



# San Bernardino Valley Water Conservation District

Helping Nature Store Our Water

## OPERATIONS COMMITTEE AGENDA

**Tuesday, November 5, 2024 – 9:00 a.m.**

**Location** – 1630 W. Redlands Blvd., Ste. A, Redlands, CA 92373

Any member of the public wishing to listen to or participate in the meeting can join via Zoom:

**Call in (669) 900-6833, Meeting ID: 858 9266 1134**

To join the Zoom meeting on <https://us02web.zoom.us/j/85892661134>

While the District makes every attempt to follow all guidance re COVID-19 safety protocols, the District cannot assure in-person attendees that they will not be exposed to COVID-19 or persons who have been so exposed, and attendees are advised to exercise caution in limiting their own incidences of exposure, particularly those who may be in groups at higher risk of infection, or serious symptoms of COVID-19 if infected.

Note: Copies of staff reports and other documents relating to the items on this agenda are on file at the District office and are available for public review during normal District business hours. New information relating to agenda topics listed, received, or generated by the District after the posting of this agenda, but before the meeting, will be made available upon request at the District office and in the Agenda Package on the District's website. It is the intention of the San Bernardino Valley Water Conservation District to comply with the Americans with Disabilities Act (ADA) in all respects. If you need special assistance with respect to the agenda or other written materials forwarded to the members of the Board for consideration at the public meeting, or if as a participant at this meeting you will need special assistance, the District will attempt to accommodate you in every reasonable manner. Please contact Athena Laroche at (909) 793-2503 at least 48 hours prior to the meeting to inform her of your particular needs and to determine if accommodation is feasible. Please advise us at that time if you will need accommodations to attend or participate in meetings on a regular basis.

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### CALL TO ORDER

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#### 1. PUBLIC PARTICIPATION

*Members of the public may address the Board of Directors on any item that is within the jurisdiction of the Board; however, no action may be taken on any item not appearing on the agenda unless the action is otherwise authorized by Subdivision (b) Section 54954.2 of the Government Code.*

#### 2. ADDITIONS/DELETIONS TO AGENDA

*Section 54954.2 provides that a legislative body may take action on items of business not appearing on the posted agenda under the following conditions: (1) an emergency situation exists, as defined in Section 54956.5; (2) a need to take immediate action and the need for action came to the attention of the District subsequent to the agenda being posted; and (3) the item was posted for a prior meeting occurring not more than five calendar days prior to the date action is taken on the item, and at the prior meeting the item was continued to the meeting at which action is being taken.*

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#### BOARD OF DIRECTORS

Division 1:  
Richard Corneille  
Division 2:  
Hillary Jenkins

Division 3:  
Robert Stewart

Division 4:  
John Longville

Division 5:  
Melody McDonald

#### GENERAL MANAGER

Betsy Miller

3. APPROVAL OF MEETING MINUTES FROM AUGUST 6, 2024
4. APPROVAL OF SPECIAL MEETING MINUTES FROM AUGUST 28, 2024
5. FIELD OPERATIONS UPDATE PRESENTATION
6. MENTONE SHOP IMPROVEMENTS CONSTRUCTION VERBAL UPDATE
7. ENHANCED RECHARGE CONSTRUCTION VERBAL UPDATE
8. DRAFT PROGRAM FOR EXPANSION OF RECHARGE CAPACITY (PERC)  
POLICY COMMITTEE STATUS REPORT NO. 20
9. RESULTS FROM STAFF WORKSHOP ON PERC FEASIBILITY STUDY MULTI-  
OBJECTIVE ALTERNATIVES ANALYSIS
10. FINAL FACILITIES MAINTENANCE PLAN FOR THE MILL CREEK  
GROUNDWATER RECHARGE FACILITY
11. GROUNDWATER MODEL CALIBRATION FUNDING
12. REDLANDS PLAZA ZONING
13. GENERAL MANAGER UPDATES
14. NEXT QUARTERLY MEETINGS
15. ADJOURN MEETING

**Committee Members:**  
Richard Corneille, Chair  
Robert Stewart

**Alternate:**  
Melody McDonald

**SAN BERNARDINO VALLEY WATER CONSERVATION DISTRICT**  
**MINUTES OF THE OPERATIONS COMMITTEE MEETING**  
**AUGUST 6, 2024**  
**9:00 A.M.**

Chairman Corneille called the Operations Committee meeting to order at 9:00 A.M. The meeting was held as a hybrid meeting with in-person and Zoom/teleconference attendance.

