply will allow us to be nimble in how we use and manage our water resources and allow better planning and development of tools to address water stress in the Colorado River Basin and Great Salt Lake Basin.

We hope Reclamation provides funding under the grant to support the Colorado River Authority of Utah project, and we look forward to the benefits of the project over the next few years. Thank you for your consideration.

Sincerely,



Kelley Hart
Conservation Director
The Nature Conservancy in Utah



Jordan Nielson

Utah Water and Habitat Program Director

May 12, 2023

Bureau of Reclamation
Research and Development Office
Attn: Kenneth Nowak
P.O. Box 25007, MS 86-69100
Denver, CO 80225

Dear Mr. Nowak and Selection Committee:

**Re: Snow Water Supply Forecasting Grant
Water Supply Forecasting Enhancements for Uinta Mountain Headwaters**

Trout Unlimited is pleased to support The Colorado River Authority of Utah's proposal for the Bureau of Reclamation's Snow Water Supply Forecasting Grant. As an organization that is working with the Colorado River stakeholders in Utah, we are interested in optimizing and conserving water use throughout the basin. We support this grant application and the information that will increase resilience of our Colorado River water supply.

As the first aerial snowpack forecasting project in Utah, the 3-year pilot would provide information to evaluate SNOTEL-based forecasting against forecasting developed using aurally collected LiDAR data. The project's results will be multi-faceted and used in the following beneficial applications:

- 1) Water Management Decisions – Results will inform short- and long-term planning for Utah's water resources.
- 2) Drought Mitigation and Resiliency – (1) Results will provide data for models to prioritize changes to water use. (2) Results will aid in development and implementation of Demand Management programs that require contract development and sensitivities related to runoff, timing, and water rights.
- 3) Improved Facilities Operation – Results will improve the balance between maximizing collection of runoff for water supply with making space for excess runoff to manage flood control. Improving the balance of water supply and flood control will improve our ability to operate reservoirs and ensure we optimize collection of the water supply.
- 4) Environmental Commitments – Results will enable improvements in forecasting through a comparison of SNOTEL and aerial measurement to optimize operations for fish flows.

I'd like to offer our support to the Colorado River Authority as well as any expertise we can provide for the success of any programs that improve our ability to forecast water supply and create conservation measures in the Colorado River basin.

Sincerely,

Utah Water and Habitat Program Director
Trout Unlimited



The Colorado River Authority of Utah

Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

Appendix B – Draft Official Resolution

**OFFICIAL RESOLUTION
OF THE
Colorado River Authority of Utah**

RESOLUTION NO. 2023-1

WHEREAS, the United States Department of the Interior, Bureau of Reclamation has announced the *Snow Water Supply Forecasting Program* to prevent water supply crises and ease conflict in the western United States and has requested proposals from eligible entities to be included in the *Snow Water Supply Forecasting Program*, and

WHEREAS, the Colorado River Authority of Utah needs funding to complete the Colorado River Authority of Utah's Management Plan.

NOW, THEREFORE, BE IT RESOLVED that the Colorado River of Utah Authority of Utah agrees and authorizes that

1. The Colorado River Authority of Utah has reviewed and supports the application submitted;
2. The applicant is capable of providing the amount of funding and/or in-kind contributions specified in the funding plan; and
3. If selected for a *Snow Water Supply Forecasting Program* Grant, the applicant will work with Reclamation to meet established deadlines for entering into a grant or cooperative agreement.



The Colorado River Authority of Utah

Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

Appendix C – OMB 4040-0019 Project Abstract Summary

Project Abstract Summary

Program Announcement (CFDA)

Program Announcement (Funding Opportunity Number)

Closing Date

Applicant Name

Length of Proposed Project

36 months

Application Control No.

Federal Share Requested (for each year)

Federal Share 1st Year

Federal Share 2nd Year

Federal Share 3rd Year

Non-Federal Share Requested (for each year)

Non-Federal Share 1st Year

Non-Federal Share 2nd Year

Non-Federal Share 3rd Year

Project Title

Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

Project Abstract Summary

Project Summary

Water users in Utah — one of the driest states in the nation — and fellow Colorado River Basin (Basin) states face future water supply gaps due to increasing demand and uncertain future hydrologic conditions, which will likely result in water supply shortage and conflict between municipal, industrial, and agricultural water users. As pressure builds on Utah and the Basin's limited water supply, cooperation between the stakeholders involved will become both more critical and challenging, calling for the best available data to support drought mitigation. The Applicants recognize that effective water management and conservation efforts begin with careful and accurate supply measurement and forecasting. Utah can better manage its water supply, increase its resiliency to drought, optimize operation of Reclamation facilities, and better support in-stream flows for vibrant habitats by improving our ability to predict Utah's available water supplies.

This project will provide remotely sensed snowpack data over a 3-year pilot period to evaluate the improvements in accuracy and reliability of water supply forecasts and the commensurate benefits to water management operations. Airborne Snow Observatories, Inc. (ASO) has pioneered the integration of airborne lidar and imaging spectrometer mapping of mountain snow cover to produce decision support water supply data and forecasting on operational time scales. This method of snowpack data is currently the most robust snow data available, and projects have already been funded in two peer Basin states. This will be the first implementation of airborne snow mapping and forecast integration in Utah, which could redefine how water supply forecasting is predicted into the future benefiting the project objectives for 1) short- and long-term water management decisions, 2) drought mitigation and resiliency, 3) optimized flood control operations of federal facilities, and 4) environmental protection.

The project results will be analyzed against conventional forecasting to examine vulnerabilities in current methods and if ASO-informed forecasting can provide similar decision-support benefits as demonstrated in neighboring states. Resulting information will provide water managers with better verified data to make informed decisions regarding timing of runoff and volume of runoff, allowing for optimized operational decision-making, incorporation into models, and contract management to enable the best use of Utah's limited water resources.

Although the project area is relatively small in scale, it could have an oversized impact on Utah's water supply, as the area provides water to the largest metropolitan region in Utah. A successful project with a proven concept will serve as a model for application to other areas in the state and elsewhere in the Colorado River system. The Applicants recognize that if successful, they will be in a unique position to further reliable water supply forecasting throughout Utah and the Colorado River Basin, ultimately improving the State's drought resiliency.

Applicants: The Colorado River Authority of Utah

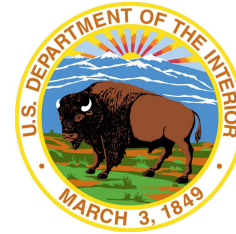
Co-Applicants: Utah Division of Water Resources and Central Utah Water Conservancy District

Estimated number of people to be served as a result of the award of this grant.

Over 1.5 Million People in Utah, plus millions in the Lower Colorado River Basin States

1. DATE ISSUED MM/DD/YYYY 01/16/2024		1a. SUPERSEDES AWARD NOTICE dated except that any additions or restrictions previously imposed remain in effect unless specifically rescinded	
2. CFDA NO. 15.078 - Snow Water Supply Forecasting (SWSF)			
3. ASSISTANCE TYPE Cooperative Agreement			
4. GRANT NO. R24AC00036-00 Originating MCA #		5. TYPE OF AWARD Other	
4a. FAIN R24AC00036		5a. ACTION TYPE New	
6. PROJECT PERIOD MM/DD/YYYY From 01/16/2024		Through MM/DD/YYYY 09/30/2026	
7. BUDGET PERIOD MM/DD/YYYY From 01/16/2024		Through MM/DD/YYYY 09/30/2026	

NOTICE OF AWARD



AUTHORIZATION (Legislation/Regulations)
Consolidated Appropriations Act, 2021: Public Law 116-260

8. TITLE OF PROJECT (OR PROGRAM)
Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

9a. GRANTEE NAME AND ADDRESS Colorado River Authority of Utah 60 E South Temple STE 850 Salt Lake City, UT, 84111-1025	9b. GRANTEE PROJECT DIRECTOR Lily Bosworth 60 East South Temple Salt Lake City, UT, 84111-0000 Phone: 801-824-9037
--	---

10a. GRANTEE AUTHORIZING OFFICIAL Ms. Cadi Sande 60 E South Temple Salt Lake City, UT, 84111-1004 Phone: 801-759-0199	10b. FEDERAL PROJECT OFFICER Christopher Frans 1849 C St NW Bureau Of Reclamation Main Interior Building Washington, DC, 20240-0001 Phone: 303-445-3021
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ALL AMOUNTS ARE SHOWN IN USD

11. APPROVED BUDGET (Excludes Direct Assistance)		12. AWARD COMPUTATION																	
I Financial Assistance from the Federal Awarding Agency Only		a. Amount of Federal Financial Assistance (from item 11m) \$ 999,999.00																	
II Total project costs including grant funds and all other financial participation		b. Less Unobligated Balance From Prior Budget Periods \$ 0.00																	
a. Salaries and Wages\$ 0.00		c. Less Cumulative Prior Award(s) This Budget Period \$ 0.00																	
b. Fringe Benefits\$ 0.00		d. AMOUNT OF FINANCIAL ASSISTANCE THIS ACTION \$ 999,999.00																	
c. Total Personnel Costs\$ 0.00		13. Total Federal Funds Awarded to Date for Project Period \$ 999,999.00																	
d. Equipment\$ 0.00		14. RECOMMENDED FUTURE SUPPORT																	
e. Supplies\$ 0.00		(Subject to the availability of funds and satisfactory progress of the project):																	
f. Travel\$ 0.00		<table border="1"> <thead> <tr> <th>YEAR</th> <th>TOTAL DIRECT COSTS</th> <th>YEAR</th> <th>TOTAL DIRECT COSTS</th> </tr> </thead> <tbody> <tr> <td>a. 2</td> <td>\$</td> <td>d. 5</td> <td>\$</td> </tr> <tr> <td>b. 3</td> <td>\$</td> <td>e. 6</td> <td>\$</td> </tr> <tr> <td>c. 4</td> <td>\$</td> <td>f. 7</td> <td>\$</td> </tr> </tbody> </table>		YEAR	TOTAL DIRECT COSTS	YEAR	TOTAL DIRECT COSTS	a. 2	\$	d. 5	\$	b. 3	\$	e. 6	\$	c. 4	\$	f. 7	\$
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b. 3	\$	e. 6	\$																
c. 4	\$	f. 7	\$																
g. Construction\$ 0.00		15. PROGRAM INCOME SHALL BE USED IN ACCORD WITH ONE OF THE FOLLOWING ALTERNATIVES:																	
h. Other\$ 0.00		<table border="1"> <tr> <td>a. DEDUCTION</td> <td rowspan="5" style="text-align: center; vertical-align: middle;">e</td> </tr> <tr> <td>b. ADDITIONAL COSTS</td> </tr> <tr> <td>c. MATCHING</td> </tr> <tr> <td>d. OTHER RESEARCH (Add / Deduct Option)</td> </tr> <tr> <td>e. OTHER (See REMARKS)</td> </tr> </table>		a. DEDUCTION	e	b. ADDITIONAL COSTS	c. MATCHING	d. OTHER RESEARCH (Add / Deduct Option)	e. OTHER (See REMARKS)										
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b. ADDITIONAL COSTS																			
c. MATCHING																			
d. OTHER RESEARCH (Add / Deduct Option)																			
e. OTHER (See REMARKS)																			
i. Contractual\$ 1,999,999.00		16. THIS AWARD IS BASED ON AN APPLICATION SUBMITTED TO, AND AS APPROVED BY, THE FEDERAL AWARDING AGENCY ON THE ABOVE TITLED PROJECT AND IS SUBJECT TO THE TERMS AND CONDITIONS INCORPORATED EITHER DIRECTLY OR BY REFERENCE IN THE FOLLOWING:																	
j. TOTAL DIRECT COSTS → \$ 1,999,999.00		<table border="1"> <tr> <td>a. The grant program legislation</td> </tr> <tr> <td>b. The grant program regulations.</td> </tr> <tr> <td>c. This award notice including terms and conditions, if any, noted below under REMARKS.</td> </tr> <tr> <td>d. Federal administrative requirements, cost principles and audit requirements applicable to this grant.</td> </tr> </table>		a. The grant program legislation	b. The grant program regulations.	c. This award notice including terms and conditions, if any, noted below under REMARKS.	d. Federal administrative requirements, cost principles and audit requirements applicable to this grant.												
a. The grant program legislation																			
b. The grant program regulations.																			
c. This award notice including terms and conditions, if any, noted below under REMARKS.																			
d. Federal administrative requirements, cost principles and audit requirements applicable to this grant.																			
k. INDIRECT COSTS \$ 0.00		In the event there are conflicting or otherwise inconsistent policies applicable to the grant, the above order of precedence shall prevail. Acceptance of the grant terms and conditions is acknowledged by the grantee when funds are drawn or otherwise obtained from the grant payment system.																	
l. TOTAL APPROVED BUDGET \$ 1,999,999.00																			
m. Federal Share \$ 999,999.00																			
n. Non-Federal Share \$ 1,000,000.00																			

REMARKS (Other Terms and Conditions Attached - Yes No)
See next page

GRANTS MANAGEMENT OFFICIAL:

Katherine Calagua, Grants Management Specialist
PO BOX 25007
Denver, CO, 80225-0007
Phone: 3034452049

17. VENDOR CODE 0071438073		18a. UEI EPFYHEUPNNZ4		18b. DUNS		19. CONG. DIST. 01	
LINE#	FINANCIAL ACCT	AMT OF FIN ASST	START DATE	END DATE	TAS ACCT	PO LINE DESCRIPTION	
1	0051042793-00010	\$999,999.00	01/16/2024	09/30/2026	0680	FY23 SNOFO Colorado River Authority of U	

NOTICE OF AWARD (Continuation Sheet)

PAGE 2 of 3	DATE ISSUED 01/16/2024
GRANT NO. R24AC00036-00	

REMARKS:

No program income authorized.

Recipients are NOT required to sign the Notice of Award or any other award document. Recipients indicate their acceptance of an award, including award terms and conditions, by starting work, drawing down funds, or accepting the award via electronic means. Recipient acceptance of an award carries with it the responsibility to be aware of and comply with all terms and conditions applicable to the award. Recipients are responsible for ensuring that their subrecipients and contractors are aware of and comply with applicable award statutes, regulations, and terms and conditions. Recipient failure to comply with award terms and conditions can result in Reclamation taking one or more of the remedies and actions described in 2 CFR 200.339343.

NOTICE OF AWARD (Continuation Sheet)

PAGE 3 of 3	DATE ISSUED 01/16/2024
GRANT NO. R24AC00036-00	

Federal Financial Report Cycle			
Reporting Period Start Date	Reporting Period End Date	Reporting Type	Reporting Period Due Date
01/16/2024	09/30/2024	Annual	12/29/2024
10/01/2024	09/30/2025	Annual	12/29/2025
10/01/2025	09/30/2026	Final	01/28/2027

AWARD ATTACHMENTS

Colorado River Authority of Utah

R24AC00036-00

1. Terms and Conditions

UNITED STATES DEPARTMENT OF THE INTERIOR

ASSISTANCE AGREEMENT

R24AC00036

Between

Bureau of Reclamation

And

Colorado River Authority of Utah

For

Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain
Headwaters

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Financial Assistance Agreement
Between
Bureau of Reclamation
And
Colorado River Authority of Utah
For
Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters

I. OVERVIEW AND SCHEDULE

1. AUTHORITY

This Financial Assistance Agreement (Agreement) is entered into between the United States of America, acting through the Department of the Interior, Bureau of Reclamation (Reclamation) and Colorado River Authority of Utah (Recipient), pursuant to **Public Law 116-260, Sec. 1111, Snow Water Supply Forecasting Program Authorization Act**, (the “Act”). The following section, provided in full text, authorizes Reclamation to award this Agreement:

SEC. 1111. SNOW WATER SUPPLY FORECASTING

(a) Short Title.--This section may be cited as the “Snow Water Supply Forecasting Program Authorization Act”.

(b) Definition of Program.--In this Act, the term “program” means the Snow Water Supply Forecasting Program established by subsection (c).

(c) Snow Water Supply Forecasting Program.

(1) Program establishment.--The Snow Water Supply Forecasting Program is hereby established within the Department of the Interior.

(2) Program implementation.--To implement the program, the Secretary shall—

(A) develop the program framework in coordination with other Federal agencies pursuant to subsection (d), culminating in the report required under subsection (d)(3); and

(B) after submitting the report required by subsection (d)(3), implement activities to improve snowpack measurement in particular watersheds pursuant to subsection (e).

(d) Development of Program Framework in Coordination With Other Federal Agencies.—

(1) Snowpack measurement data.--When determining water supply forecasts or allocations to Federal water contractors, the Secretary, acting through the Commissioner of the Bureau of Reclamation, shall incorporate, to the greatest extent practicable, information from emerging technologies for snowpack measurement, such as—

*(A) synthetic aperture radar; *

(B) laser altimetry; and

(C) other emerging technologies that the Secretary determines are likely to provide more accurate or timely snowpack measurement data.

(e) Program Implementation.-

(1) Activities implementing framework.--After submitting the report required under subsection (d)(3), the Secretary shall participate with program partners in implementing activities to improve snowpack measurement in particular watersheds.

(2) Focus.--The program shall focus on activities that will maintain, establish, expand, or advance snowpack measurement consistent with the report required by subsection (d)(3), with an emphasis on—

(A) enhancing activities in river basins to achieve

improved snow and water supply forecasting results;

(B) activities in river basins where snow water supply forecasting related activities described in this Act are not occurring on the date of the enactment of this Act; and

(C) demonstrating or testing new, or improving existing, snow and water supply forecasting technology.

(g) Authorization of Appropriations.--There is authorized to be appropriated to the Secretary to carry out this Act \$15,000,000, in the aggregate, for fiscal years 2022 through 2026.

2. PUBLIC PURPOSE OF SUPPORT OR STIMULATION

The proposed Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters (Project) achieves the public purpose of the Act by seeking to enhance snow monitoring information and improve water supply forecasts used by water managers.

3. BACKGROUND AND OBJECTIVES

The objective of the Snow Water Supply Forecasting Program is to enhance snow information and improve water supply forecasts used by water managers by deploying existing snow monitoring technologies in underserved areas, demonstrating or deploying emerging snow monitoring technologies (or enhancements to existing technologies) that can enhance the characterization of snow conditions, and by improving forecast use of snow information.

This project will provide Light Detection And Ranging airborne snow surveys over a 3-year pilot period to evaluate the improvements in accuracy and reliability of water supply forecasts and the commensurate benefits to water management operations. This will be the first implementation of airborne snow mapping and forecast integration in Utah. The project results will be analyzed

against conventional forecasting to examine vulnerabilities in current methods and if Airborne Snow Observancy-informed forecasting can provide decision-support benefits.

4. PERIOD OF PERFORMANCE AND FUNDS AVAILABILITY

This Agreement becomes effective on the issue date shown in block 1 of the United States of America, Department of the Interior, Notice of Award (NOA). The Agreement’s project period (period of performance) shall remain in effect through the date shown in block 6 of the NOA and may only be changed through written amendment of the Agreement by a Reclamation Grants Officer (GO).

No legal liability on the part of the Government for any payment may arise until funds are made available, in writing, to the Recipient by a Reclamation GO. The total estimated project cost for this Agreement is **\$1,999,999** and the total estimated amount of Federal funding is **\$999,999**. The initial amount of Federal funds available is limited to **\$999,999** as indicated by “Amount of Financial Assistance This Action” within block 12 of the NOA. Subject to the availability of Congressional appropriations, subsequent funds will be made available for payment through written amendments to this Agreement by a Reclamation GO.

5. SCOPE OF WORK AND MILESTONES

Under this Agreement, the Colorado River Authority of Utah (Recipient or Authority) aims to use Airborne Snow Observatories, Inc. (ASO) snowpack data to evaluate improvements and accuracy and reliability of water supply forecasts and the commensurate benefits to water management operations in portions of the Duchesne River and Utah Lake Watersheds. The project will provide remotely sensed snowpack data over a 3-year pilot period, and streamflow predictions will be calculated using a combination of remote sensing (aerial lidar and hyperspectral data), distributed snowpack modeling, and hydrologic modeling. Project results will be analyzed against conventional and open loop forecasts to examine vulnerabilities in current methods and to determine if ASO-informed forecasting can provide decision-support benefits in these basins. The full proposal, “Flakes, Flights, and Forecasts: Snowpack Measurement Enhancements in the Uinta Mountain Headwaters,” submitted in response to Notice of Funding Opportunity Announcement No. R23AS00079, Snow Water Supply Forecasting Program, is incorporated herein via reference. It includes the detailed technical approach, hypotheses, key personnel, and other details regarding the Project.

5.1 Approved Scope of Work.

Under this Agreement, the Recipient shall perform the following tasks:

5.1.1 Task 1 – Team kick-off/preparation

The Recipient will work with ASO and the Reclamation team to initiate the project. The meeting will establish the team members’ roles and responsibilities as well as required procedures. The project team will coordinate the implementation of the project, when the first-year flights will be

flown, software coordination, and output models for integration into the Utah Colorado River Accounting and Forecasting model (UCRAF).

5.1.2 Task 2 – Grant administration

Upon award, the Authority will manage the proposed project and may hire an external consultant to support project management and recommendations based on results. The goal of this task is to ensure the project is well managed and meets all requirements of the grant agreement with Reclamation, while connecting future work to lessons from project outcomes. Activities to be completed under Task 2 include developing a work plan for approval by Reclamation at the outset of the project, providing interim performance reports every 6 months, and developing a Final Project Report. The Report will be submitted in draft form for Reclamation review, and a final Report will address comments and corrections.

5.1.3 Task 3 – ASO Flights

The technical approach will follow the process identified in the full proposal. ASO will first fly the project area in Fall 2023, when the watershed is snow-free, to collect baseline elevation data. The resulting data product will be gridded at 3-meter resolution. Beginning in Spring 2024 and continuing through Spring 2026, three flights will be flown during the snow season (near April 1st or peak accumulation, as well as mid-to-late melt season, with actual survey timing determined in collaboration with Authority staff). Resulting data will include snow depth and albedo and snow water equivalent (SWE) derived across all project watersheds.

ASO will conduct real-time simulation of snowpack evolution using the iSnobal energy-balance snow physics model. This system, constrained by ASO snow depth measurements, provides snow density values at 50-meter resolution that are used for calibrating SWE. The continuous snowpack tracking will enable regular reporting on SWE and other snowpack conditions (e.g. cold content, melt volume, etc.) between and after ASO flights. SWE and albedo values then will be assimilated in the Weather Research and Forecasting Hydrological modeling system (WRF-Hydro model) to produce seasonal ensemble snowpack, streamflow and unregulated reservoir predictions. Using existing, demonstrated, and operationally hardened capabilities, the ASO data products will be assimilated in the WRF-Hydro hydrology model to produce ensemble-based snowpack and snowmelt runoff forecasts. Additionally, ASO and the Recipient will continue the work initiated in neighboring states with agency staff at the Natural Resource Conservation Service (NRCS) Snow Survey and the Colorado Basin River Forecast Center (CBRFC) to explore integration of ASO data with their forecast systems.

5.1.4 Task 4– Forecast Evaluation

The Open Loop (OL) and ASO-assimilated WRF-Hydro forecast runs will be evaluated against total seasonal runoff and compared to forecasts from operational agencies. Operational water management decisions and alternatives will be evaluated as informed by the several available forecast choices. Via connection to the UCRAF operations model, operational decision-making and Demand Management allocation scenarios will be explored to understand the additional

value, resilience, and flexibility enabled by ASO snowpack mapping and ASO-informed forecasts in Utah.

6. RESPONSIBILITY OF THE PARTIES

6.1 Recipient Responsibilities

6.1.1 The Recipient shall carry out the Scope of Work (SOW) in accordance with the terms and conditions stated herein. The Recipient shall adhere to Federal, state, and local laws, regulations, and codes, as applicable, and shall obtain all required approvals and permits. If the SOW contains construction activities, the Recipient is responsible for construction inspection, oversight, and acceptance. If applicable, the Recipient shall also coordinate and obtain approvals from site owners and operators.

6.1.2 Administrative Reports. Recipient will prepare and submit to Reclamation interim financial and Project performance reports (Interim Reports) and final financial and Project performance reports (Final Reports) as required by Section I.10 of this Agreement. The Final Project Report shall also include a breakdown of the final project costs by budget category.

6.1.3. Conferences. Recipient shall notify the GOTR of any submitted and/or accepted abstracts for conferences that will be attended to present on the results of work performed under this Agreement.

6.1.4 Tangible Personal Property. The Recipient shall use materials and supplies purchased under this Agreement in accordance with 2 CFR §200.314. Within 120 days after the period of performance is complete, the Recipient shall complete and submit a Tangible Personal Property Report (SF-428); Final Report (SF-424B); Disposition Request (SF-424C); and, if appropriate, Supplemental Form (SF-428S). If the value of the remaining materials and supplies exceeds \$5,000 in total aggregate value upon termination or completion of the project or program and the supplies are not needed for any other Federal award, the Recipient must retain the supplies for use on other activities or sell them, but must, in either case, compensate the Federal Government for its share. Should the personal property be sold, the Recipient may deduct and retain from the Federal share \$500.00 or ten percent of the proceeds, whichever, is less, for its selling and handling expenses.

6.1.5 Equipment. The Recipient shall use, manage and dispose of the equipment purchased under this Agreement in accordance with 2 CFR §200.313. After the period of performance is complete, the Recipient is authorized to retain the equipment for use consistent with the purpose of this project or the performance of work for another Federal financial assistance agreement. If the item of equipment is no longer needed for these purposes, and the fair market value of the item is greater than \$5,000.00, the Recipient shall sell the equipment and return the Federal share of the proceeds to Reclamation. Should the equipment be sold, the Recipient may deduct and retain from the Federal share \$500.00 or ten percent of the proceeds, whichever, is less, for its selling and handling expenses.

6.2 Reclamation Responsibilities

6.2.1 Reclamation will monitor and provide Federal oversight of activities performed under this Agreement. Monitoring and oversight includes review and approval of financial status and performance reports, payment requests, and any other deliverables identified as part of the SOW. Additional monitoring activities may include site visits, conference calls, and other on-site and off-site monitoring activities. At the Recipient's request, Reclamation may also provide technical assistance to the Recipient in support of the SOW and objectives of this Agreement.

6.2.2 Substantial involvement by Reclamation is anticipated during the performance of activities funded under this cooperative agreement. In support of this Agreement, Reclamation will be responsible for the following:

- Evaluating successes as each task is undertaken
- Review, input, and comment on Interim Technical Project Reports and preliminary research outcomes
- Review, input, and comment on Final Technical Project Report and final research outcomes

7. BUDGET

7.1 Budget Estimate. The following is the estimated budget for this Agreement. As Federal financial assistance agreements are cost-reimbursable, the budget provided is for estimation purposes only. Final costs incurred under the budget categories listed may be either higher or lower than the estimated costs. All costs incurred by the Recipient under this Agreement must be in accordance with any pre-award clarifications conducted between the Recipient and Reclamation, as well as with the terms and conditions of this Agreement. Final determination of the allowability, allocability, or reasonableness of costs incurred under this Agreement is the responsibility of the GO. Recipients are encouraged to direct any questions regarding allowability, allocability or reasonableness of costs to the GO for review prior to incurrence of the costs in question.

Category	Total Cost	Federal Estimated Amount	Non-Federal Estimated Amount
a. Personnel	\$0		
b. Fringe Benefits	\$0		
c. Travel	\$0		
d. Equipment	\$0		
e. Supplies	\$0		
f. Contractual	\$1,999,999		
g. Construction	\$0		
h. Other Direct Costs	\$0		

i. Total Direct Costs	\$1,999,999		
i. Indirect Charges	\$0		
Total Costs	\$1,999,999	\$999,999	\$1,000,000
Cost Share Percentage		50%	50%

7.2 Cost Sharing Requirement

At least 50% non-Federal cost-share is required for costs incurred under this Agreement. If pre-award costs are authorized, reimbursement of these costs is limited to federal cost share percentage identified in this Agreement.

The Federal share of allowable costs shall not be expended in advance of the Recipient's non-Federal share. It is expected that expenditure of Federal and non-Federal funds based upon the cost share percentage above shall occur concurrently. If a bona fide need arises which requires the expenditure of Federal funds in advance of the Recipient share, then the Recipient must request written approval from the GO prior to the expenditure. Recipient's may expend their agreed upon share of costs in advance of the expenditure of Federal funds without prior written approval.

7.3 Pre-Award Incurrence of Costs

The Recipient shall be entitled to reimbursement for costs incurred on or after **October 18, 2023**, which if had been incurred after this Agreement was entered into, would have been allowable, allocable, and reasonable under the terms and conditions of this Agreement.

7.4 Allowable Costs

Costs incurred for the performance of this Agreement must be allowable, allocable to the project, and reasonable. The following regulations, codified within the Code of Federal Regulations (CFR), governs the allowability of costs for Federal financial assistance:

2 CFR 200 Subpart E, "Cost Principles"

Expenditures for the performance of this Agreement must conform to the requirements within this CFR. The Recipient must maintain sufficient documentation to support these expenditures. Questions on the allowability of costs should be directed to the GO responsible for this Agreement.

The Recipient shall not incur costs or obligate funds for any purpose pertaining to operation of the program or activities beyond the expiration date stated in the Agreement. The only costs which are authorized for a period of up to **120 days** following the project period are those strictly associated with closeout activities for preparation of the final reports.

7.5 Revision of Budget and Program Plans

In accordance with 2 CFR 200.308(c)-(f) the recipient must request prior written approval for any of the following changes:

- (a) A change in the approved scope of work or associated tasks, even if there is no associated budget revisions.
- (b) Change in key personnel specified in section 8 “Key Personnel” of this Agreement.
- (c) Changes in the approved cost-sharing or matching outlined within this Agreement in section 7.2 “Cost Share requirements”
- (d) Inclusion of pre-award costs or reimbursement for pre-award costs which are not included in the initially approved budget and included in section 7.3 “Pre-Award Incurrence of Costs” of this Agreement.
- (e) Extensions to the project period identified in block 6 of the NOA.
- (f) The transfer of funds between direct cost categories, functions, and activities for which the expected transfer amount is to exceed 10 percent of the total approved budget.

7.6 Amendments

Any changes to this Agreement shall be made by means of a written amendment. Reclamation may make changes to the Agreement by amendment to address changes in address, no-cost time extensions, changes to Key Personnel, the addition of previously agreed upon funding, administrative corrections which do not impact the terms and conditions of the Agreement, or it should become necessary to suspend or terminate the Agreement in accordance with 2 CFR 200.340.

No oral statement made by any person, or written statement by any person other than the GO, shall be allowed in any manner or degree to amend, modify or otherwise effect the terms of the Agreement. Acceptance of an amendment is indicated by starting work, drawing down funds, or electronic acceptance.

All requests for amendment of the Agreement shall be made in writing, provide a full description of the reason for the request, and be sent to the attention of the GO. Any request for project period extension shall be made at least 45 days prior to the end of the project period of the Agreement or the project period date of any extension that may have been previously granted. Any determination to extend the project period or to provide follow-on funding for continuation of a project is solely at the discretion of Reclamation.

8. KEY PERSONNEL

8.1 Recipient’s Key Personnel.

The Recipient's Project Manager for this Agreement shall be:

Lily Bosworth
Staff Engineer

60 E South Temple STE 850
 Salt Lake City,
 Utah 84111-1025
 United States
 801-824-9037
 lbosworth@utha.gov

9. LIMITATION OF AUTHORITIES

9.1 Grants Officer (GO).

The Reclamation GO is the only official with legal delegated authority to represent Reclamation. The Reclamation GO's responsibilities include, but are not limited to, the following:

- (a) Formally obligate Reclamation to expend funds or change the funding level of the Agreement;
- (b) Approve through formal amendment changes in the scope of work and/or budget;
- (c) Approve through formal amendment any increase or decrease in the period of performance of the Agreement;
- (d) Approve through formal amendment changes in any of the expressed terms, conditions, or specifications of the Agreement;
- (e) Be responsible for the overall administration, management, and other non-programmatic aspects of the Agreement including, but not limited to, interpretation of financial assistance statutes, regulations, circulars, policies, and terms of the Agreement; Where applicable, ensures that Reclamation complies with the administrative requirements required by statutes, regulations, circulars, policies, and terms of the Agreement.

9.2 Grants Management Specialist (GMS).

The Reclamation Grants Management Specialist (GMS) is the primary administrative point of contact for this agreement and should be contacted regarding issues related to the day-to-day management of the agreement. Requests for approval regarding the terms and conditions of the agreement, including but not limited to amendments and prior approval, may only be granted, in writing, by a Reclamation GO. Please note that for some agreements, the Reclamation GO and the Reclamation GMS may be the same individual.

10. REPORTING REQUIREMENTS AND DISTRIBUTION

10.1 Noncompliance. Failure to comply with the reporting requirements contained in this Agreement may be considered a material noncompliance with the terms and conditions of the award. Noncompliance may result in withholding of payments pending receipt of required reports, denying both the use of funds and matching credit for all or part of the cost of the activity or action not in compliance, whole or partial suspension or termination of the

Agreement, recovery of funds paid under the Agreement, withholding of future awards, or other legal remedies in accordance with 2 CFR 200.339-340.

10.2 Financial Reports. Federal Financial Reports shall be submitted by means of the SF-425 and shall be submitted according to the Report Frequency and Distribution schedule below. All financial reports shall be signed by an Authorized Certifying Official for the Recipient's organization.

10.3 Monitoring and Reporting Program Performance.

- (a) Monitoring by the non-Federal entity. The non-Federal entity is responsible for oversight of the operations of the Federal award supported activities. The non-Federal entity must monitor its activities under Federal awards to assure compliance with applicable Federal requirements and performance expectations are being achieved. Monitoring by the non-Federal entity must cover each program, function or activity. See also 2 CFR 200.332 Requirements for pass-through entities.
- (b) Non-construction performance reports. The Federal awarding agency must use standard, OMB-approved data elements for collection of performance information (including performance progress reports, Research Performance Progress Report, or such future collections as may be approved by OMB and listed on the OMB Web site).
 - (1) The non-Federal entity must submit performance reports at the interval required by the Federal awarding agency or pass-through entity to best inform improvements in program outcomes and productivity. Intervals must be no less frequent than annually nor more frequent than quarterly except in unusual circumstances, for example where more frequent reporting is necessary for the effective monitoring of the Federal award or could significantly affect program outcomes. Annual reports must be due **90 calendar days** after the reporting period; quarterly or semiannual reports must be due **30 calendar days** after the reporting period. Alternatively, the Federal awarding agency or pass-through entity may require annual reports before the anniversary dates of multiple year Federal awards. The final performance report will be due **120 calendar days** after the period of performance end date. If a justified request is submitted by a non-Federal entity, the Federal agency may extend the due date for any performance report.
 - (2) The non-Federal entity must submit performance reports using OMB-approved governmentwide standard information collections when providing performance information. As appropriate in accordance with above mentioned information collections, these reports will contain, for each Federal award, brief information on the following unless other collections are approved by OMB:
 - (i) A comparison of actual accomplishments to the objectives of the Federal award established for the period. Where the accomplishments of the Federal award can be quantified, a computation of the cost (for example, related to units of accomplishment) may be required if that information will be useful. Where

performance trend data and analysis would be informative to the Federal awarding agency program, the Federal awarding agency should include this as a performance reporting requirement.

- (ii) The reasons why established goals were not met, if appropriate.
 - (iii) Additional pertinent information including, when appropriate, analysis and explanation of cost overruns or high unit costs.
 - (iv) The status of objectives from the previous reporting period that were not met, if applicable.
 - (v) Whether the Project is on schedule and within the original cost estimate.
 - (vi) Any additional pertinent information or issues related to the status of the Project.
 - (vii) Photographs documenting the Project are also appreciated. *Note: Reclamation may print photos with appropriate credit to the applicant.*
- (c) Construction performance reports. For the most part, onsite technical inspections and certified percentage of completion data are relied on heavily by Federal awarding agencies and pass-through entities to monitor progress under Federal awards and subawards for construction. The Federal awarding agency may require additional performance reports only when considered necessary.
- (d) Significant developments. Events may occur between the scheduled performance reporting dates that have significant impact upon the supported activity. In such cases, the non-Federal entity must inform the Federal awarding agency or pass-through entity as soon as the following types of conditions become known:
- (1) Problems, delays, or adverse conditions which will materially impair the ability to meet the objective of the Federal award. This disclosure must include a statement of the action taken, or contemplated, and any assistance needed to resolve the situation.
 - (2) Favorable developments which enable meeting time schedules and objectives sooner or at less cost than anticipated or producing more or different beneficial results than originally planned.

Reclamation requires Performance reporting for all financial assistance awards, both Construction and non-Construction. Performance reports for Construction agreements shall meet the same minimum requirements outlined in paragraph (b)(2) above.

10.4 Report Frequency and Distribution. The following table sets forth the standard reporting requirements for this Agreement. Please note the first report due date listed for each type of report.

Required Reports	Interim Reports	Final Report
Administrative Performance Report (see 6.1.2)		
Format	No specific format required. See content requirements in Section 10.3 (2 CFR 200.328) above.	Summary of activities completed during the entire period of performance is required. See content requirements within Section 10.3 (2 CFR 200.328) above.
Reporting Frequency	Semi-Annual	Final Report due within 120 days after the end of the period of performance.
Reporting Period	October 1 through March 31 and April 1 through September 30	Entire period of performance
Due Date	Within 30 days after the end of the Reporting Period	Final Report due within 120 days after the end of the period of performance or completion of the project.
First Report Due Date	The first Federal performance report is due for reporting period ending <u>03/31/2024</u>	N/A
Submit to:	Reports can be submitted using GrantSolutions.gov	Reports can be submitted using GrantSolutions.gov
Federal Financial Report (see 6.1.2)		
Format	SF-425 (all sections must be completed)	SF-425(all sections must be completed)
Reporting Frequency	Annual	Final Report due within 120 days after the end of the period of performance.
Reporting Period	October 01 through September 30	Entire period of performance
Due Date	Within 90 days after the end of the Reporting Period	Final Report due within 120 days after the end of the period of performance or completion of project.
First Report Due Date	The first Federal financial report is due for reporting period ending <u>09/30/2024</u>	N/A
Submit to:	Reports can be submitted using GrantSolutions.gov	Reports can be submitted using GrantSolutions.gov

11. REGULATORY COMPLIANCE

The Recipient agrees to comply or assist Reclamation with all regulatory compliance requirements and all applicable state, Federal, and local environmental and cultural and paleontological resource protection laws and regulations as applicable to this project. These may include, but are not limited to, the National Environmental Policy Act (NEPA), including the Council on Environmental Quality and Department of the Interior regulations implementing

NEPA, the Clean Water Act, the Endangered Species Act, consultation with potentially affected Tribes, and consultation with the State Historic Preservation Office. If the Recipient begins project activities that require environmental or other regulatory compliance approval prior to receipt of written notice from a Reclamation GO that all such clearances have been obtained, then Reclamation reserves the right to initiate remedies for non-compliance as defined by 2 CFR 200.339-340 up to and including unilateral termination of this agreement.

12. INTANGIBLE PROPERTY (2 CFR 200.315)

Title to trademarks, copyrights, patents, patent applications, and other intangible property (see §200.59 Intangible property) acquired under this Agreement vests upon acquisition to the Recipient. The Recipient must use that property for the originally-authorized purpose, and must not encumber the property without approval of Reclamation. When no longer needed for the originally authorized purpose, disposition of the intangible property must occur in accordance with the provisions in §200.313(e).

The Recipient may copyright any work that is subject to copyright and was developed, or for which ownership was acquired, under this Agreement. Reclamation reserves a royalty-free, nonexclusive and irrevocable right to reproduce, publish, or otherwise use the work for Federal purposes, and to authorize others to do so.

The Recipient is subject to applicable regulations governing patents and inventions, including governmentwide regulations issued by the Department of Commerce at 37 CFR Part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Awards, Contracts and Cooperative Agreements.”

13. BUY AMERICA DOMESTIC PROCUREMENT PREFERENCE [Public Law 117-58, Sec. 70911-70917 of IIJA]

As required by Section 70914 of the Bipartisan Infrastructure Law (also known as the Infrastructure Investment and Jobs Act), P.L. 117-58, on or after May 14, 2022, none of the funds under a Federal award that are part of Federal financial assistance program for infrastructure may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States, unless subject to an approved waiver. The requirements of this section must be included in all subawards, including all contracts and purchase orders for work or products under this program.

Recipients of an award of Federal financial assistance are hereby notified that none of the funds provided under this award may be used for a project for infrastructure unless:

1. all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
2. all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of

the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and

3. all construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

For further information on the Buy America preference, please visit www.doi.gov/grants/BuyAmerica. Additional information can also be found at the White House Made in America Office website: www.whitehouse.gov/omb/management/made-in-america/.

Waivers

When necessary, recipients may apply for, and the Department of the Interior (DOI) may grant, a waiver from these requirements, subject to review by the Made in America Office. The DOI may waive the application of the domestic content procurement preference in any case in which it is determined that one of the below circumstances applies:

1. Non-availability Waiver: the types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality;
2. Unreasonable Cost Waiver: the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent; or
3. Public Interest Waiver: applying the domestic content procurement preference would be inconsistent with the public interest.

There may be instances where an award qualifies, in whole or in part, for an existing DOI general applicability waiver as described at:

www.doi.gov/grants/BuyAmerica/GeneralApplicabilityWaivers. If the specific financial assistance agreement, infrastructure project, or non-domestic materials meets the criteria of an existing general applicability waiver within the limitations defined within the waiver, the recipient is not required to request a separate waiver for non-domestic materials.

If a general applicability waiver does not already apply, and a recipient believes that one of the above circumstances applies to an award, a request to waive the application of the domestic content procurement preference may be submitted to the financial assistance awarding officer in writing. Waiver requests shall include the below information. The waiver shall not include any

Privacy Act information, sensitive data, or proprietary information within their waiver request. Waiver requests will be posted to www.doi.gov/grants/buyamerica and are subject to public comment periods of no less than 15 days.

Waiver requests will also be reviewed by the Made in America Office.

1. Type of waiver requested (non-availability, unreasonable cost, or public interest).
2. Requesting entity and Unique Entity Identifier (UEI) submitting the request.
3. Department of Interior Bureau or Office who issued the award.
4. Federal financial assistance listing name and number (reference block 2 on DOI Notice of Award)
5. Financial assistance title of project (reference block 8 on DOI Notice of Award).
6. Federal Award Identification Number (FAIN).
7. Federal funding amount (reference block 11.m. on DO Notice of Award).
8. Total cost of Infrastructure expenditures (includes Federal and non-Federal funds to the extent known).
9. Infrastructure project description(s) and location(s) (to the extent known).
10. List of iron or steel item(s), manufactured goods, and construction material(s) the recipient seeks to waive from Buy America requirements. Include the name, cost, countries of origin (if known), and relevant [PSC](#) or [NAICS](#) code for each.
11. A certification that the recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with the prime contractor.
12. A statement of waiver justification, including a description of efforts made (e.g., market research, industry outreach) by the recipient, in an attempt to avoid the need for a waiver. Such a justification may cite, if applicable, the absence of any Buy America-compliant bids received in response to a solicitation.
13. Anticipated impact if no waiver is issued.

Approved waivers will be posted at www.doi.gov/grants/BuyAmerica/ApprovedWaivers; recipients requesting a waiver will be notified of their waiver request determination by an awarding officer.

Questions pertaining to waivers should be directed to the financial assistance awarding officer.

Definitions

“Construction materials” includes an article, material, or supply that is or consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);
- lumber; or
- drywall.

“Construction Materials” does **not** include cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

“Domestic content procurement preference” means all iron and steel used in the project are produced in the United States; the manufactured products used in the project are produced in the United States; or the construction materials used in the project are produced in the United States.

“Infrastructure” includes, at a minimum, the structures, facilities, and equipment for, in the United States, roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property. Infrastructure includes facilities that generate, transport, and distribute energy.

“Project” means the construction, alteration, maintenance, or repair of infrastructure in the United States

II. RECLAMATION STANDARD TERMS AND CONDITIONS

1. REGULATIONS

The regulations at [2 CFR Subtitle A, Chapter II, Part 200](#) “Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards”, are hereby incorporated by reference as though set forth in full text. Failure of a Recipient to comply with any applicable regulation or circular may be the basis for withholding payments for proper charges made by the Recipient and/or for termination of support.

2. PAYMENT

2.1 Payment (2 CFR 200.305).

(a) For states, payments are governed by Treasury-State Cash Management Improvement Act (CMIA) agreements and default procedures codified at 31 CFR part 205 and Treasury Financial Manual (TFM) 4A-2000, “Overall Disbursing Rules for All Federal Agencies”.

(b) For non-Federal entities other than states, payments methods must minimize the time elapsing between the transfer of funds from the United States Treasury or the pass-through entity and the disbursement by the non-Federal entity whether the payment is made by electronic funds transfer, or issuance or redemption of checks, warrants, or payment by other means. See also §200.302(b). Except as noted elsewhere in this part, Federal agencies must require recipients to use only OMB-approved, governmentwide information collection requests to request payment.

- (1) The non-Federal entity must be paid in advance, provided it maintains or demonstrates the willingness to maintain both written procedures that minimize the time elapsing between the transfer of funds and disbursement by the non-Federal entity, and financial management systems that meet the standards for fund control and accountability as established in this part. Advance payments to a non-Federal entity must be limited to the minimum amounts needed and be timed to be in accordance with the actual, immediate cash requirements of the non-Federal entity in carrying out the purpose of the approved

program or project. The timing and amount of advance payments must be as close as is administratively feasible to the actual disbursements by the non-Federal entity for direct program or project costs and the proportionate share of any allowable indirect costs. The non-Federal entity must make timely payment to contractors in accordance with the contract provisions.

- (2) Whenever possible, advance payments must be consolidated to cover anticipated cash needs for all Federal awards made by the Federal awarding agency to the recipient.
 - (i) Advance payment mechanisms include, but are not limited to, Treasury check and electronic funds transfer and must comply with applicable guidance in 31 CFR part 208.
 - (ii) Non-Federal entities must be authorized to submit requests for advance payments and reimbursements at least monthly when electronic fund transfers are not used, and as often as they like when electronic transfers are used, in accordance with the provisions of the Electronic Fund Transfer Act (15 U.S.C. 1693-1693r).
- (3) Reimbursement is the preferred method when the requirements in this paragraph (b) cannot be met, when the Federal awarding agency sets a specific condition per §200.208, or when the non-Federal entity requests payment by reimbursement. This method may be used on any Federal award for construction, or if the major portion of the construction project is accomplished through private market financing or Federal loans, and the Federal award constitutes a minor portion of the project. When the reimbursement method is used, the Federal awarding agency or pass-through entity must make payment within 30 calendar days after receipt of the billing, unless the Federal awarding agency or pass-through entity reasonably believes the request to be improper.
- (4) If the non-Federal entity cannot meet the criteria for advance payments and the Federal awarding agency or pass-through entity has determined that reimbursement is not feasible because the non-Federal entity lacks sufficient working capital, the Federal awarding agency or pass-through entity may provide cash on a working capital advance basis. Under this procedure, the Federal awarding agency or pass-through entity must advance cash payments to the non-Federal entity to cover its estimated disbursement needs for an initial period generally geared to the non-Federal entity's disbursing cycle. Thereafter, the Federal awarding agency or pass-through entity must reimburse the non-Federal entity for its actual cash disbursements. Use of the working capital advance method of payment requires that the pass-through entity provide timely advance payments to any subrecipients in order to meet the subrecipient's actual cash disbursements. The working capital advance method of payment must not be used by the pass-through entity if the reason for using this method is the unwillingness or inability of the pass-through entity to provide timely advance payments to the subrecipient to meet the subrecipient's actual cash disbursements.

- (5) To the extent available, the non-Federal entity must disburse funds available from program income (including repayments to a revolving fund), rebates, refunds, contract settlements, audit recoveries, and interest earned on such funds before requesting additional cash payments.
- (6) Unless otherwise required by Federal statutes, payments for allowable costs by non-Federal entities must not be withheld at any time during the period of performance unless the conditions of §200.208, subpart D of this part, including §200.339, or one or more of the following applies:
 - (i) The non-Federal entity has failed to comply with the project objectives, Federal statutes, regulations, or the terms and conditions of the Federal award.
 - (ii) The non-Federal entity is delinquent in a debt to the United States as defined in OMB Circular A-129, "Policies for Federal Credit Programs and Non-Tax Receivables." Under such conditions, the Federal awarding agency or pass-through entity may, upon reasonable notice, inform the non-Federal entity that payments must not be made for financial obligations incurred after a specified date until the conditions are corrected or the indebtedness to the Federal Government is liquidated.
 - (iii) A payment withheld for failure to comply with Federal award conditions, but without suspension of the Federal award, must be released to the non-Federal entity upon subsequent compliance. When a Federal award is suspended, payment adjustments will be made in accordance with §200.343.
 - (iv) A payment must not be made to a non-Federal entity for amounts that are withheld by the non-Federal entity from payment to contractors to assure satisfactory completion of work. A payment must be made when the non-Federal entity actually disburses the withheld funds to the contractors or to escrow accounts established to assure satisfactory completion of work.
- (7) Standards governing the use of banks and other institutions as depositories of advance payments under Federal awards are as follows:
 - (i) The Federal awarding agency and pass-through entity must not require separate depository accounts for funds provided to a non-Federal entity or establish any eligibility requirements for depositories for funds provided to the non-Federal entity. However, the non-Federal entity must be able to account for funds received, obligated, and expended.
 - (ii) Advance payments of Federal funds must be deposited and maintained in insured accounts whenever possible.
- (8) The non-Federal entity must maintain advance payments of Federal awards in interest-bearing accounts, unless the following apply:
 - (i) The non-Federal entity receives less than \$250,000 in Federal awards per year.

- (ii) The best reasonably available interest-bearing account would not be expected to earn interest in excess of \$500 per year on Federal cash balances.
 - (iii) The depository would require an average or minimum balance so high that it would not be feasible within the expected Federal and non-Federal cash resources.
 - (iv) A foreign government or banking system prohibits or precludes interest-bearing accounts.
- (9) Interest earned amounts up to \$500 per year may be retained by the non-Federal entity for administrative expense. Any additional interest earned on Federal advance payments deposited in interest-bearing accounts must be remitted annually to the Bureau of Reclamation through an electronic medium using either Automated Clearing House (ACH) network or a Fedwire Funds Service payment.
- (i) For returning interest on Federal awards paid through ASAP, the refund should:
 - (A) Provide an explanation stating that the refund is for interest;
 - (B) List the ASAP Account
 - (C) List the Federal award number(s) for which the interest was earned; and
 - (D) Make returns payable to: Bureau of Reclamation.
 - (ii) For returning interest on Federal awards not paid through ASAP, the refund should:
 - (A) Provide an explanation stating that the refund is for interest;
 - (B) List the Federal award number(s) for which the interest was earned; and
 - (C) Make returns payable to: Bureau of Reclamation
- (10) Funds, principal, and excess cash returns must be directed to the original Federal agency payment system. The non-Federal entity should review instructions from the original Federal agency payment system. Returns should include the following information:
- (i) Agency information to indicate whom to credit the funding if the payment originated from ASAP, NSF, PMS, or another Federal agency payment system.
 - (ii) Relevant ASAP account numbers.
 - (iii) The reason for the return (e.g., excess cash, funds not spent, interest, part interest part other, etc.)
- (11) When returning funds or interest to Reclamation you must include the following as applicable:
- (i) For ACH Returns:
 - ABA Routing Number: 051036706
 - Account number: 312018
 - Bank Name and Location: Credit Gateway, Federal Reserve Bank, Richmond, VA
 - Agreement Number: Reclamation Grant or Cooperative Agreement Number

- (ii) For Fedwire Returns¹:
 - ABA Routing Number: 021030004
 - ABA Short Name: TREAS NYC
 - Account number: 14060905
 - Beneficiary Name: Bureau of Reclamation
 - Bank Name and Location: Federal Reserve Bank, 33 Liberty Street, Federal Reserve Post Office Station, New York, NY 10045
 - Agreement Number: Reclamation Grant or Cooperative Agreement Number

¹Please note that the organization initiating payment is likely to incur a charge from their Financial Institution for this type of payment.

- (iii) For International ACH Returns:
 - Beneficiary Account: Federal Reserve Bank of New York/ITS (FRBNY/ITS)
 - Bank: Citibank N.A. (New York)
 - Swift Code: CITIUS33
 - Account Number: 36838868
 - Bank Address: 388 Greenwich Street, New York, NY 10013 USA
 - Payment Details (Line 70): Agency Name (abbreviated when possible) and Agency Locator Code (ALC): 75010501
- (iv) For recipients that do not have electronic remittance capability, please make check payable to: “Bureau of Reclamation” and **include** the award number and ASAP account number in the memo lines of the check.

Please note it can take up to three weeks to process once received.

Mail (by USPS only) the check to Treasury approved lockbox:
DOI-BOR-Region: Denver
P.O. Box 6200-21
Portland, OR
97228-6200

2.2 Payment Method.

Recipients must utilize the Department of Treasury Automated Standard Application for Payments (ASAP) payment system to request advance or reimbursement payments. ASAP is a Recipient-initiated payment and information system designed to provide a single point of contact for the request and delivery of Federal funds. ASAP is the only allowable method for request and receipt of payment. Recipient procedures must minimize the time elapsing between the drawdown of Federal funds and the disbursement for agreement purposes.

In accordance with 2 CFR 25.200(b)(2)(3) the Recipient shall “Maintain an active SAM registration with current information, including information on a recipient's immediate and highest level owner and subsidiaries, as well as on all predecessors that have been awarded a

Federal contract or grant within the last three years, if applicable, at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency; and provide its unique entity identifier in each application or plan it submits to the Federal awarding agency. If the Recipient allows their SAM registration to lapse, the Recipient's accounts within ASAP will be automatically suspended by Reclamation until such time as the Recipient renews their SAM registration.

3. PROCUREMENT STANDARDS (2 CFR 200.317 through 200.327)

§200.317 Procurements by States.

When procuring property and services under a Federal award, a State must follow the same policies and procedures it uses for procurements from its non-Federal funds. The State will comply with §§200.321, 200.322, and 200.323 and ensure that every purchase order or other contract includes any clauses required by §200.327. All other non-Federal entities, including subrecipients of a State, must follow the procurement standards in §§200.318 through 200.327.

§200.318 General procurement standards.

- (a) The non-Federal entity must use its own documented procurement procedures which reflect applicable State, local, and tribal laws and regulations, provided that the procurements conform to applicable Federal law and the standards identified in this part.
- (b) Non-Federal entities must maintain oversight to ensure that contractors perform in accordance with the terms, conditions, and specifications of their contracts or purchase orders.
- (c)
 - (1) The non-Federal entity must maintain written standards of conduct covering conflicts of interest and governing the actions of its employees engaged in the selection, award and administration of contracts. No employee, officer, or agent may participate in the selection, award, or administration of a contract supported by a Federal award if he or she has a real or apparent conflict of interest. Such a conflict of interest would arise when the employee, officer, or agent, any member of his or her immediate family, his or her partner, or an organization which employs or is about to employ any of the parties indicated herein, has a financial or other interest in or a tangible personal benefit from a firm considered for a contract. The officers, employees, and agents of the non-Federal entity may neither solicit nor accept gratuities, favors, or anything of monetary value from contractors or parties to subcontracts. However, non-Federal entities may set standards for situations in which the financial interest is not

substantial or the gift is an unsolicited item of nominal value. The standards of conduct must provide for disciplinary actions to be applied for violations of such standards by officers, employees, or agents of the non-Federal entity.

- (2) If the non-Federal entity has a parent, affiliate, or subsidiary organization that is not a state, local government, or Indian tribe, the non-Federal entity must also maintain written standards of conduct covering organizational conflicts of interest. Organizational conflicts of interest means that because of relationships with a parent company, affiliate, or subsidiary organization, the non-Federal entity is unable or appears to be unable to be impartial in conducting a procurement action involving a related organization.
- (d) The non-Federal entity's procedures must avoid acquisition of unnecessary or duplicative items. Consideration should be given to consolidating or breaking out procurements to obtain a more economical purchase. Where appropriate, an analysis will be made of lease versus purchase alternatives, and any other appropriate analysis to determine the most economical approach.
- (e) To foster greater economy and efficiency, and in accordance with efforts to promote cost-effective use of shared services across the Federal Government, the non-Federal entity is encouraged to enter into state and local intergovernmental agreements or inter-entity agreements where appropriate for procurement or use of common or shared goods and services.
- (f) The non-Federal entity is encouraged to use Federal excess and surplus property in lieu of purchasing new equipment and property whenever such use is feasible and reduces project costs.
- (g) The non-Federal entity is encouraged to use value engineering clauses in contracts for construction projects of sufficient size to offer reasonable opportunities for cost reductions. Value engineering is a systematic and creative analysis of each contract item or task to ensure that its essential function is provided at the overall lower cost.
- (h) The non-Federal entity must award contracts only to responsible contractors possessing the ability to perform successfully under the terms and conditions of a proposed procurement. Consideration will be given to such matters as contractor integrity, compliance with public policy, record of past performance, and financial and technical resources. See also 200.212 Suspension and debarment.
- (i) The non-Federal entity must maintain records sufficient to detail the history of procurement. These records will include, but are not necessarily limited to the following: rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price.
- (j)

- (1) The non-Federal entity may use a time and materials type contract only after a determination that no other contract is suitable and if the contract includes a ceiling price that the contractor exceeds at its own risk. Time and materials type contract means a contract whose cost to a non-Federal entity is the sum of:
 - (i) The actual cost of materials; and
 - (ii) Direct labor hours charged at fixed hourly rates that reflect wages, general and administrative expenses, and profit.
- (2) Since this formula generates an open-ended contract price, a time-and-materials contract provides no positive profit incentive to the contractor for cost control or labor efficiency.

Therefore, each contract must set a ceiling price that the contractor exceeds at its own risk. Further, the non-Federal entity awarding such a contract must assert a high degree of oversight in order to obtain reasonable assurance that the contractor is using efficient methods and effective cost controls.

- (k) The non-Federal entity alone must be responsible, in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements. These issues include, but are not limited to, source evaluation, protests, disputes, and claims. These standards do not relieve the non-Federal entity of any contractual responsibilities under its contracts. The Federal awarding agency will not substitute its judgment for that of the non-Federal entity unless the matter is primarily a Federal concern. Violations of law will be referred to the local, state, or Federal authority having proper jurisdiction.

§200.319 Competition.

- (a) All procurement transactions for the acquisition of property or services required under a Federal award must be conducted in a manner providing full and open competition consistent with the standards of this section and §200.320.
- (b) In order to ensure objective contractor performance and eliminate unfair competitive advantage, contractors that develop or draft specifications, requirements, statements of work, or invitations for bids or requests for proposals must be excluded from competing for such procurements. Some of the situations considered to be restrictive of competition include but are not limited to:
 - (1) Placing unreasonable requirements on firms in order for them to qualify to do business;
 - (2) Requiring unnecessary experience and excessive bonding;
 - (3) Noncompetitive pricing practices between firms or between affiliated companies;
 - (4) Noncompetitive contracts to consultants that are on retainer contracts;
 - (5) Organizational conflicts of interest;

- (6) Specifying only a “brand name” product instead of allowing “an equal” product to be offered and describing the performance or other relevant requirements of the procurement; and
 - (7) Any arbitrary action in the procurement process.
- (c) The non-Federal entity must conduct procurements in a manner that prohibits the use of statutorily or administratively imposed state, local, or tribal geographical preferences in the evaluation of bids or proposals, except in those cases where applicable Federal statutes expressly mandate or encourage geographic preference. Nothing in this section preempts state licensing laws.
- When contracting for architectural and engineering (A/E) services, geographic location may be a selection criterion provided its application leaves an appropriate number of qualified firms, given the nature and size of the project, to compete for the contract.
- (d) The non-Federal entity must have written procedures for procurement transactions. These procedures must ensure that all solicitations:
- (1) Incorporate a clear and accurate description of the technical requirements for the material, product, or service to be procured. Such description must not, in competitive procurements, contain features which unduly restrict competition.
The description may include a statement of the qualitative nature of the material, product or service to be procured and, when necessary, must set forth those minimum essential characteristics and standards to which it must conform if it is to satisfy its intended use. Detailed product specifications should be avoided if at all possible.
When it is impractical or uneconomical to make a clear and accurate description of the technical requirements, a “brand name or equivalent” description may be used as a means to define the performance or other salient requirements of procurement. The specific features of the named brand which must be met by offers must be clearly stated; and
 - (2) Identify all requirements which the offerors must fulfill and all other factors to be used in evaluating bids or proposals.
- (e) The non-Federal entity must ensure that all prequalified lists of persons, firms, or products which are used in acquiring goods and services are current and include enough qualified sources to ensure maximum open and free competition. Also, the non-Federal entity must not preclude potential bidders from qualifying during the solicitation period.
- (f) Noncompetitive procurements can only be awarded in accordance with §200.320(c).

§200.320 Methods of procurement to be followed.

The non-Federal entity must have and use documented procurement procedures, consistent with the standards of this section and §§200.317, 200.318, and 200.319 for any of the following methods of procurement used for the acquisition of property or services required under a Federal award or sub-award.

- (a) Informal procurement methods. When the value of the procurement for property or services under a Federal award does not exceed the simplified acquisition threshold (SAT), as defined in §200.1, or a lower threshold established by a non-Federal entity, formal procurement methods are not required. The non-Federal entity may use informal procurement methods to expedite the completion of its transactions and minimize the associated administrative burden and cost. The informal methods used for procurement of property or services at or below the SAT include:
- (1) Micro-purchases—(i) Distribution. The acquisition of supplies or services, the aggregate dollar amount of which does not exceed the micro-purchase threshold (See the definition of micro-purchase in §200.1). To the maximum extent practicable, the non-Federal entity should distribute micro-purchases equitably among qualified suppliers.
- (ii) Micro-purchase awards. Micro-purchases may be awarded without soliciting competitive price or rate quotations if the non-Federal entity considers the price to be reasonable based on research, experience, purchase history or other information and documents it files accordingly. Purchase cards can be used for micro-purchases if procedures are documented and approved by the non-Federal entity.
- (iii) Micro-purchase thresholds. The non-Federal entity is responsible for determining and documenting an appropriate micro-purchase threshold based on internal controls, an evaluation of risk, and its documented procurement procedures. The micro-purchase threshold used by the non-Federal entity must be authorized or not prohibited under State, local, or tribal laws or regulations. Non-Federal entities may establish a threshold higher than the Federal threshold established in the Federal Acquisition Regulations (FAR) in accordance with paragraphs (a)(1)(iv) and (v) of this section.
- (iv) Non-Federal entity increase to the micro-purchase threshold up to \$50,000. Non-Federal entities may establish a threshold higher than the micro-purchase threshold identified in the FAR in accordance with the requirements of this section. The non-Federal entity may self-certify a threshold up to \$50,000 on an annual basis and must maintain documentation to be made available to the Federal awarding agency and auditors in accordance with §200.334. The self-certification must include a justification, clear identification of the threshold, and supporting documentation of any of the following:
- (A) A qualification as a low-risk auditee, in accordance with the criteria in §200.520 for the most recent audit;
 - (B) An annual internal institutional risk assessment to identify, mitigate, and manage financial risks; or,
 - (C) For public institutions, a higher threshold consistent with State law.

- (v) Non-Federal entity increase to the micro-purchase threshold over \$50,000. Micro-purchase thresholds higher than \$50,000 must be approved by the cognizant agency for indirect costs. The non-federal entity must submit a request with the requirements included in paragraph (a)(1)(iv) of this section. The increased threshold is valid until there is a change in status in which the justification was approved.
- (2) Small purchases—
- (i) Small purchase procedures. The acquisition of property or services, the aggregate dollar amount of which is higher than the micro-purchase threshold but does not exceed the simplified acquisition threshold. If small purchase procedures are used, price or rate quotations must be obtained from an adequate number of qualified sources as determined appropriate by the non-Federal entity.
 - (ii) Simplified acquisition thresholds. The non-Federal entity is responsible for determining an appropriate simplified acquisition threshold based on internal controls, an evaluation of risk and its documented procurement procedures which must not exceed the threshold established in the FAR. When applicable, a lower simplified acquisition threshold used by the non-Federal entity must be authorized or not prohibited under State, local, or tribal laws or regulations.
- (b) Formal procurement methods. When the value of the procurement for property or services under a Federal financial assistance award exceeds the SAT, or a lower threshold established by a non-Federal entity, formal procurement methods are required. Formal procurement methods require following documented procedures. Formal procurement methods also require public advertising unless a non-competitive procurement can be used in accordance with §200.319 or paragraph (c) of this section. The following formal methods of procurement are used for procurement of property or services above the simplified acquisition threshold or a value below the simplified acquisition threshold the non-Federal entity determines to be appropriate:
- (1) Sealed bids. A procurement method in which bids are publicly solicited and a firm fixed-price contract (lump sum or unit price) is awarded to the responsible bidder whose bid, conforming with all the material terms and conditions of the invitation for bids, is the lowest in price. The sealed bids method is the preferred method for procuring construction, if the conditions.
 - (i) In order for sealed bidding to be feasible, the following conditions should be present:
 - (A) A complete, adequate, and realistic specification or purchase description is available;
 - (B) Two or more responsible bidders are willing and able to compete effectively for the business; and

(C) The procurement lends itself to a firm fixed price contract and the selection of the successful bidder can be made principally on the basis of price.

(ii) If sealed bids are used, the following requirements apply:

(A) Bids must be solicited from an adequate number of qualified sources, providing them sufficient response time prior to the date set for opening the bids, for local, and tribal governments, the invitation for bids must be publicly advertised;

(B) The invitation for bids, which will include any specifications and pertinent attachments, must define the items or services in order for the bidder to properly respond;

(C) All bids will be opened at the time and place prescribed in the invitation for bids, and for local and tribal governments, the bids must be opened publicly;

(D) A firm fixed price contract award will be made in writing to the lowest responsive and responsible bidder. Where specified in bidding documents, factors such as discounts, transportation cost, and life cycle costs must be considered in determining which bid is lowest. Payment discounts will only be used to determine the low bid when prior experience indicates that such discounts are usually taken advantage of; and

(E) Any or all bids may be rejected if there is a sound documented reason.

(2) Proposals. A procurement method in which either a fixed price or cost-reimbursement type contract is awarded. Proposals are generally used when conditions are not appropriate for the use of sealed bids. They are awarded in accordance with the following requirements:

(i) Requests for proposals must be publicized and identify all evaluation factors and their relative importance. Proposals must be solicited from an adequate number of qualified offerors. Any response to publicized requests for proposals must be considered to the maximum extent practical;

(ii) The non-Federal entity must have a written method for conducting technical evaluations of the proposals received and making selections;

(iii) Contracts must be awarded to the responsible offeror whose proposal is most advantageous to the non-Federal entity, with price and other factors considered; and

(iv) The non-Federal entity may use competitive proposal procedures for qualifications-based procurement of architectural/engineering (A/E) professional services whereby offeror's qualifications are evaluated and the most qualified offeror is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in procurement of A/E professional services. It cannot be used to purchase other

types of services through A/E firms that are a potential source to perform the proposed effort.

- (c) Noncompetitive procurement. There are specific circumstances in which noncompetitive procurement can be used. Noncompetitive procurement can only be awarded if one or more of the following circumstances apply:
- (1) The acquisition of property or services, the aggregate dollar amount of which does not exceed the micro-purchase threshold (see paragraph (a)(1) of this section);
 - (2) The item is available only from a single source;
 - (3) The public exigency or emergency for the requirement will not permit a delay resulting from publicizing a competitive solicitation;
 - (4) The Federal awarding agency or pass-through entity expressly authorizes a noncompetitive procurement in response to a written request from the non-Federal entity; or
 - (5) After solicitation of a number of sources, competition is determined inadequate.

§200.321 Contracting with small and minority businesses, women's business enterprises, and labor surplus area firms.

- (a) The non-Federal entity must take all necessary affirmative steps to assure that minority businesses, women's business enterprises, and labor surplus area firms are used when possible.
- (b) Affirmative steps must include:
 - (1) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;
 - (2) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;
 - (3) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
 - (4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
 - (5) Using the services and assistance, as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce; and
 - (6) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (b)(1) through (5) of this section.

§200.322 Domestic preferences for procurements.

- (a) As appropriate and to the extent consistent with law, the non-Federal entity should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.
- (b) For purposes of this section:
 - (1) “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
 - (2) “Manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

§200.323 Procurement of recovered materials.

A non-Federal entity that is a state agency or agency of a political subdivision of a state and its contractors must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

§200.324 Contract cost and price.

- (a) The non-Federal entity must perform a cost or price analysis in connection with every procurement action in excess of the Simplified Acquisition Threshold including contract amendments. The method and degree of analysis is dependent on the facts surrounding the particular procurement situation, but as a starting point, the non-Federal entity must make independent estimates before receiving bids or proposals.
- (b) The non-Federal entity must negotiate profit as a separate element of the price for each contract in which there is no price competition and in all cases where cost analysis is performed. To establish a fair and reasonable profit, consideration must be given to the complexity of the work to be performed, the risk borne by the contractor, the contractor's investment, the amount of subcontracting, the quality of its record of past performance, and industry profit rates in the surrounding geographical area for similar work.

- (c) Costs or prices based on estimated costs for contracts under the Federal award are allowable only to the extent that costs incurred or cost estimates included in negotiated prices would be allowable for the non-Federal entity under subpart E of this part. The non-Federal entity may reference its own cost principles that comply with the Federal cost principles.
- (d) The cost plus a percentage of cost and percentage of construction cost methods of contracting must not be used.

§200.325 Federal awarding agency or pass-through entity review.

- (a) The non-Federal entity must make available, upon request of the Federal awarding agency or pass-through entity, technical specifications on proposed procurements where the Federal awarding agency or pass-through entity believes such review is needed to ensure that the item or service specified is the one being proposed for acquisition. This review generally will take place prior to the time the specification is incorporated into a solicitation document. However, if the non-Federal entity desires to have the review accomplished after a solicitation has been developed, the Federal awarding agency or pass-through entity may still review the specifications, with such review usually limited to the technical aspects of the proposed purchase.
- (b) The non-Federal entity must make available upon request, for the Federal awarding agency or pass-through entity pre-procurement review, procurement documents, such as requests for proposals or invitations for bids, or independent cost estimates, when:
 - (1) The non-Federal entity's procurement procedures or operation fails to comply with the procurement standards in this part;
 - (2) The procurement is expected to exceed the Simplified Acquisition Threshold and is to be awarded without competition or only one bid or offer is received in response to a solicitation;
 - (3) The procurement, which is expected to exceed the Simplified Acquisition Threshold, specifies a "brand name" product;
 - (4) The proposed contract is more than the Simplified Acquisition Threshold and is to be awarded to other than the apparent low bidder under a sealed bid procurement; or
 - (5) A proposed contract amendment changes the scope of a contract or increases the contract amount by more than the Simplified Acquisition Threshold.
- (c) The non-Federal entity is exempt from the pre-procurement review in paragraph (b) of this section if the Federal awarding agency or pass-through entity determines that its procurement systems comply with the standards of this part.
 - (1) The non-Federal entity may request that its procurement system be reviewed by the Federal awarding agency or pass-through entity to determine whether its system meets these standards in order for its system to be certified. Generally, these reviews must occur where there is continuous high-dollar funding, and third-party contracts are awarded on a regular basis;

- (2) The non-Federal entity may self-certify its procurement system. Such self-certification must not limit the Federal awarding agency's right to survey the system. Under a self-certification procedure, the Federal awarding agency may rely on written assurances from the non-Federal entity that it is complying with these standards. The non-Federal entity must cite specific policies, procedures, regulations, or standards as being in compliance with these requirements and have its system available for review.

§200.326 Bonding requirements.

For construction or facility improvement contracts or subcontracts exceeding the Simplified Acquisition Threshold, the Federal awarding agency or pass-through entity may accept the bonding policy and requirements of the non-Federal entity provided that the Federal awarding agency or pass-through entity has made a determination that the Federal interest is adequately protected. If such a determination has not been made, the minimum requirements must be as follows:

- (a) A bid guarantee from each bidder equivalent to five percent of the bid price. The “bid guarantee” must consist of a firm commitment such as a bid bond, certified check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of the bid, execute such contractual documents as may be required within the time specified.
- (b) A performance bond on the part of the contractor for 100 percent of the contract price. A “performance bond” is one executed in connection with a contract to secure fulfillment of all the contractor's requirements under such contract.
- (c) A payment bond on the part of the contractor for 100 percent of the contract price. A “payment bond” is one executed in connection with a contract to assure payment as required by law of all persons supplying labor and material in the execution of the work provided for in the contract.

§200.327 Contract provisions.

The non-Federal entity's contracts must contain the applicable provisions described in [appendix II](#) to this part.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75885, Dec. 19, 2014, and 85 FR 49506]

4. EQUIPMENT (2 CFR 200.313)

See also §200.439 Equipment and other capital expenditures.

- (a) Title. Subject to the obligations and conditions set forth in this section, title to equipment acquired under a Federal award will vest upon acquisition in the non-Federal entity. Unless a statute specifically authorizes the Federal agency to vest title in the non-Federal entity

without further obligation to the Federal Government, and the Federal agency elects to do so, the title must be a conditional title. Title must vest in the non-Federal entity subject to the following conditions:

- (1) Use the equipment for the authorized purposes of the project during the period of performance, or until the property is no longer needed for the purposes of the project.
 - (2) Not encumber the property without approval of the Federal awarding agency or pass-through entity.
 - (3) Use and dispose of the property in accordance with paragraphs (b), (c) and (e) of this section.
- (b) A state must use, manage and dispose of equipment acquired under a Federal award by the state in accordance with state laws and procedures. Other non-Federal entities must follow paragraphs (c) through (e) of this section.
- (c) Use.
- (1) Equipment must be used by the non-Federal entity in the program or project for which it was acquired as long as needed, whether or not the project or program continues to be supported by the Federal award, and the non-Federal entity must not encumber the property without prior approval of the Federal awarding agency. When no longer needed for the original program or project, the equipment may be used in other activities supported by the Federal awarding agency, in the following order of priority:
 - (i) Activities under a Federal award from the Federal awarding agency which funded the original program or project, then
 - (ii) Activities under Federal awards from other Federal awarding agencies. This includes consolidated equipment for information technology systems.
 - (2) During the time that equipment is used on the project or program for which it was acquired, the non-Federal entity must also make equipment available for use on other projects or programs currently or previously supported by the Federal Government, provided that such use will not interfere with the work on the projects or program for which it was originally acquired. First preference for other use must be given to other programs or projects supported by Federal awarding agency that financed the equipment and second preference must be given to programs or projects under Federal awards from other Federal awarding agencies. Use for non-federally-funded programs or projects is also permissible. User fees should be considered if appropriate.
 - (3) Notwithstanding the encouragement in 200.307 Program income to earn program income, the non-Federal entity must not use equipment acquired with the Federal award to provide services for a fee that is less than private companies charge for equivalent services unless specifically authorized by Federal statute for as long as the Federal Government retains an interest in the equipment.
 - (4) When acquiring replacement equipment, the non-Federal entity may use the equipment to be replaced as a trade-in or sell the property and use the proceeds to offset the cost of the replacement property.

- (d) Management requirements. Procedures for managing equipment (including replacement equipment), whether acquired in whole or in part under a Federal award, until disposition takes place will, as a minimum, meet the following requirements:
- (1) Property records must be maintained that include a description of the property, a serial number or other identification number, the source of funding for the property (including the FAIN), who holds title, the acquisition date, and cost of the property, percentage of Federal participation in the project costs for the Federal award under which the property was acquired, the location, use and condition of the property, and any ultimate disposition data including the date of disposal and sale price of the property.
 - (2) A physical inventory of the property must be taken and the results reconciled with the property records at least once every two years.
 - (3) A control system must be developed to ensure adequate safeguards to prevent loss, damage, or theft of the property. Any loss, damage, or theft must be investigated.
 - (4) Adequate maintenance procedures must be developed to keep the property in good condition.
 - (5) If the non-Federal entity is authorized or required to sell the property, proper sales procedures must be established to ensure the highest possible return.
- (e) Disposition. When original or replacement equipment acquired under a Federal award is no longer needed for the original project or program or for other activities currently or previously supported by a Federal awarding agency, except as otherwise provided in Federal statutes, regulations, or Federal awarding agency disposition instructions, the non-Federal entity must request disposition instructions from the Federal awarding agency if required by the terms and conditions of the Federal award. Disposition of the equipment will be made as follows, in accordance with Federal awarding agency disposition instructions:
- (1) Items of equipment with a current per unit fair market value of \$5,000 or less may be retained, sold or otherwise disposed of with no further obligation to the Federal awarding agency.
 - (2) Except as provided in 200.312 Federally-owned and exempt property, paragraph (b), or if the Federal awarding agency fails to provide requested disposition instructions within 120 days, items of equipment with a current per-unit fair-market value in excess of \$5,000 may be retained by the non-Federal entity or sold. The Federal awarding agency is entitled to an amount calculated by multiplying the current market value or proceeds from sale by the Federal awarding agency's percentage of participation in the cost of the original purchase. If the equipment is sold, the Federal awarding agency may permit the non-Federal entity to deduct and retain from the Federal share \$500 or ten percent of the proceeds, whichever is less, for its selling and handling expenses.
 - (3) The non-Federal entity may transfer title to the property to the Federal Government or to an eligible third party provided that, in such cases, the non-Federal entity must be entitled to compensation for its attributable percentage of the current fair market value of the property.

- (4) In cases where a non-Federal entity fails to take appropriate disposition actions, the Federal awarding agency may direct the non-Federal entity to take disposition actions.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75884, Dec. 19, 2014]

5. SUPPLIES (2 CFR 200.314)

See also 200.453 Materials and supplies costs, including costs of computing devices.

- (a) Title to supplies will vest in the non-Federal entity upon acquisition. If there is a residual inventory of unused supplies exceeding \$5,000 in total aggregate value upon termination or completion of the project or program and the supplies are not needed for any other Federal award, the non-Federal entity must retain the supplies for use on other activities or sell them, but must, in either case, compensate the Federal Government for its share. The amount of compensation must be computed in the same manner as for equipment. See 200.313 Equipment, paragraph (e)(2) for the calculation methodology.
- (b) As long as the Federal Government retains an interest in the supplies, the non-Federal entity must not use supplies acquired under a Federal award to provide services to other organizations for a fee that is less than private companies charge for equivalent services, unless specifically authorized by Federal statute.

6. INSPECTION

Reclamation has the right to inspect and evaluate the work performed or being performed under this Agreement, and the premises where the work is being performed, at all reasonable times and in a manner that will not unduly delay the work. If Reclamation performs inspection or evaluation on the premises of the Recipient or a sub-Recipient, the Recipient shall furnish and shall require sub-recipients to furnish all reasonable facilities and assistance for the safe and convenient performance of these duties.

7. AUDIT REQUIREMENTS (2 CFR 200.501)

- (a) Audit required. A non-Federal entity that expends \$750,000 or more during the non-Federal entity's fiscal year in Federal awards must have a single or program-specific audit conducted for that year in accordance with the provisions of this part.
- (b) Single audit. A non-Federal entity that expends \$750,000 or more during the non-Federal entity's fiscal year in Federal awards must have a single audit conducted in accordance with 200.514 Scope of audit except when it elects to have a program-specific audit conducted in accordance with paragraph (c) of this section.
- (c) Program-specific audit election. When an auditee expends Federal awards under only one Federal program (excluding R&D) and the Federal program's statutes, regulations, or the terms and conditions of the Federal award do not require a financial statement audit of the auditee, the auditee may elect to have a program-specific audit conducted in accordance with 200.507 Program-specific audits. A program-specific audit may not be elected for R&D

unless all of the Federal awards expended were received from the same Federal agency, or the same Federal agency and the same pass-through entity, and that Federal agency, or pass-through entity in the case of a subrecipient, approves in advance a program-specific audit.

- (d) Exemption when Federal awards expended are less than \$750,000. A non-Federal entity that expends less than \$750,000 during the non-Federal entity's fiscal year in Federal awards is exempt from Federal audit requirements for that year, except as noted in 200.503 Relation to other audit requirements, but records must be available for review or audit by appropriate officials of the Federal agency, pass-through entity, and Government Accountability Office (GAO).
- (e) Federally Funded Research and Development Centers (FFRDC). Management of an auditee that owns or operates a FFRDC may elect to treat the FFRDC as a separate entity for purposes of this part.
- (f) Subrecipients and Contractors. An auditee may simultaneously be a recipient, a subrecipient, and a contractor. Federal awards expended as a recipient or a subrecipient are subject to audit under this part.
- (g) The payments received for goods or services provided as a contractor are not Federal awards. Section 200.331 Subrecipient and contractor determinations sets forth the considerations in determining whether payments constitute a Federal award or a payment for goods or services provided as a contractor.
- (h) Compliance responsibility for contractors. In most cases, the auditee's compliance responsibility for contractors is only to ensure that the procurement, receipt, and payment for goods and services comply with Federal statutes, regulations, and the terms and conditions of Federal awards. Federal award compliance requirements normally do not pass through to contractors. However, the auditee is responsible for ensuring compliance for procurement transactions which are structured such that the contractor is responsible for program compliance or the contractor's records must be reviewed to determine program compliance. Also, when these procurement transactions relate to a major program, the scope of the audit must include determining whether these transactions are in compliance with Federal statutes, regulations, and the terms and conditions of Federal awards.
- (i) For-profit subrecipient. Since this part does not apply to for-profit subrecipients, the pass-through entity is responsible for establishing requirements, as necessary, to ensure compliance by for-profit subrecipients. The agreement with the for-profit subrecipient must describe applicable compliance requirements and the for-profit subrecipient's compliance responsibility. Methods to ensure compliance for Federal awards made to for-profit subrecipients may include pre-award audits, monitoring during the agreement, and post-award audits. See also 200.332 Requirements for pass-through entities.

[78 FR 78608, Dec. 26, 2013, as amended at 79 FR 75887, Dec. 19, 2014; 85 FR 49571, Aug. 13, 2020]

8. REMEDIES FOR NONCOMPLIANCE (2 CFR 200.339)

200.339 Remedies for noncompliance.

If a non-Federal entity fails to comply with Federal statutes, regulations or the terms and conditions of a Federal award, the Federal awarding agency or pass-through entity may impose additional conditions, as described in 200.207 Specific conditions. If the Federal awarding agency or pass-through entity determines that noncompliance cannot be remedied by imposing additional conditions, the Federal awarding agency or pass-through entity may take one or more of the following actions, as appropriate in the circumstances.

- (a) Temporarily withhold cash payments pending correction of the deficiency by the non-Federal entity or more severe enforcement action by the Federal awarding agency or pass-through entity.
- (b) Disallow (that is, deny both use of funds and any applicable matching credit for) all or part of the cost of the activity or action not in compliance.
- (c) Wholly or partly suspend or terminate the Federal award.
- (d) Initiate suspension or debarment proceedings as authorized under 2 CFR part 180 and Federal awarding agency regulations (or in the case of a pass-through entity, recommend such a proceeding be initiated by a Federal awarding agency).
- (e) Withhold further Federal awards for the project or program.
- (f) Take other remedies that may be legally available.

9. TERMINATION (2 CFR 200.340)

- (a) The Federal award may be terminated in whole or in part as follows:
 - (1) By the Federal awarding agency or pass-through entity, if a non-Federal entity fails to comply with the terms and conditions of a Federal award;
 - (2) By the Federal awarding agency or pass-through entity, to the greatest extent authorized by law, if an award no longer effectuates the program goals or agency priorities;
 - (3) By the Federal awarding agency or pass-through entity with the consent of the non-Federal entity, in which case the two parties must agree upon the termination conditions, including the effective date and, in the case of partial termination, the portion to be terminated;
 - (4) By the non-Federal entity upon sending to the Federal awarding agency or pass-through entity written notification setting forth the reasons for such termination, the effective date, and, in the case of partial termination, the portion to be terminated. However, if the Federal awarding agency or pass-through entity determines in the case of partial termination that the reduced or modified portion of the Federal award or subaward will not accomplish the purposes for which the Federal award was made, the Federal awarding agency or pass-through entity may terminate the Federal award in its entirety; or
 - (5) By the Federal awarding agency or pass-through entity pursuant to termination provisions included in the Federal award.

- (b) When a Federal award is terminated or partially terminated, both the Federal awarding agency or pass-through entity and the non-Federal entity remain responsible for compliance with the requirements in 200.344 Closeout and 200.345 Post-closeout adjustments and continuing responsibilities.

10. DEBARMENT AND SUSPENSION (2 CFR 1400)

The Department of the Interior regulations at 2 CFR 1400—Governmentwide Debarment and Suspension (Nonprocurement), which adopt the common rule for the governmentwide system of debarment and suspension for nonprocurement activities, are hereby incorporated by reference and made a part of this Agreement.

By entering into this grant or cooperative Agreement with the Bureau of Reclamation, the Recipient agrees to comply with 2 CFR 1400, Subpart C, and agrees to include a similar term or condition in all lower-tier covered transactions. These regulations are available at <http://www.gpoaccess.gov/ecfr/>.

11. DRUG-FREE WORKPLACE (2 CFR 182 and 1401)

The Department of the Interior regulations at 2 CFR 1401—Governmentwide Requirements for Drug-Free Workplace (Financial Assistance), which adopt the portion of the Drug-Free Workplace Act of 1988 (41 U.S.C. 701 et seq, as amended) applicable to grants and cooperative agreements, are hereby incorporated by reference and made a part of this agreement. By entering into this grant or cooperative agreement with the Bureau of Reclamation, the Recipient agrees to comply with 2 CFR 182.

12. ASSURANCES AND CERTIFICATIONS INCORPORATED BY REFERENCE

The provisions of the Assurances, SF 424B or SF 424D as applicable, executed by the Recipient in connection with this Agreement shall apply with full force and effect to this Agreement. All anti-discrimination and equal opportunity statutes, regulations, and Executive Orders that apply to the expenditure of funds under Federal contracts, grants, and cooperative Agreements, loans, and other forms of Federal assistance. The Recipient shall comply with Title VI or the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Age Discrimination Act of 1975, and any program-specific statutes with anti-discrimination requirements. The Recipient shall comply with civil rights laws including, but not limited to, the Fair Housing Act, the Fair Credit Reporting Act, the Americans with Disabilities Act, Title VII of the Civil Rights Act of 1964, the Equal Educational Opportunities Act, the Age Discrimination in Employment Act, and the Uniform Relocation Act.

Such Assurances also include, but are not limited to, the promise to comply with all applicable Federal statutes and orders relating to nondiscrimination in employment, assistance, and housing; the Hatch Act; Federal wage and hour laws and regulations and work place safety standards; Federal environmental laws and regulations and the Endangered Species Act; and Federal protection of rivers and waterways and historic and archeological preservation.

13. COVENANT AGAINST CONTINGENT FEES

The Recipient warrants that no person or agency has been employed or retained to solicit or secure this Agreement upon an Agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide offices established and maintained by the Recipient for the purpose of securing Agreements or business. For breach or violation of this warranty, the Government shall have the right to annul this Agreement without liability or, in its discretion, to deduct from the Agreement amount, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

14. TRAFFICKING VICTIMS PROTECTION ACT OF 2000 (2 CFR 175.15)

Trafficking in persons.

- (a) *Provisions applicable to a recipient that is a private entity.* You as the recipient, your employees, subrecipients under this award, and subrecipients' employees may not
- (1) Engage in severe forms of trafficking in persons during the period of time that the award is in effect;
 - (2) Procure a commercial sex act during the period of time that the award is in effect; or
 - (3) Use forced labor in the performance of the award or subawards under the award.
- (b) We as the Federal awarding agency may unilaterally terminate this award, without penalty, if you or a subrecipient that is a private entity —
- (1) Is determined to have violated a prohibition in paragraph a.1 of this award term; or
 - (2) Has an employee who is determined by the agency official authorized to terminate the award to have violated a prohibition in paragraph a.1 of this award term through conduct that is either:
 - (i) Associated with performance under this award; or
 - (ii) Imputed to you or the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, “OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement),” as implemented by our agency at 2 CFR part 1400.
- (c) *Provision applicable to a recipient other than a private entity.* We as the Federal awarding agency may unilaterally terminate this award, without penalty, if a subrecipient that is a private entity—
- (1) Is determined to have violated an applicable prohibition in paragraph a.1 of this award term; or

- (2) Has an employee who is determined by the agency official authorized to terminate the award to have violated an applicable prohibition in paragraph a.1 of this award term through conduct that is either:
- (i) Associated with performance under this award; or
 - (ii) Imputed to the subrecipient using the standards and due process for imputing the conduct of an individual to an organization that are provided in 2 CFR part 180, “OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement),” as implemented by our agency at 2 CFR part 1400.

(d) *Provisions applicable to any recipient.*

- (1) You must inform us immediately of any information you receive from any source alleging a violation of a prohibition in paragraph a.1 of this award term.
- (2) Our right to terminate unilaterally that is described in paragraph a.2 or b of this section:
 - (i) Implements section 106(g) of the Trafficking Victims Protection Act of 2000 (TVPA), as amended (22 U.S.C. 7104(g)), and
 - (ii) Is in addition to all other remedies for noncompliance that are available to us under this award.
- (3) You must include the requirements of paragraph a.1 of this award term in any subaward you make to a private entity.

(e) *Definitions.* For purposes of this award term:

- (1) “Employee” means either:
 - (i) An individual employed by you or a subrecipient who is engaged in the performance of the project or program under this award; or
 - (ii) Another person engaged in the performance of the project or program under this award and not compensated by you including, but not limited to, a volunteer or individual whose services are contributed by a third party as an in-kind contribution toward cost sharing or matching requirements.
- (2) “Forced labor” means labor obtained by any of the following methods: the recruitment, harboring, transportation, provision, or obtaining of a person for labor or services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.
- (3) “Private entity”:
 - (i) Means any entity other than a state, local government, Indian tribe, or foreign public entity, as those terms are defined in 2 CFR 175.25.
Includes:
 - (A) A nonprofit organization, including any nonprofit institution of higher education, hospital, or tribal organization other than one included in the definition of Indian tribe at 2 CFR 175.25(b).

(B) A for-profit organization.

(4) “Severe forms of trafficking in persons,” “commercial sex act,” and “coercion” have the meanings given at section 103 of the TVPA, as amended (22 U.S.C. 7102).

15. NEW RESTRICTIONS ON LOBBYING (43 CFR 18)

The Recipient agrees to comply with 43 CFR 18, New Restrictions on Lobbying, including the following certification:

- (a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Recipient, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or amendment of any Federal contract, grant, loan, or cooperative agreement.
- (b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying" in accordance with its instructions.
- (c) The Recipient shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

16. UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970 (URA) (42 USC 4601 *et seq.*)

- (a) The Uniform Relocation Assistance Act (URA), 42 U.S.C. 4601 *et seq.*, as amended, requires certain assurances for Reclamation funded land acquisition projects conducted by a Recipient that cause the displacement of persons, businesses, or farm operations. Because Reclamation funds only support acquisition of property or interests in property from willing sellers, it is not anticipated that Reclamation funds will result in any "displaced persons," as defined under the URA.
- (b) However, if Reclamation funds are used for the acquisition of real property that results in displacement, the URA requires Recipients to ensure that reasonable relocation payments and other remedies will be provided to any displaced person. Further, when acquiring real property, Recipients must be guided, to the greatest extent practicable, by the land acquisition policies in 42 U.S.C. 4651.
- (c) Exemptions to the URA and 49 CFR Part 24

- (1) The URA provides for an exemption to the appraisal, review and certification rules for those land acquisitions classified as “voluntary transactions.” Such “voluntary transactions” are classified as those that do not involve an exercise of eminent domain authority on behalf of a Recipient, and must meet the conditions specified at 49 CFR 24.101(b)(1)(i)-(iv).
- (2) For any land acquisition undertaken by a Recipient that receives Reclamation funds, but does not have authority to acquire the real property by eminent domain, to be exempt from the requirements of 49 CFR Part 24 the Recipient must:
 - (i) provide written notification to the owner that it will not acquire the property in the event negotiations fail to result in an amicable agreement, and;
 - (ii) inform the owner in writing of what it believes to be the market value of the property
- (d) Review of Land Acquisition Appraisals. Reclamation reserves the right to review any land appraisal whether or not such review is required under the URA or 49 CFR 24.104. Such reviews may be conducted by the Department of the Interior’s Appraisal Services Directorate or a Reclamation authorized designee. When Reclamation determines that a review of the original appraisal is necessary, Reclamation will notify the Recipient and provide an estimated completion date of the initial appraisal review.

17. SYSTEM FOR AWARD MANAGEMENT and Universal Identifier Requirements (2 CFR 25, Appendix A)

A. Requirement for System for Award Management

Unless you are exempted from this requirement under 2 CFR 25.110, you as the recipient must maintain current information in the SAM. This includes information on your immediate and highest level owner and subsidiaries, as well as on all of your predecessors that have been awarded a Federal contract or Federal financial assistance within the last three years, if applicable, until you submit the final financial report required under this Federal award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another Federal award term.

B. Requirement for unique entity identifier

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its unique entity identifier to you.
2. May not make a subaward to an entity unless the entity has provided its Unique Entity Identifier to you. Subrecipients are not required to obtain an active SAM registration, but must obtain a Unique Entity Identifier.

C. Definitions

For purposes of this award term:

1. System for Award Management (SAM) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the SAM Internet site (currently at <http://www.sam.gov>).
2. Unique entity identifier means the identifier required for SAM registration to uniquely identify business entities.
3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR part 25, subpart C:
 - a. A Governmental organization, which is a State, local government, or Indian Tribe;
 - b. A foreign public entity;
 - c. A domestic or foreign nonprofit organization;
 - d. A domestic or foreign for-profit organization; and
 - e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.
4. Subaward has the meaning given in 2 CFR 200.1.
5. Subrecipient has the meaning given in 2 CFR 200.1.

18. PROHIBITION ON TEXT MESSAGING AND USING ELECTRONIC EQUIPMENT SUPPLIED BY THE GOVERNMENT WHILE DRIVING

Executive Order 13513, *Federal Leadership On Reducing Text Messaging While Driving*, was signed by President Barack Obama on October 1, 2009 (ref: <http://edocket.access.gpo.gov/2009/pdf/E9-24203.pdf>). This Executive Order introduces a Federal Government-wide prohibition on the use of text messaging while driving on official business or while using Government-supplied equipment. Additional guidance enforcing the ban will be issued at a later date. In the meantime, please adopt and enforce policies that immediately ban text messaging while driving company-owned or rented vehicles, government-owned or leased vehicles, or while driving privately owned vehicles when on official government business or when performing any work for or on behalf of the government.

19. REPORTING SUBAWARDS AND EXECUTIVE COMPENSATION (2 CFR 170 APPENDIX A)

I. Reporting Subawards and Executive Compensation.

- a. Reporting of first-tier subawards.
 1. Applicability. Unless you are exempt as provided in paragraph d. of this award term, you must report each action that equals or exceeds \$30,000 in Federal funds for a

- subaward to a non-Federal entity or Federal agency (see definitions in paragraph e. of this award term).
2. Where and when to report.
 - i. The non-Federal entity or Federal agency must report each obligating action described in paragraph a.1. of this award term to <http://www.fsrs.gov>.
 - ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)
 3. What to report. You must report the information about each obligating action that the submission instructions posted at <http://www.fsrs.gov> specify.
- b. Reporting total compensation of recipient executives for non-Federal entities.
1. Applicability and what to report. You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if—
 - i. The total Federal funding authorized to date under this Federal award equals or exceeds \$30,000 as defined in 2 CFR 170.320;
 - ii. in the preceding fiscal year, you received—
 - (A) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards), and
 - (B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and,
 - iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)
 2. Where and when to report. You must report executive total compensation described in paragraph b.1. of this award term:
 - i. As part of your registration profile at <https://www.sam.gov>.
 - ii. By the end of the month following the month in which this award is made, and annually thereafter.
- c. Reporting of Total Compensation of Subrecipient Executives.
1. Applicability and what to report. Unless you are exempt as provided in paragraph d. of this award term, for each first-tier non-Federal entity subrecipient under this award, you shall report the names and total compensation of each of the subrecipient's five

- most highly compensated executives for the subrecipient's preceding completed fiscal year, if—
- i. in the subrecipient's preceding fiscal year, the subrecipient received—
 - (A) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards) and,
 - (B) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and
 - ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/excomp.htm>.)
2. Where and when to report. You must report subrecipient executive total compensation described in paragraph c.1. of this award term:
- i. To the recipient.
 - ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the subrecipient by November 30 of that year.
- d. Exemptions.
- If, in the previous tax year, you had gross income, from all sources, under \$300,000, you are exempt from the requirements to report:
- i. Subawards, and
 - ii. The total compensation of the five most highly compensated executives of any subrecipient.
- e. Definitions. For purposes of this award term:
1. Federal Agency means a Federal agency as defined at 5 U.S.C. 551(1) and further clarified by 5 U.S.C. 552(f).
 2. Non-Federal entity means all of the following, as defined in 2 CFR part 25:
 - i. A Governmental organization, which is a State, local government, or Indian tribe;
 - ii. A foreign public entity;
 - iii. A domestic or foreign nonprofit organization; and,
 - iv. A domestic or foreign for-profit organization

3. Executive means officers, managing partners, or any other employees in management positions.
4. Subaward:
 - i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
 - ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see 2 CFR 200.331).
 - iii. A subaward may be provided through any legal agreement, including an agreement that you or a subrecipient considers a contract.
5. Subrecipient means a non-Federal entity or Federal agency that:
 - i. Receives a subaward from you (the recipient) under this award; and
 - ii. Is accountable to you for the use of the Federal funds provided by the subaward.
6. Total compensation means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)).

[85 FR 49526, Aug. 13, 2020]

20. RECIPIENT EMPLOYEE WHISTLEBLOWER RIGHTS AND REQUIREMENT TO INFORM EMPLOYEES OF WHISTLEBLOWER RIGHTS (SEP 2013)

- (a) This award and employees working on this financial assistance agreement will be subject to the whistleblower rights and remedies in the pilot program on Award Recipient employee whistleblower protections established at 41 U.S.C. 4712 by section 828 of the National Defense Authorization Act for Fiscal Year 2013 (Pub.L. 112-239).
- (b) The Award Recipient shall inform its employees in writing, in the predominant language of the workforce, of employee whistleblower rights and protections under 41 U.S.C 4712.
- (c) The Award Recipient shall insert the substance of this clause, including this paragraph (c), in all subawards or subcontracts over the simplified acquisition threshold. 48 CFR 52.203-17 (as referenced in 48 CFR 3.908-9).

21. REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (APPENDIX XII to 2 CFR Part 200)

1. General Reporting Requirement

If the total value of your currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds \$10,000,000 for any period of time during the period of performance of this Federal award, then you as the recipient during that period of time must maintain the currency of information reported to the System for Award Management

Agreement Template
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(SAM) that is made available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)) about civil, criminal, or administrative proceedings described in paragraph 2 of this award term and condition. This is a statutory requirement under section 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by section 3010 of Public Law 111-212, all information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

2. Proceedings About Which You Must Report

Submit the information required about each proceeding that:

- a. Is in connection with the award or performance of a grant, cooperative agreement, or procurement contract from the Federal Government;
- b. Reached its final disposition during the most recent five-year period; and
- c. Is one of the following:
 - (1) A criminal proceeding that resulted in a conviction, as defined in paragraph 5 of this award term and condition;
 - (2) A civil proceeding that resulted in a finding of fault and liability and payment of a monetary fine, penalty, reimbursement, restitution, or damages of \$5,000 or more;
 - (3) An administrative proceeding, as defined in paragraph 5. of this award term and condition, that resulted in a finding of fault and liability and your payment of either a monetary fine or penalty of \$5,000 or more or reimbursement, restitution, or damages in excess of \$100,000; or
 - (4) Any other criminal, civil, or administrative proceeding if:
 - (i) It could have led to an outcome described in paragraph 2.c.(1), (2), or (3) of this award term and condition;
 - (ii) It had a different disposition arrived at by consent or compromise with an acknowledgment of fault on your part; and
 - (iii) The requirement in this award term and condition to disclose information about the proceeding does not conflict with applicable laws and regulations.

3. Reporting Procedures

Enter in the SAM Entity Management area the information that SAM requires about each proceeding described in paragraph 2 of this award term and condition. You do not need to submit the information a second time under assistance awards that you received if you already provided the information through SAM because you were required to do so under Federal procurement contracts that you were awarded.

4. Reporting Frequency

During any period of time when you are subject to the requirement in paragraph 1 of this award term and condition, you must report proceedings information through SAM for the most recent five year period, either to report new information about any proceeding(s) that you have not reported previously or affirm that there is no new information to report. Recipients that have Federal contract, grant, and cooperative agreement awards with a cumulative total value greater than \$10,000,000 must disclose semiannually any information about the criminal, civil, and administrative proceedings.

5. Definitions

For purposes of this award term and condition:

- a. Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative proceedings, Civilian Board of Contract Appeals proceedings, and Armed Services Board of Contract Appeals proceedings). This includes proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include audits, site visits, corrective plans, or inspection of deliverables.
- b. Conviction, for purposes of this award term and condition, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere.
- c. Total value of currently active grants, cooperative agreements, and procurement contracts includes—
 - (1) Only the Federal share of the funding under any Federal award with a recipient cost share or match; and
 - (2) The value of all expected funding increments under a Federal award and options, even if not yet exercised.

[80 FR 43310, July 22, 2015, as amended at 85 FR 49582, Aug. 13, 2020]

22. CONFLICTS OF INTEREST

(a) Applicability.

- (1) This section intends to ensure that non-Federal entities and their employees take appropriate steps to avoid conflicts of interest in their responsibilities under or with respect to Federal financial assistance agreements.
- (2) In the procurement of supplies, equipment, construction, and services by recipients and by subrecipients, the conflict of interest provisions in 2 CFR 200.318 apply.

(b) Requirements.

- (1) Non-Federal entities must avoid prohibited conflicts of interest, including any significant financial interests that could cause a reasonable person to question the recipient's ability to provide impartial, technically sound, and objective performance under or with respect to a Federal financial assistance agreement.
 - (2) In addition to any other prohibitions that may apply with respect to conflicts of interest, no key official of an actual or proposed recipient or subrecipient, who is substantially involved in the proposal or project, may have been a former Federal employee who, within the last one (1) year, participated personally and substantially in the evaluation, award, or administration of an award with respect to that recipient or subrecipient or in development of the requirement leading to the funding announcement.
 - (3) No actual or prospective recipient or subrecipient may solicit, obtain, or use non-public information regarding the evaluation, award, or administration of an award to that recipient or subrecipient or the development of a Federal financial assistance opportunity that may be of competitive interest to that recipient or subrecipient.
- (c) Notification.
- (1) Non-Federal entities, including applicants for financial assistance awards, must disclose in writing any conflict of interest to the DOI awarding agency or pass-through entity in accordance with 2 CFR 200.112, Conflicts of Interest.
 - (2) Recipients must establish internal controls that include, at a minimum, procedures to identify, disclose, and mitigate or eliminate identified conflicts of interest. The recipient is responsible for notifying the Financial Assistance Officer in writing of any conflicts of interest that may arise during the life of the award, including those that have been reported by subrecipients.
- (d) Restrictions on Lobbying. Non-Federal entities are strictly prohibited from using funds under this grant or cooperative agreement for lobbying activities and must provide the required certifications and disclosures pursuant to 43 CFR Part 18 and 31 USC 1352.
- (e) Review Procedures. The Financial Assistance Officer will examine each conflict of interest disclosure on the basis of its particular facts and the nature of the proposed grant or cooperative agreement, and will determine whether a significant potential conflict exists and, if it does, develop an appropriate means for resolving it.
- (f) Enforcement. Failure to resolve conflicts of interest in a manner that satisfies the Government may be cause for termination of the award. Failure to make required disclosures may result in any of the remedies described in 2 CFR 200.338, Remedies for Noncompliance, including suspension or debarment (see also 2 CFR Part 180).

23. DATA AVAILABILITY

- (a) Applicability. The Department of the Interior is committed to basing its decisions on the best available science and providing the American people with enough information to thoughtfully and substantively evaluate the data, methodology, and analysis used by the Department to inform its decisions.

- (b) Use of Data. The regulations at 2 CFR 200.315 apply to data produced under a Federal award, including the provision that the Federal Government has the right to obtain, reproduce, publish, or otherwise use the data produced under a Federal award as well as authorize others to receive, reproduce, publish, or otherwise use such data for Federal purposes.
- (c) Availability of Data. The recipient shall make the data produced under this award and any subaward(s) available to the Government for public release, consistent with applicable law, to allow meaningful third party evaluation and reproduction of the following:
 - (i) The scientific data relied upon;
 - (ii) The analysis relied upon; and
 - (iii) The methodology, including models, used to gather and analyze data.

24. PROHIBITION ON PROVIDING FUNDS TO THE ENEMY

- (a) The recipient must—
 - (1) Exercise due diligence to ensure that none of the funds, including supplies and services, received under this grant or cooperative agreement are provided directly or indirectly (including through subawards or contracts) to a person or entity who is actively opposing the United States or coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities, which must be completed through [2 CFR 180.300](#) prior to issuing a subaward or contract and;
 - (2) Terminate or void in whole or in part any subaward or contract with a person or entity listed in SAM as a prohibited or restricted source pursuant to subtitle E of Title VIII of the NDAA for FY 2015, unless the Federal awarding agency provides written approval to continue the subaward or contract.
- (b) The recipient may include the substance of this clause, including paragraph (a) of this clause, in subawards under this grant or cooperative agreement that have an estimated value over \$50,000 and will be performed outside the United States, including its outlying areas.
- (c) The Federal awarding agency has the authority to terminate or void this grant or cooperative agreement, in whole or in part, if the Federal awarding agency becomes aware that the recipient failed to exercise due diligence as required by paragraph (a) of this clause or if the Federal awarding agency becomes aware that any funds received under this grant or cooperative agreement have been provided directly or indirectly to a person or entity who is actively opposing coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities.

25. ADDITIONAL ACCESS TO RECIPIENT RECORDS

- (a) In addition to any other existing examination-of-records authority, the Federal Government is authorized to examine any records of the recipient and its subawards or contracts to the extent necessary to ensure that funds, including supplies and services, available under this grant or cooperative agreement are not provided, directly or indirectly, to a person or entity

that is actively opposing United States or coalition forces involved in a contingency operation in which members of the Armed Forces are actively engaged in hostilities, except for awards awarded by the Department of Defense on or before Dec 19, 2017 that will be performed in the United States Central Command (USCENTCOM) theater of operations.

- (b) The substance of this clause, including this paragraph (b), is required to be included in subawards or contracts under this grant or cooperative agreement that have an estimated value over \$50,000 and will be performed outside the United States, including its outlying areas.

26. PROHIBITION ON CERTAIN TELECOMMUNICATION AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

Federal award recipients are prohibited from using government funds to enter contracts (or extend or renew contracts) with entities that use covered telecommunications equipment or services as described in section 889 of the 2019 National Defense Authorization Act. This prohibition applies even if the contract is not intended to procure or obtain, any equipment, system, or service that uses covered telecommunications equipment or services.

III. DEPARTMENT OF THE INTERIOR STANDARD AWARD TERMS AND CONDITIONS

The Department of the Interior (DOI) Standard Award Terms and Conditions found at <https://www.doi.gov/grants/doi-standard-terms-and-conditions> are hereby incorporated by reference as though set forth in full text. These terms and conditions are in addition to the assurances and certifications made as part of the award and terms, conditions or restrictions reflected on this Agreement. Recipient acceptance of this Agreement carries with it the responsibility to be aware of and comply with all DOI terms and conditions applicable to this Agreement. The Recipient is responsible for ensuring their subrecipients and contractors are aware of and comply with applicable statutes, regulations, and agency requirements.

Recipient and subrecipient failure to comply with the general terms and conditions outlined below and those directly reflected in this Agreement can result in the DOI taking one or more of remedies described in 2 Code of Federal Regulations parts 200.339 and 200.340. The DOI will notify the recipient whenever terms and conditions are updated to accommodate instances in the passage of a regulation or statute that requires compliance. Also, DOI will inform the Recipient of revised terms and conditions in the action of an Agreement amendment adding additional Federal funds. Reclamation will make such changes by issuing a Notice of Award amendment that describes the change and provides the effective date. Revised terms and conditions do not apply to the Recipient's expenditures of funds or activities the Recipient carries out before the effective date of the revised DOI terms and conditions.

Airborne Snow Observatories Services Agreement

(Colorado River Authority of Utah)

This Airborne Snow Observatories Inc. Services Agreement (this "**Agreement**"), dated as of October 18, 2023, (the "**Effective Date**"), is by and between Airborne Snow Observatories, Inc., a Colorado public benefit corporation, with an address of PO Box 1644, Mammoth Lakes, California 93546 ("**ASO**") and Colorado River Authority of Utah, a public entity of the state of Utah ("**the Authority**"), with its principal office located at 60 East South Temple, Suite 850, Salt Lake City, Utah 84111 (together with **ASO**, the "**Parties**", and each a "**Party**").

Recitals:

A. ASO has the capability and capacity to provide certain services for snow and water resource management generally consisting of: (i) collecting data and measurements of snowpack, snow water equivalents, snow albedo, and other geophysical characterizations using airborne measurement and remote sensing techniques ("**Data**"); (ii) to prepare snow density and snowmelt runoff reports, models, and estimates for snow and water resource management and research purposes; and (iii) develop, compile, and deliver certain Data sets and Data products based upon the measurements (the "**Data Products**").

B. The Authority desires to engage ASO to provide such services, Data, and Data Products to the Authority, and ASO is willing to perform such services subject to and in accordance with the terms and conditions set forth in this Agreement and any attachments hereto.

Agreement:

NOW, THEREFORE, in consideration of the mutual covenants and agreements hereinafter set forth and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, ASO and the Authority agree as follows:

1. Services.

1.1 *Services Description.* ASO shall provide to the Authority the snowpack, snow water equivalent, and snow albedo measurement and snowmelt runoff modeling estimate services, Data, and Data Products (the "**Services**") specifically set out in one or more statements of work to be mutually agreed upon and signed by the Authority and ASO (each, a "**Statement of Work**"). The initial accepted Statement of Work is attached hereto as **Exhibit A**. Additional Statements of Work shall be deemed issued and accepted only if signed by the ASO Contract Manager and the Authority Contract Manager, appointed pursuant to Section 2.1(a) and Section 3.1(a), respectively.

1.2 *Statement of Work.* Each Statement of Work shall include the following information, if applicable:

- (a) a detailed description of the Services to be performed pursuant to the Statement of Work;

(b) the date upon which the Services will commence and the term of such Statement of Work;

(c) the name of the ASO Contract Manager;

(d) the Fees to be paid to ASO under the Statement of Work;

(e) the Project implementation plan, including a timetable;

(f) any criteria for completion of the Services; and

(g) any other terms and conditions agreed upon by the Parties in connection with the Services to be performed pursuant to such Statement of Work.

2. ASO Obligations. ASO shall:

2.1 Designate employees or contractors that it determines, in its sole discretion, to be capable of filling the following positions:

(a) A primary contact to act as its authorized representative with respect to all matters pertaining to this Agreement (the "**ASO Contract Manager**").

(b) A number of employees or contractors that it deems sufficient to perform the Services set out in each Statement of Work, (collectively, with the ASO Contract Manager, "**Provider Representatives**").

2.2 Make no changes in the ASO Contract Manager except:

(a) Following notice to the Authority; or

(b) Upon a change in work assignment, resignation, termination, death or disability of an existing Provider Representative.

2.3 Comply with all applicable federal, state and local laws, and obtain all permits and licenses, required for the lawful fulfillment of ASO's obligations under this Agreement.

3. The Authority Obligations.

3.1 The Authority shall:

(a) Designate one of its employees to serve as its primary contact with respect to this Agreement and to act as its authorized representative with respect to matters pertaining to this Agreement (the "**Authority Contract Manager**"), with such designation to remain in force unless and until a successor Authority Contract Manager is appointed.

(b) Require that the Authority Contract Manager respond promptly to any reasonable requests from ASO for instructions, information, or approvals required by ASO to provide the Services.

(c) Cooperate with ASO in its performance of the Services and upon reasonable request from ASO provide access to the Authority's employees, contractors, and equipment as required to enable ASO to provide the Services.

(d) Respond promptly to any ASO request to provide direction, information, approvals, authorizations, or decisions that are reasonably necessary for ASO to perform Services in accordance with the requirements of this Agreement.

3.2 If ASO's performance of its obligations under this Agreement is prevented or delayed by any act or omission of the Authority or its agents, subcontractors, consultants, or employees, ASO shall not be deemed in breach of its obligations under this Agreement or otherwise liable for any costs, charges, or losses sustained or incurred by the Authority, in each case, to the extent arising directly or indirectly from such prevention or delay.

4. Fees and Expenses.

4.1 *Fees.* In consideration of the provision of the Services by ASO and the rights granted to the Authority under this Agreement, the Authority shall pay the fees for the Services set out in the applicable Statement of Work ("**Fees**"). Unless otherwise provided in the applicable Statement of Work, said Fees will be payable within 30 days of the date of the invoice from ASO in accordance with the Utah Addendum, attached hereto and incorporated herein. All payments hereunder shall be in US Dollars and made by check or wire transfer.

4.2 *Reimbursements.* The Authority shall reimburse ASO for all documented reasonable expenses incurred in accordance with the Statement of Work within 30 days of the date of the invoice from ASO in accordance with Exhibit A hereto.

4.3 *Form of Payment.* All payments hereunder shall be in US Dollars and made by check or wire transfer.

4.4 *Taxes and Assessments* To the extent the Authority is not subject to any taxes, duties or other local, state and federal charges, the remainder of this paragraph 4.4 shall not apply. However, to the extent the Authority is not exempt from some or all of such taxes, duties and charges, the Authority is responsible for all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state, or local governmental or regulatory authority on any amounts payable by the Authority hereunder, other than any taxes imposed on ASO's income. If applicable, ASO will invoice the Authority for any such taxes that ASO is legally obligated to collect and the Authority shall pay such invoices in accordance with Section 4, or in lieu thereof, the Authority shall provide an exemption certificate or other documentation acceptable to the relevant taxing authorities to confirm its tax-exempt status.

4.5 *Late Payments.* Except for invoiced payments that the Authority has successfully disputed, all late payments shall bear interest at the lesser of (a) the rate of 1.5% per month and

(b) the highest rate permissible under applicable law, calculated daily and compounded monthly. In addition to all other remedies available under this Agreement or at law (which ASO does not waive by the exercise of any rights hereunder), ASO shall be entitled to suspend the provision of any Services if the Authority fails to pay any amounts when due hereunder.

5. Limited Warranty and Limitation of Liability.

5.1 ASO warrants that it shall perform the Services:

(a) In accordance with the terms and subject to the conditions set out in the respective Statement of Work and this Agreement.

(b) In a timely, workmanlike, and professional manner consistent with the standard of care generally applicable to the specific services being provided hereunder.

5.2 ASO's sole and exclusive liability and the Authority's sole and exclusive remedy for breach of this warranty or a material nonconformity, error, or defect in the Deliverables shall be as follows:

(a) ASO shall use reasonable commercial efforts to promptly cure any such breach, or material nonconformity, error, or defect; provided, that if ASO cannot cure such breach within a reasonable time (but no more than 30 days) after the Authority's written notice of such breach, the Authority may, at its option, terminate the Agreement by serving written notice of termination in accordance with Section 7.3.

(b) The foregoing remedy shall not be available unless the Authority provides written notice of such breach within 30 days after delivery of such Service or Deliverable to the Authority.

5.3 EXCEPT FOR THE EXPRESS WARRANTIES IN THIS SECTION 5, THE SERVICES, DATA, DATA PRODUCTS, DELIVERABLES, MATERIALS, AND ANALYSIS CONTAINED THEREIN ARE PROVIDED "AS IS," AND ASO HEREBY DISCLAIMS ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE. ASO SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINTERFERENCE, SYSTEM INTEGRATION, TITLE, AND NON-INFRINGEMENT, AND ALL WARRANTIES ARISING FROM COURSE OF DEALING, USAGE, OR TRADE PRACTICE. THE ENTIRE RISK OF USE OF THE DATA, DATA PRODUCTS, AND DELIVERABLES SHALL BE WITH THE AUTHORITY.

5.4 The Authority expressly acknowledges that the Deliverables, models, analysis and forecasts, and any Data or Data Products may contain some nonconformities, defects, or errors. ASO does not warrant that the Deliverables will meet the user's needs or expectations, that the use of the Deliverables will be uninterrupted, or error free, or that all nonconformities, defects, or errors can or will be corrected. ASO is not inviting reliance on these Deliverables, DATA, and DATA PRODUCTS, and The Authority should always verify actual data and Data Products and exercise its own professional judgment when reviewing and analyzing Deliverables, models,

analysis, forecasts, data and Data Products. AS BETWEEN THE AUTHORITY AND ASO, THE AUTHORITY IS SOLELY RESPONSIBLE FOR ANY ANALYSIS, INTERPRETATION, FORECASTS, DECISIONS, OR ACTIONS TAKEN OR NOT TAKEN BY THE AUTHORITY BASED UPON THE DELIVERABLES, MODELS, ANALYSIS, FORECASTS, DATA, OR DATA PRODUCTS. NOTWITHSTANDING THE FOREGOING, TO THE EXTENT ASO HAS ACTUAL KNOWLEDGE OF MATERIAL NONCONFORMITIES, DEFECTS OR ERRORS, ASO SHALL UNDERTAKE COMMERCIALY REASONABLE EFFORTS TO DISCLOSE THE SAME TO THE AUTHORITY AND TO CORRECT THE SAME AS SOON AS REASONABLY PRACTICABLE.

6. Intellectual Property.

6.1 *Intellectual Property Rights Defined.* For purposes of this Agreement, "Intellectual Property Rights" means all forms of intellectual property rights, interests, and protections throughout the world in or arising from intellectual property, whether currently existing or hereafter developed or acquired and whether now known or hereafter recognized, including all right, title and interest arising under United States or foreign common or statutory law in and to all: (a) patents and all filed, pending or potential applications for patents, including any patent disclosure, reissue, reexamination, division, continuation or continuation-in-part applications throughout the world now or hereafter filed; (b) trade secret rights and equivalent rights and all goodwill associated therewith; (c) copyrights, copyright registrations, design registrations and applications therefor, moral rights, other literary property or authors' rights, whether or not protected by copyright or as a mask work; and (d) proprietary indicia, trademarks, service marks, trade names, trade dress, logos, symbols, domain names, rights in databases, logos and/or brand names.

6.2 *Ownership of Deliverables.* Subject to and conditioned on the Authority's payment of Fees and compliance with all other terms and conditions of this Agreement, and except with respect to any ASO Materials that may be included in a Deliverable, the Authority is, and shall be, the sole and exclusive owner of all right, title, and interest in and to the reports and work product designated as "Deliverables" in the applicable Statement of Work (the "Deliverables") including all Intellectual Property Rights therein. The Authority agrees that it will not modify the Deliverables generated by ASO pursuant to this agreement or use it for any purpose other than the Permitted Use (as defined below) without the prior written permission of the ASO.

6.3 *License to Data Products.* Subject to and conditioned on the Authority's payment of Fees and compliance with all other terms and conditions of this Agreement, ASO hereby grants the Authority a perpetual, non-exclusive, non-transferable (except in compliance with Section 15) right and license to use the Data and Data Products and reports available on ASO's Data Product website. This right of use includes the rights to use, copy, download, store, print, publish and publicly display (without charging a fee for access or display of such Data or Data Products) the Data and Data Products solely for snow and water resource management, analysis, and research purposes (the "Permitted Use") to the extent necessary to enable the Authority to make reasonable use of the Data, Deliverables, and the Services.

6.4 *ASO Materials.* ASO and its licensors are, and shall remain, the sole and exclusive owners of all right, title, and interest in and to all documents, Data, forms, know-how, methodologies, software, tools, and other materials, provided by or used by ASO in connection with performing the Services, in each case developed or acquired by the ASO prior to the commencement or independently of this Agreement (the "ASO Materials"), including all Intellectual Property Rights therein. To the extent that any Deliverables include any ASO Materials, ASO hereby grants the Authority a perpetual, non-exclusive, non-transferable (except in accordance with Section 15), right and license to use, copy, download, or store any ASO Materials that are incorporated into the Deliverables solely for the Permitted Use to the extent necessary to enable the Authority to make reasonable use of the Deliverables.

6.5 *Use Restrictions.* The Authority shall only use the Data, Data Products, and Deliverables for the Permitted Use and shall not utilize the Deliverables, Data, or Data Products for any profit-making venture or sell or grant rights to a third party who intends to do so. Any purpose or use not specifically authorized herein is prohibited unless otherwise agreed to in writing by ASO. Without limiting the foregoing and except as otherwise expressly set forth in this Agreement, the Authority shall not at any time, directly or indirectly: (a) modify or alter the Data, Data Products, or Deliverables, in whole or in part; (b) rent, lease, sell, sublicense, assign, or transfer, or otherwise make available for a fee or charge the Data, Data Products, or Deliverables; (c) reverse engineer, disassemble, decompile, decode, adapt, or otherwise attempt to derive or gain access to the source of the Data, Data Products, or methods used to compile the Data, Data Products, or Deliverables, in whole or in part; (d) remove any proprietary notices included within the Data, Data Products, or Deliverables; or (e) use the Data, Data Products, or Deliverables in any manner or for any purpose that infringes, misappropriates, or otherwise violates any Intellectual Property Rights or other right of any person, or that violates any applicable law.

6.6 *All Rights Reserved.* ASO reserves all rights not expressly granted to the Authority in this Agreement. Except for the limited rights and licenses expressly granted under this Agreement, nothing in this Agreement grants, by implication, waiver, estoppel, or otherwise, to the Authority or any third party any Intellectual Property Rights or other right, title, or interest in or to the Deliverables, Data, or Data Products.

7. Term, Termination, and Survival.

7.1 *Term.* This Agreement shall commence as of the Effective Date and shall continue until June 30, 2026, (the "**Term**"), unless sooner terminated pursuant to this Section 7.

7.2 *Renewal Term.* N/A

7.3 *Default; Termination.* Either Party may terminate this Agreement, effective upon written notice to the other Party (the "Defaulting Party") if the Defaulting Party:

(a) Breaches any material term or condition of this Agreement, and such breach is incapable of cure, or with respect to a breach of a material term or condition that is capable of cure, the Defaulting Party does not cure such breach within 30 days after receipt of written notice of such breach.

(b) Becomes insolvent or admits its inability to pay its debts generally as they become due.

(c) Becomes subject, voluntarily or involuntarily, to any proceeding under any domestic or foreign bankruptcy or insolvency law, which is not fully stayed within seven business days or is not dismissed or vacated within 45 days after filing.

(d) Is dissolved or liquidated or takes any corporate action for such purpose.

(e) Makes a general assignment for the benefit of creditors.

(f) Has a receiver, trustee, custodian, or similar agent appointed by order of any court of competent jurisdiction to take charge of or sell any material portion of its property or business.

(g) *Subject to SNOFO Grant.* The Authority may terminate this Agreement if the Authority receives notice or otherwise determines, in its discretion that the United States, Bureau of Reclamation will not issue the SNOFO grant identified in the Statement of Work. Such termination will be subject to the terms of the Utah Addendum.

7.4 *Non-Payment.* Notwithstanding anything to the contrary in Section 7.3(a), ASO may terminate this Agreement before the expiration date of the Term immediately on written notice to the Authority if the Authority fails to pay any amount when due hereunder: (a) and such failure continues for 10 days after the Authority's receipt of written notice of nonpayment; or (b) more than two times in any 12 month period.

7.5 *Non-appropriation of Funds.* Upon thirty (30) days written notice delivered to ASO, this Agreement may be terminated in whole or in part at the sole discretion of the Authority, if the Authority reasonably determines that: (i) a change in Federal or State legislation or applicable laws materially affects the ability of either Party to perform under the terms of this Agreement; or (ii) that a change in available funds affects the Authority's ability to pay under this Agreement. A change of available funds as used in this paragraph includes, but is not limited to, a change in Federal or State funding, whether as a result of a legislative act or by order of the President or the Governor. If such notice of termination is delivered under this Section 7.5, the Authority will pay ASO for Services received prior to the effective date the written notice, or irrevocably committed to by ASO prior to such termination, including any applicable cancellation or similar fees.

7.6 *Effect of Expiration/Termination.* Upon expiration or earlier termination of this Agreement, and subject to the Authority's payment, as required, of all Fees for Services performed by ASO through the effective date of expiration or termination, ASO shall provide the Authority with all Deliverables prepared by ASO that are completed through the effective date of expiration or termination. Upon expiration or earlier termination of this Agreement pursuant to Section 7.3 or 7.4, the right of use by the Authority under this Agreement will also terminate with respect to any Data, Data Products, and Deliverables for which the Authority hasn't yet paid or for which the Authority breached the terms or restrictions hereof, and thereupon the Authority shall cease using all copies of such Data, Data Products, and Deliverables. No expiration or

termination of this Agreement will affect the Authority's obligation to pay all Fees that may have become due before such expiration or termination, or entitle the Authority to any refund. The Authority's obligation to pay Fees shall be limited to those incurred prior to such expiration or termination or as otherwise stated herein, or irrevocably committed to by ASO prior to such termination, including any applicable cancelation or similar fees.

7.7 *Survival.* The rights and obligations of the Parties set forth in this Section 7.7 and in Section[s] 4, 5.3, 5.4, 6, 7, 8, 10-14, 16-22, and any right or obligation of the Parties in this Agreement which, by its nature, should survive termination or expiration of this Agreement, will survive any such termination or expiration of this Agreement.

8. Limitation of Liability.

8.1 IN NO EVENT SHALL ASO BE LIABLE TO THE AUTHORITY OR TO ANY THIRD PARTY FOR ANY LOSS OF USE, REVENUE, OR PROFIT OR LOSS OF DATA OR DIMINUTION IN VALUE, OR FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY, SPECIAL, OR PUNITIVE DAMAGES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE), OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE AND WHETHER OR NOT ASO HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.

8.2 IN NO EVENT WILL EITHER PARTY'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, UNDER ANY LEGAL OR EQUITABLE THEORY, INCLUDING BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, AND OTHERWISE, EXCEED (a) IN THE CASE OF ASO, THE TOTAL AMOUNTS PAID TO ASO UNDER THIS AGREEMENT IN THE 12 MONTH PERIOD PRECEDING THE EVENT GIVING RISE TO THE CLAIM, OR (b) IN THE CASE OF THE AUTHORITY, THE AMOUNT BILLED BY ASO TO THE AUTHORITY IN THE 12 MONTH PERIOD PRECEDING THE EVENT GIVING RISE TO THE CLAIM.

9. Insurance. During the Term of this Agreement, ASO shall, at its own expense, maintain and carry insurance that complies with the insurance requirements set forth in Exhibit B.

10. Entire Agreement. This Agreement includes all attachments, including the Utah Addendum (Modified "State of Utah Standard Terms and Conditions"), exhibits, addenda, any Statements of Work and constitutes the sole and entire agreement of the Parties with respect to the subject matter contained herein, and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, regarding such subject matter. The Parties acknowledge and agree that if there is any conflict between the terms and conditions of this Agreement and the terms and conditions of any Statement of Work, the terms and conditions of the Statement of Work shall supersede and control, but only with respect to the specific Services described therein.

thereof, nor shall any single or partial exercise of any right, remedy, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

15. Assignment. Neither Party may assign or transfer any its rights hereunder, in each case whether voluntarily, involuntary, by operation of law or otherwise without the prior written consent of the other Party,; provided, however, that ASO may, without the prior consent of the Authority, assign all of its rights under this Agreement to (i) a parent, subsidiary of Affiliate of ASO, (ii) a purchaser of all or substantially all of ASO's assets or business related to this Agreement, or (iii) a third party participating in a merger, acquisition, sale of assets or other corporate reorganization in which ASO is participating. Any attempt to assign this Agreement in violation of this provision shall be void and of no effect. This Agreement shall bind and inure to the benefit of the Parties and their respective successors and permitted assigns. The Authority further acknowledges that ASO may and intends to subcontract certain of the obligations and production of the Deliverables hereunder, and such subcontracting shall not constitute a violation of the provisions hereof.

16. Relationship of the Parties. The relationship between the Parties is that of independent contractors. The details of the method and manner for performance of the Services by ASO shall be under its own control, the Authority being interested only in the results thereof. ASO shall be solely responsible for supervising, controlling and directing the details and manner of the completion of the Services. Nothing in this Agreement shall give the Authority the right to instruct, supervise, control, or direct the details and manner of the completion of the Services. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the Parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

17. No Third-Party Beneficiaries. This Agreement benefits solely the Parties to this Agreement and their respective permitted successors and assigns and nothing in this Agreement, express or implied, confers on any other Person any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of this Agreement.

18. Choice of Law. This Agreement and all related documents including all exhibits attached hereto, and all matters arising out of or relating to this Agreement, whether sounding in contract, tort, or statute are governed by, and construed in accordance with, the laws of the State of Utah.

19. Choice of Forum. Each Party irrevocably and unconditionally agrees that it will not commence any action, litigation or proceeding of any kind whatsoever against the other Party in any way arising from or relating to this Agreement, including all exhibits, schedules, attachments and appendices attached to this Agreement, and all contemplated transactions, including contract, equity, tort, fraud and statutory claims, in any forum other than the state and federal courts of appropriate jurisdiction in Salt Lake City, State of Utah. Each Party agrees that a final judgment in any such action, litigation, or proceeding is conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

20. Waiver of Jury Trial. EACH PARTY ACKNOWLEDGES THAT ANY CONTROVERSY THAT MAY ARISE UNDER THIS AGREEMENT, INCLUDING EXHIBITS, SCHEDULES, ATTACHMENTS, AND APPENDICES ATTACHED TO THIS AGREEMENT, IS LIKELY TO INVOLVE COMPLICATED AND DIFFICULT ISSUES AND, THEREFORE, EACH SUCH PARTY IRREVOCABLY AND UNCONDITIONALLY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY LEGAL ACTION ARISING OUT OF OR RELATING TO THIS AGREEMENT, INCLUDING ANY EXHIBITS, SCHEDULES, ATTACHMENTS OR APPENDICES ATTACHED TO THIS AGREEMENT, OR THE TRANSACTIONS CONTEMPLATED HEREBY.

21. Counterparts. This Agreement may be executed in counterparts, each of which is deemed an original, but all of which together are deemed to be one and the same agreement. Notwithstanding anything to the contrary in Section 11, a signed copy of this Agreement delivered by facsimile, email, or other means of electronic transmission is deemed to have the same legal effect as delivery of an original signed copy of this Agreement.

22. Force Majeure. ASO shall not be liable or responsible to the Authority, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of ASO including, without limitation, acts of God, flood, fire, earthquake, weather, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lock-outs, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting aircraft, carriers or inability or delay in obtaining supplies of adequate or suitable materials, materials or telecommunication breakdown or power outage, provided that, if the event in question continues for a continuous period in excess of 90 days, the Authority shall be entitled to give notice in writing to ASO to terminate this Agreement.

23. Legal Fees and Costs. In the event of a dispute or collection action with respect to this Agreement or amounts due hereunder, the substantially prevailing party shall be awarded as against the substantially non-prevailing party, its reasonable costs and legal fees incurred in pursuing the same, including costs and legal fees of appeal and collection.

24. Additional Provisions and Attachments.

See Utah Addendum, attached hereto and incorporated herein.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed as of the Effective Date by their respective duly authorized officers.

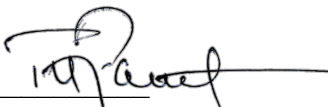
COLORADO RIVER AUTHORITY OF
UTAH

By Amy I. Haas

Name: Amy Haas 10/18/23

Title: Executive Director

AIRBORNE SNOW
OBSERVATORIES, INC.

By Thomas H. Painter 

Name: 10/18/2023

Title: Chief Executive Officer

UTAH ADDENDUM:

MODIFIED STATE OF UTAH STANDARD TERMS AND CONDITIONS FOR SERVICES

This Utah Addendum is for a contract for services (including professional services) meaning the furnishing of labor, time, or effort by a contractor and is appended to that certain Agreement between Colorado River Authority of Utah and Airborne Snow Observatories, Inc. dated _____, 2023.

1. **DEFINITIONS:** The following terms shall have the meanings set forth below:
 - a) “**Agreement**” means the agreement to which this Utah Addendum is appended, and includes all referenced attachments and documents incorporated by reference. The term “Agreement” may include any purchase orders that result from this Agreement.
 - b) “**Confidential Information**” means information that is deemed as confidential under applicable state and federal laws, including personal information. The State Entity reserves the right to identify, during and after this Agreement, additional reasonable types of categories of information that must be kept confidential under federal and state laws.
 - c) “**Contractor**” means the individual or entity delivering the Services identified in this Agreement. The term “Contractor” shall include Contractor’s agents, officers, employees, and partners.
 - d) “**Custom Deliverable**” means the Work Product that Contractor is required to deliver to the State Entity under this Agreement.
 - e) “**Services**” means the furnishing of labor, time, or effort by Contractor pursuant to this Agreement. Services include, but are not limited to, all of the deliverable(s) (including Custom Deliverable, supplies, equipment, or commodities) that result from Contractor performing the Services pursuant to this Agreement. Services include those professional services identified in Section 63G-6a-103 of the Utah Procurement Code. The Parties agree that Contractor is a single source supplier.
 - f) “**State Entity**” means the Colorado River Authority of Utah.
 - g) “**State of Utah**” means the State of Utah, in its entirety, including its institutions, agencies, departments, divisions, authorities, instrumentalities, boards, commissions, elected or appointed officers, employees, agents, and authorized volunteers.

2. **LAWS AND REGULATIONS:** At all times during this Agreement, Contractor and all Procurement Items delivered and/or performed under this Agreement will comply with all applicable federal and state constitutions, laws, rules, codes, orders, and regulations, including applicable licensure and certification requirements. If this Agreement is funded by federal funds, either in whole or in part, then any federal regulation related to the federal funding, including CFR Appendix II to Part 200, will supersede this Utah Addendum.

3. **RECORDS ADMINISTRATION:** Contractor shall maintain or supervise the maintenance of all records necessary to properly account for Contractor’s performance and the payments made by the State Entity to Contractor under this Agreement. These records shall be retained by Contractor for at least six (6) years after final payment, or until all audits initiated within the six (6) years have been completed, whichever is later. Contractor agrees to allow, at no additional cost,

the State of Utah, federal auditors, and State Entity staff, access to all such records upon reasonable request.

4. CERTIFY REGISTRATION AND USE OF EMPLOYMENT "STATUS VERIFICATION SYSTEM": The Status Verification System, also referred to as "E-verify", only applies to contracts issued through a Request for Proposal process and to sole sources that are included within a Request for Proposal.

a. Contractor certifies as to its own entity, under penalty of perjury, that Contractor has registered and is participating in the Status Verification System to verify the work eligibility status of Contractor's new employees that are employed in the State of Utah in accordance with applicable immigration laws.

b. Contractor shall require that each of its Subcontractors certify by affidavit, as to their own entity, under penalty of perjury, that each Subcontractor has registered and is participating in the Status Verification System to verify the work eligibility status of Subcontractor's new employees that are employed in the State of Utah in accordance with applicable immigration laws.

c. Contractor's failure to comply with this section will be considered a material breach of this Agreement.

5. CONFLICT OF INTEREST: Contractor represents that none of its officers or employees are officers or employees of the State Entity or the State of Utah, unless disclosure has been made to the State Entity.

6. INDEPENDENT CONTRACTOR: Contractor and Subcontractors, in the performance of this Agreement, shall act in an independent capacity and not as officers or employees or agents of the State Entity or the State of Utah.

7. EMPLOYMENT PRACTICES: Contractor agrees to abide by federal and state employment laws, including: (i) Title VI and VII of the Civil Rights Act of 1964 (42 U.S.C. 2000e), which prohibits discrimination against any employee or applicant for employment or any applicant or recipient of services, on the basis of race, religion, color, or national origin; (ii) Executive Order No. 11246, as amended, which prohibits discrimination on the basis of sex; (iii) 45 CFR 90, which prohibits discrimination on the basis of age; (iv) Section 504 of the Rehabilitation Act of 1973, or the Americans with Disabilities Act of 1990, which prohibits discrimination on the basis of disabilities; and (v) Utah's Executive Order 2019-1, dated February 5, 2019, which prohibits unlawful harassment in the workplace. Contractor further agrees to abide by any other laws, regulations, or orders that prohibit the discrimination of any kind by any of Contractor's employees.

8. DEBARMENT: Contractor certifies that it is not presently nor has ever been debarred, suspended, or proposed for debarment by any governmental department or agency, whether international, national, state, or local. Contractor must notify the State Entity within thirty (30) days if debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in any contract by any governmental entity during this Agreement.

9. **TERMINATION:** This Agreement may be terminated, with cause by either party, in advance of the specified expiration date, upon written notice given by the other party. The party in violation will be given ten (10) days after written notification to correct and cease the violations, after which this Agreement may be terminated for cause immediately and is subject to the remedies listed below. This Agreement may also be terminated without cause (for convenience), in advance of the specified expiration date, by the State Entity, upon thirty (30) days written termination notice being given to the Contractor. The State Entity and the Contractor may terminate this Agreement, in whole or in part, at any time, by mutual agreement in writing. On termination of this Agreement, all accounts and payments will be processed according to the financial arrangements set forth herein for approved Services ordered prior to date of termination, or irrevocably committed to by ASO prior to such termination, including any applicable cancelation or similar fees.

Contractor shall be compensated for the Services properly performed under this Agreement up to the effective date of the notice of termination. Contractor agrees that in the event of such termination for cause or without cause, Contractor's sole remedy and monetary recovery from the State Entity or the State of Utah is limited to full payment for all Services properly performed as authorized under this Agreement up to the date of termination as well as any reasonable monies owed as a result of Contractor having to terminate other contracts necessarily and appropriately entered into by Contractor pursuant to this Agreement. In no event shall the State Entity be liable to the Contractor for compensation for any services neither requested by the State, known by the State to have been procured on behalf of the State for performance of the Work hereunder, nor satisfactorily performed by the Contractor. In no event shall the State Entity's exercise of its right to terminate this Agreement for convenience relieve the Contractor of any liability to the State Entity for any damages or claims arising under this Agreement for work actually performed by Contractor prior to such termination. Notwithstanding any termination by State Entity, those obligations that are specifically described as surviving termination, or which by their nature impliedly survive termination, shall continue to be enforceable, including without limitation, any provisions regarding protection of proprietary rights.

10. **NONAPPROPRIATION OF FUNDS, REDUCTION OF FUNDS, OR CHANGES IN LAW:** Upon thirty (30) days written notice delivered to the Contractor, this Agreement may be terminated in whole or in part at the sole discretion of the State Entity, if the State Entity reasonably determines that: (i) a change in Federal or State legislation or applicable laws materially affects the ability of either party to perform under the terms of this Agreement; or (ii) that a change in available funds affects the State Entity's ability to pay under this Agreement. A change of available funds as used in this paragraph includes, but is not limited to, a change in Federal or State funding, whether as a result of a legislative act or by order of the President or the Governor. If a written notice is delivered under this section, the State Entity will reimburse Contractor for the Services properly ordered until the effective date of said notice, or irrevocably committed to by ASO prior to such termination, including any applicable cancelation or similar fees. Except as otherwise provided, the State Entity will not be liable for any performance, commitments, penalties, or liquidated damages that accrue after the effective date of said written notice.

11. **SUSPENSION OF WORK:** Should circumstances arise which would cause the State Entity to suspend Contractor's responsibilities under this Agreement, but not terminate this Agreement,

this will be done by written notice. Contractor's responsibilities may be reinstated upon advance formal written notice from the State Entity.

12. **SALES TAX EXEMPTION:** The Services under this Agreement will be paid for from the State Entity's funds and used in the exercise of the State Entity's essential functions as a State of Utah entity. Upon request, the State Entity will provide Contractor with its sales tax exemption number. It is Contractor's responsibility to request the State Entity's sales tax exemption number. It also is Contractor's sole responsibility to ascertain whether any tax deduction or benefits apply to any aspect of this Agreement.

13. **PUBLIC INFORMATION:** Contractor agrees that this Agreement, related purchase orders, related pricing documents, and invoices will be public documents and may be available for public and private distribution in accordance with the State of Utah's Government Records Access and Management Act (GRAMA). Contractor gives the State Entity and the State of Utah express permission to make copies of this Agreement, related sales orders, related pricing documents, and invoices in accordance with GRAMA. Except for sections identified in writing by Contractor and expressly approved by the State of Utah Division of Purchasing and General Services, Contractor also agrees that the Contractor's Proposal to the Solicitation will be a public document, and copies may be given to the public as permitted under GRAMA. The State Entity and the State of Utah are not obligated to inform Contractor of any GRAMA requests for disclosure of this Agreement, related purchase orders, related pricing documents, or invoices.

14. **INVOICING:** Contractor will submit invoices within thirty (30) days of Contractor's performance of the Services to the State Entity. The contract number shall be listed on all invoices, freight tickets, and correspondence relating to this Agreement. The prices paid by the State Entity will be those prices listed in this Agreement, unless Contractor offers a prompt payment discount within its Proposal or on its invoice. The State Entity has the right to adjust or return any invoice reflecting incorrect pricing.

15. **PAYMENT:** Payments are to be made within thirty (30) days after a correct invoice is received. All payments to Contractor will be remitted by mailed check or electronic funds transfer. If payment has not been made after sixty (60) days from the date a correct invoice is received by the State Entity, then interest may be added by Contractor as prescribed in the Utah Prompt Payment Act. The State of Utah and the State Entity will not allow the Contractor to charge end users electronic payment fees of any kind.

16. **TIME IS OF THE ESSENCE:** The Services shall be completed by any applicable deadline stated in this Agreement. For all Services, time is of the essence.

17. **CHANGES IN SCOPE:** Any changes in the scope of the Services to be performed under this Agreement shall be in the form of a written amendment to this Agreement, mutually agreed to and signed by both parties, specifying any such changes, fee adjustments, any adjustment in time of performance, or any other significant factors arising from the changes in the scope of Services.

18. **PERFORMANCE EVALUATION:** The State Entity may conduct a performance evaluation of Contractor's Services, including Contractor's Subcontractors. Results of any evaluation may be made available to Contractor upon request.

19. **STANDARD OF CARE:** The Services of Contractor and its Subcontractors shall be performed in accordance with the standard of care exercised by licensed members of their respective professions having substantial experience providing similar services which similarities include the type, magnitude, and complexity of the Services that are the subject of this Agreement. Subject to the limitations on Contractor's liability set forth in this Agreement, Contractor shall be liable to the State Entity and the State of Utah for claims, liabilities, additional burdens, penalties, damages, or third party claims (e.g., another Contractor's claim against the State of Utah), to the extent caused by wrongful acts, errors, or omissions that do not meet this standard of care.

20. **REVIEWS:** The State Entity reserves the right to perform plan checks, plan reviews, other reviews, and/or comment upon the Services of Contractor. Such reviews do not waive the requirement of Contractor to meet all of the terms and conditions of this Agreement.

21. **FORCE MAJEURE:** Neither party to this Agreement will be held responsible for delay or default caused by fire, riot, act of God, and/or war which is beyond that party's reasonable control. The State Entity may terminate this Agreement after determining such delay will prevent successful performance of this Agreement.

22. **PUBLICITY:** Contractor shall submit to the State Entity for written approval all advertising and publicity matters relating to this Agreement. It is within the State Entity's sole discretion whether to provide approval, which must be done in writing.

23. **INDEMNIFICATION RELATING TO INTELLECTUAL PROPERTY:** Contractor will indemnify and hold the State Entity and the State of Utah harmless from and against any and all damages, expenses (including reasonable attorneys' fees), claims, judgments, liabilities, and costs in any action or claim brought against the State Entity or the State of Utah for infringement of a third party's copyright, trademark, trade secret, or other proprietary right.

24. **OWNERSHIP IN INTELLECTUAL PROPERTY:** The State Entity and Contractor agree that each has no right, title, interest, proprietary or otherwise in the intellectual property owned or licensed by the other, unless otherwise agreed upon by the parties in writing.

25. **PROCUREMENT ETHICS:** Contractor understands that a person who is interested in any way in the sale of any supplies, services, construction, or insurance to the State of Utah is violating the law if the person gives or offers to give any compensation, gratuity, contribution, loan, reward, or any promise thereof to any person acting as a procurement officer on behalf of the State of Utah, or to any person in any official capacity participates in the procurement of such supplies, services, construction, or insurance, whether it is given for their own use or for the use or benefit of any other person or organization.

26. **DISPUTE RESOLUTION:** Prior to either party filing a judicial proceeding, the parties agree to participate in the mediation of any dispute. Such mediation shall be commenced by either Party

providing written notice of demand for mediation (“Mediation Notice”) to the other Party. Such mediation shall occur within 90 days of the date of the Mediation Notice, unless otherwise agreed by the Parties. The Parties shall agree upon a single mediator within ten days of the date of the Mediation Notice, and if the Parties cannot so agree, both Parties shall designate a Mediator and those two mediators shall agree upon a third mediator which third mediator shall conduct the mediation. The costs of the mediation shall be split equally between the Parties. In the event the mediation is unsuccessful, and a written statement is provided by the mediator to the Parties confirming the failure to reach agreement through mediation, either Party may initiate legal action as otherwise provided in this Agreement.

27. **ORDER OF PRECEDENCE:** In the event of any conflict in the terms and conditions in this Agreement, the order of precedence shall be: (i) the Statement of Work, (ii) this Utah Addendum, (iii) the terms of the Agreement, and (iv) Contractor’s terms and conditions that are attached to this Agreement, if any.

EXHIBIT A
STATEMENT OF WORK
AIRBORNE SNOW OBSERVATORIES, INC.
WATER YEAR 2024 – WATER YEAR 2026

1 Background

The ASO Inc. suite generates spatially complete maps of snow depth, snow water equivalent (the depth of water if the snow were to melt instantaneously), and snow albedo (reflectivity, which controls snowmelt rates) through remote sensing data and snowpack and runoff modeling frameworks to provide the best possible water resources data. The uniqueness of ASO Inc. comes from the experience of the team and its exclusive software products developed, applied, advanced, and adopted by our customers over the last seven years. Dr. Painter and his team are the founders of the program at NASA, creators of the airborne snow survey market, and now ASO Inc. is the sole licensee from NASA/JPL/Caltech to commercialize snow surveys with this software suite.

2 Project Scope & Schedule for Water Years 2024-2026

ASO Inc. will carry out the following tasks for the Colorado River Authority of Utah (The Authority) in collaboration with other partnering agencies:

- One (1) snow-free lidar + spectrometer survey of the Uintah Mountain Headwaters, Utah, USA
- Three (3) ASO lidar + spectrometer surveys per year of the Uintah Mountain Headwaters
- Data analysis and interpretation
- Delivery of snow depth, snow water equivalent, and snow albedo data products
- Coordination of iSnoBal modeling of the snowpack

ASO Inc., using its proprietary software exclusively licensed from Caltech, will perform the data analysis, interpretation, prepare and deliver the report, and be available for interaction with The Authority staff. ASO Inc. will interact regularly with The Authority staff and other stakeholders to adapt timing of surveys, formatting of data products, and timeliness of product delivery. ASO Inc. will also work with The Authority on public outreach efforts to provide its members with the full knowledge of their investment in water resource technology.

3 Approach

Airborne Surveys

ASO will conduct one snow-free survey in Year 1 and three snow-on surveys in Years 1-3 of the Uintah Mountain Headwaters (see Figure 1 for location map) using aircraft equipped with lidar and spectrometer. The snow-free survey will take place when there is little or no snow coverage of the area, and the snow-on surveys will take place at times determined in collaboration with Authority staff and other stakeholders (commonly near April 1st or peak accumulation, as well as mid- and late melt season). The surveys will occur on relatively clear sky days (< 20% cloud

cover) to assess snow depth at 3 m spatial sampling and SWE and snow albedo at 50 m spatial sampling.

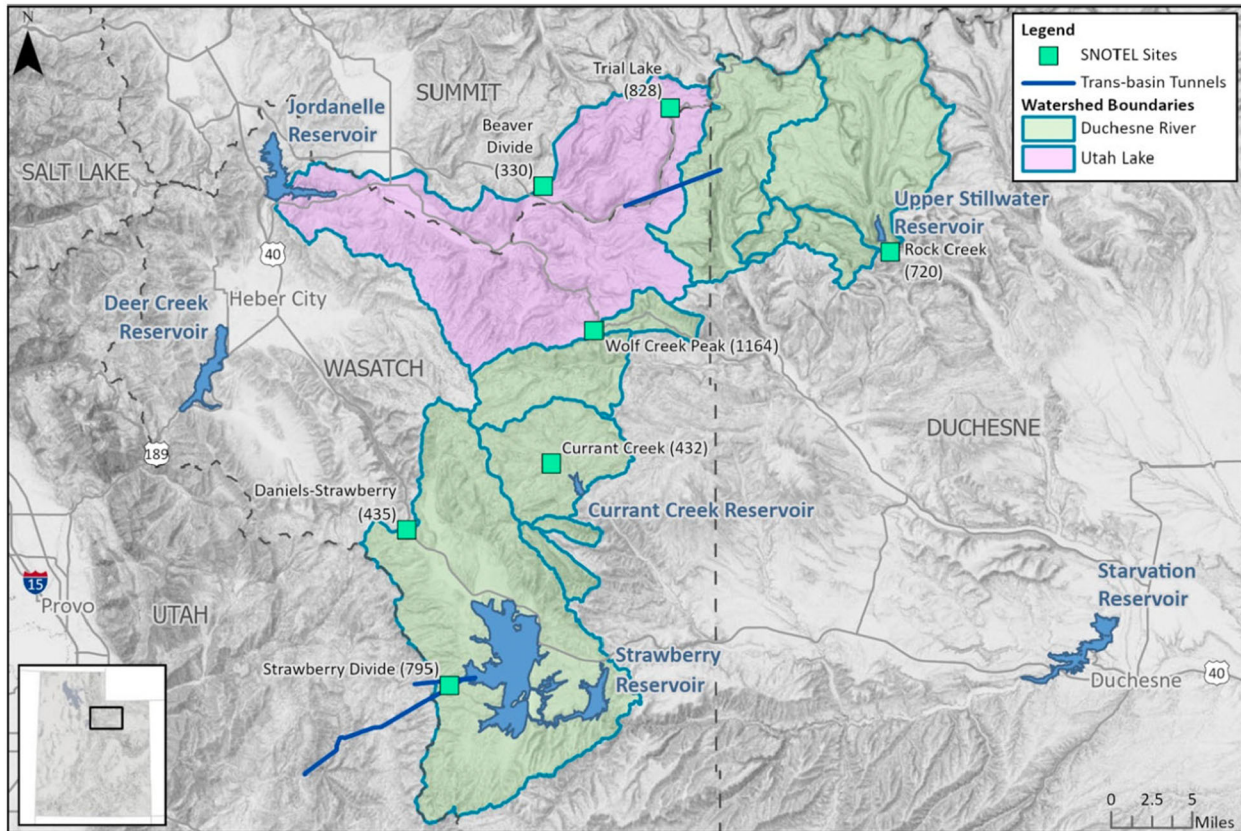


Figure 1. Project location map of the Uintah Mountain Headwaters in the Duchesne River and Utah Lake watersheds.

Data Analysis and Interpretation

ASO Inc. will process and analyze the acquired data from raw acquisition through generation of snow products. The processing of the imaging spectrometer data includes angular calibration, spectral calibration, radiometric calibration, and orthorectification with the topography (based on the ASO’s airborne Global Positioning System/Inertial Navigation System – GPS/INS). The integration with the lidar requires the additional synchronization in space, which relies on a robust synchronization of timing and pointing by the respective GPS/INS of the spectrometer and the lidar. Unique to the ASO processing is the per-survey update of the digital elevation model from which sunlight is reflected given the changes in snow slope, aspect, and depth.

The ASO processing chain is designed to deliver high-accuracy products within 72 hours of survey in order to meet snowmelt runoff forecasting and water management needs.

Snowpack Modeling

ASO with its subcontractor M3Works will conduct real-time simulation of snowpack evolution using the iSnobal energy-balance snow physics model. This system, constrained by ASO snow depth measurements, provides snow density values at 50-meter resolution, used for calculating SWE. The continuous snowpack tracking enables regular reporting on SWE and other snowpack conditions (e.g., cold content, melt volume, etc.) between and after ASO flights. SWE and albedo

values then will be assimilated in the WRF-Hydro model to produce seasonal ensemble snowpack, streamflow and unregulated reservoir predictions.

WRF-Hydro Runoff Forecasts

ASO with subcontractor National Center for Atmospheric Research (NCAR) will deploy the WRF-Hydro hydrology model in the project domain. Using existing, demonstrated, and operationally hardened capabilities, the ASO data products will be assimilated in the WRF-Hydro system to produce ensemble-based snowpack and snowmelt runoff forecasts.

Additionally, ASO and the Applicants will continue the work initiated in neighboring states with agency staff at the NRCS Snow Survey and CBRFC to explore integration of ASO data with their forecast systems.

Reports and Deliverables

- Survey report (PDF)
- ASCII total basin report
- ASCII elevation stratification report
- Delivery of Provider products for iSnobal and coordination of model outputs and reports with M3Works
- Delivery of Provider products for WRF-Hydro and coordination of model outputs and reports with NCAR

Data Products

- Snow depth maps (3 m, geotiff format)
- Snow water equivalent maps (50 m, geotiff format)
- Snow albedo maps (50 m, geotiff format)

Delivery of ASO Inc. Deliverables and Data Products

ASO team will provide the above products to The Authority and other stakeholders within 72 hours and maintain them on a cloud-enabled database, accessible via the ASO data portal (data.airbornesnowobservatories.com). iSnobal assimilation update reports will be provided within 2 days of ASO product delivery, and model state reports will be provided bi-weekly following the initial flight through the end of snowmelt season. WRF-Hydro runoff forecasts will be generated within 3 days of ASO product delivery and forecast updates will be provided bi-weekly to monthly following the initial flight through the end of the water year, with forecast timing determined in collaboration with The Authority and other stakeholders.

4 Pricing

Below we present the discussed ASO Inc. pricing scenario for the Uintah Mountain Headwaters for WY2024, WY2025, and WY2026. The area to be flown is 1935 km².

ASO Inc. scenario presented below consists of:

- One (1) snow-free survey in WY2024
- Three (3) snow-on surveys each year WY2024-WY2026
- iSnobal modeling

- WRF-Hydro streamflow forecasting

The Authority will contribute \$650,000 (Authority Fee Ceiling) towards the completion of the overall project. The remainder of the project costs (\$1,349,999.00 - see the overall project budget in Table 1 below) will be covered by the SNOWFO grant from the Bureau of Reclamation (pending grant approval) and other funding partners.

Table 1 Summary of funding sources

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1. Colorado River Authority of Utah	\$ 650,000.00
2. Utah Division of Water Resources	\$ 100,000.00
3. Central Utah Water Conservancy District	\$ 250,000.00
Non-Federal Subtotal	\$1,000,000.00
REQUESTED RECLAMATION FUNDING	\$ 999,999.00

ASO Inc. pricing is based on base costs and variable costs. In no event shall the Authority’s obligation exceed the Authority Fee Ceiling.

Base costs cover *product region preparation, aircraft mobilization & demobilization, calibration flights and processing, and first survey + processing.*

Variable costs are dependent on the survey area, number of surveys, and number of months across which surveys occur. These costs are specific to *monthly deployment and standby, flying, processing, and modeling.*

The pricing components for WY2024, WY2025, and WY2026 are shown in 2 – Table 4, respectively.

Hence, the not-to-exceed costs for the snow-free survey (Table 5) and the snow-on surveys each year (Table 6 – Table 8) are based on the area of the Uintah Mountain Headwaters (1935 km²) and the number of surveys and number of months.

Table 2 ASO Inc. costing components for Water Year 2024.

Data storage, distribution, maintenance per km	\$1.74
Flying price per km ² per acquisition	\$40.38
Processing price per km ² per acq	\$7.16
Aircraft period cost per month per basin	\$13,025.36
Product and region prep	\$13,025.36
Aircraft mob/demob	\$39,076.08
Calibration flight/processing	\$13,025.36

Table 3 ASO Inc. costing components for Water Year 2025.

Data storage, distribution, maintenance per km	\$1.83
Flying price per km ² per acquisition	\$42.40
Processing price per km ² per acq	\$7.52
Aircraft period cost per month per basin	\$13,676.63
Product and region prep	\$13,676.63
Aircraft mob/demob	\$41,029.88
Calibration flight/processing	\$13,676.63

Table 4 ASO Inc. costing components for Water Year 2026.

Data storage, distribution, maintenance per km	\$1.92
Flying price per km ² per acquisition	\$44.52
Processing price per km ² per acq	\$7.90
Aircraft period cost per month per basin	\$14,360.46
Product and region prep	\$14,360.46
Aircraft mob/demob	\$43,081.37
Calibration flight/processing	\$14,360.46

Table 5 ASO Inc. pricing a snow-free survey of the Uintah Mountain Headwaters (1532 km²).


Airborne Snow Observatories, Inc.		Area (km²)	1935
Components			Cost
Product and region prep			\$13,677
Aircraft mob/demob			\$41,030
Calibration flights + processing			\$13,677
Flights + Processing			\$144,083
3DEP snow-free preparation (subject to evaluation)			\$0
		Base Sub	\$212,466
<p>CO River Authority of UT Watersheds</p> 		Total	\$212,466
		Quote generated by JSD, 5/4/2023	

Table 6 ASO Inc. pricing for three snow-on surveys of the Uintah Mountain Headwaters (1532 km²) in WY2024 plus full-season iSnoval modeling and WRF-Hydro streamflow forecasting.

Airborne Snow Observatories, Inc. Cost Estimate				
CO River Authority of UT Watersheds				
Water Year 2024 Snow-on Surveys				
Area (km ²): 1935		Basins: 1		
Surveys: 3		Months: 3		
Baseline + First Survey				Cost
Product + region prep				\$13,025.36
Aircraft mobilization / demobilization				\$39,076.08
Calibration				\$13,025.36
1st month deployment + standby fee				\$13,025.36
1st survey flying				\$78,135.30
1st survey processing				\$13,854.60
1st survey data storage, distribution, maintenance				\$3,366.90
iSnoval modeling (full season)				\$59,923.05
WRF-Hydro modeling (full season)				\$85,000.00
				=
Baseline + First Survey Subtotal				\$318,432.01
Subsequent Surveys				
	Months or Acquisitions	Area	Unit Price	Cost
Monthly deployment cost + standby fee	2	N/A	\$13,025.36	\$26,050.72
Flying price (survey #2)	2	1935	\$40.38	\$156,270.60
Processing price (survey #2)	2	1935	\$7.16	\$27,709.20
Data storage price (survey #2)	2	1935	\$1.74	\$6,733.80
				=
Subsequent Surveys Subtotal				\$216,764.32
Total				\$535,196.33

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Table 7 ASO Inc. pricing for three snow-on surveys of the Uintah Mountain Headwaters (1532 km²) in WY2025 plus full-season iSnoval modeling and WRF-Hydro streamflow forecasting.

Airborne Snow Observatories, Inc. Cost Estimate				
CO River Authority of UT Watersheds				
Water Year 2025 Snow-on Surveys				
Area (km ²): 1935		Basins: 1		
Surveys: 3		Months: 3		
Baseline + First Survey				Cost
Product + region prep				\$13,676.63
Aircraft mobilization / demobilization				\$41,029.88
Calibration				\$13,676.63
1st month deployment + standby fee				\$13,676.63
1st survey flying				\$82,044.00
1st survey processing				\$14,551.20
1st survey data storage, distribution, maintenance				\$3,541.05
iSnoval modeling (full season)				\$62,919.20
WRF-Hydro modeling (full season)				\$85,000.00
				=
Baseline + First Survey Subtotal				\$330,115.22
Subsequent Surveys				
	Months or Acquisitions	Area	Unit Price	Cost
Monthly deployment cost + standby fee	2	N/A	\$13,676.63	\$27,353.26
Flying price (survey #2)	2	1935	\$42.40	\$164,088.00
Processing price (survey #2)	2	1935	\$7.52	\$29,102.40
Data storage price (survey #2)	2	1935	\$1.83	\$7,082.10
				=
Subsequent Surveys Subtotal				\$227,625.76
Total				\$557,740.98

Quote generated by JSD, 5/4/2023

Table 8 ASO Inc. pricing for three snow-on surveys of the Uintah Mountain Headwaters (1532 km²) in WY2026 plus full-season iSnobal modeling and WRF-Hydro streamflow forecasting.


Airborne Snow Observatories, Inc. Cost Estimate				
CO River Authority of UT Watersheds				
Water Year 2026 Snow-on Surveys				
		Area (km²): 1935 Basins: 1 Surveys: 3 Months: 3		
				
Baseline + First Survey				Cost
Product + region prep				\$14,360.46
Aircraft mobilization / demobilization				\$43,081.37
Calibration				\$14,360.46
1st month deployment + standby fee				\$14,360.46
1st survey flying				\$86,146.20
1st survey processing				\$15,286.50
1st survey data storage, distribution, maintenance				\$3,715.20
iSnobal modeling (full season)				\$66,065.16
WRF-Hydro modeling (full season)				\$85,000.00
				=
				Baseline + First Survey Subtotal
				\$342,375.81
<hr/>				
Subsequent Surveys				
	Months or Acquisitions	Area	Unit Price	Cost
Monthly deployment cost + standby fee	2	N/A	\$14,360.46	\$28,720.92
Flying price (survey #2)	2	1935	\$44.52	\$172,292.40
Processing price (survey #2)	2	1935	\$7.90	\$30,573.00
Data storage price (survey #2)	2	1935	\$1.92	\$7,430.40
				=
				Subsequent Surveys Subtotal
				\$239,016.72
				=
				Total
				\$581,392.53
Quote generated by JSD, 5/4/2023				

EXHIBIT B
Insurance Requirements

a. Workers' Compensation and Employer's Liability Insurance.

- (1) ASO shall take out and maintain during the life of the Agreement, all legally required Workers' Compensation and Employer's Liability Insurance for all its employees in the state(s) where work or services are to be performed. Employer's Liability Insurance with coverage limits of at least \$1,000,000 for each accident, \$1,000,000 for each employee for injury by disease, and \$1,000,000 aggregate for injury by disease; or with coverage limits of \$500,000 for each accident, \$500,000 for each employee for injury by disease, and \$500,000 aggregate for injury by disease and an excess/umbrella policy that covers employer's liability insurance claims;
- (2) ASO shall require all Subcontractors to provide ASO with evidence of all legally required Workers' Compensation and Employer's Liability Insurance.
- (3) Coverage shall include a waiver of subrogation endorsement in favor of the Authority, its respective Directors, officers, employees, and agents.

b. Public Liability Insurance.

- (1) ASO shall take out and maintain during the life of this Contract Commercial Automobile Insurance, General Liability Insurance (Occurrence Form), Pollution Liability Insurance and Aircraft Coverages that provide protection for claims which may arise out of or result from operations or performance under this Agreement, whether such operations or performance be by ASO or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.
- (2) The amount of insurance shall be not less than the following:

General Liability:

\$1,000,000.00 each occurrence,

\$2,000,000.00 annual aggregate.

\$2,000,000.00 products/completed operations aggregate.

Commercial Auto:

\$1,000,000 Combined Single Limit

Pollution Liability Insurance:

\$1,000,000 per occurrence, \$2,000,000 aggregate

Aircraft Coverages:

When necessary to use aircraft for the performance of ASO's work or services under the terms of this Agreement, either by ASO or by any subcontractor, ASO or Subcontractor operating the aircraft shall carry aircraft liability insurance in the amount of \$5,000,000 Combined Single Limit for bodily injury and property damage, including Passenger Liability.

- (3) Coverage must include the following provisions and must be indicated on the certificate and by endorsement to the policy for each applicable policy:
 - (a) The Authority, its respective Directors, officers, employees, and agents are named as Additional Insureds in the policy with respect to the Agreement;
 - (b) **Contract No.** [REDACTED] must be referenced on the COI.
 - (c) The coverage is PRIMARY, and no other insurance carried by the Authority or Utah State self-insurance will be called upon to contribute to a loss under this coverage;
 - (d) The policy covers use of Hired and Non-owned Autos;
 - (e) Non-owned aircraft liability with a limit not less than \$5,000,000.00 per occurrence;
 - (f) The coverage shall not be canceled nor materially altered unless thirty (30) Days written notice is given to the Authority;
 - (g) "Cross Liability" or "Severability of Interest" clause.
 - (h) An insurer's waiver of subrogation in favor of all insureds and additional insureds under the policies of insurance provided.
 - (i) ASO shall require all Subcontractors to provide ASO with evidence of all coverages required above.
- (4) Professional Liability (Errors and Omissions) insurance with a limit of not less than \$2,000,000.00 per occurrence.