**OPERATIONS COMMITTEE MEMBERS PRESENT:**

Richard Corneille, Chair  
Robert Stewart

**STAFF PRESENT:**

Betsy Miller, General Manager  
David Cosgrove, General Counsel  
John Lambie, Consulting Chief Engineer and Hydrogeologist  
Laura Torres, Assistant Engineer

**OTHERS PRESENT:**

None

1. PUBLIC PARTICIPATION

There was no public participation.

2. ADDITIONS/DELETIONS TO AGENDA

There were none.

3. APPROVAL OF MEETING MINUTES FROM MAY 21, 2024

**It was moved by Vice President Stewart and seconded by Director Corneille to approve the meeting minutes from May 21, 2024, as presented. The motion carried 2-0, with all directors present voting in the affirmative.**

**Vice President Stewart: Yes**

**Director Corneille: Yes**

4. FIELD OPERATIONS UPDATE PRESENTATION

Mr. Colunga presented the Field Operations Update, noting that water flows in the Santa Ana River and Mill Creek remain higher than usual for August, with the exception of limited SAR flows during maintenance work on Seven Oaks Dam. He shared that Tommy Purvis developed a new locking tool for the Mill Creek intake gates which will limit vandalism to our facilities, and that Mike Guizar earned his drone pilot certification which allows the District to increase the safety and efficiency of our site patrols and natural resource monitoring activities. loader with rock teeth has increased efficiency for cleaning recharge ponds. The team has also been using the District's equipment to repair erosion damage to roads

near the SAR basins. The field team also initiated vegetation clearing near property lines at the **Mendoza Property, and scheduled additional work in this area by CalFire. In addition, the team delivered** fill material to the Mentone Shop construction site to support installation of the septic system. Finally, the field team coordinated with BLM staff to complete a site assessment of a 64-acre fire that occurred in the riverbed.

- Water persists in the CEMEX pit, observed cascading down the east bank, likely due to pumping near Highway 210.

Ms. Miller and Ms. Torres presented a preliminary draft of the Mill Creek facility maintenance plan, which includes criteria for maintenance prioritization and a map of prioritized maintenance at Mill Creek. The plan, which is based on field assessments and discussions between our field team, engineers, and natural resource staff, categorizes maintenance strategies based on wet and dry year scenarios, focusing on safety, recharge efficiency, and a balance between staff-led and contractor tasks to ensure the highest value per dollar spent. Staff plans to prepare a similar document for the Santa Ana basins following completion and initial operation of the Enhanced Recharge project. Director Corneille requested clarification on the overlap in 3-year and 5-year maintenance needs. Ms. Torres discussed the way the draft document shows annual tasks, 3-year tasks, and 5-year tasks

The Board reviewed a proposed plan to license material processing at Mill Creek with Upland Rock, including requirements to minimize environmental and traffic impacts.

#### 5. MENTONE SHOP CONSTRUCTION VERBAL UPDATE

Ms. Miller reported that the contractor has vacated the Mentone Shop site last week. The District is assessing next steps, including a review of bonds and documentation of all communications with the contractor and subcontractors and retention of special counsel. The Board discussed the status of the contractor's cessation of work. Director Stewart inquired about the potential for corrective action. Mr. Cosgrove explained that the contract includes a 48-hour default notice option, which may be exercised pending the contractor's response. Discussion ensued regarding the effect of disputes on a project's timeline and cost. Mr. Cosgrove noted that the primary objective is to complete the project as quickly and affordably as possible within the current constraints.

#### 6. ENHANCED RECHARGE VERBAL UPDATE

Ms. Torres presented an update on construction of the Enhanced Recharge basins, detailing the facilities currently receiving water and ongoing construction activities. She explained that specific basins are temporarily dry to facilitate construction tasks such as rebar installation, backfilling, and compacting. Individual basins in various stages of completion, with some undergoing rough grading while others undergo final adjustments.

Director Stewart asked about data collection for groundwater recharge and recent groundwater mounding. Ms. Torres described the weekly well readings that are taken by District staff, and shared that these data are provided Valley District to support calibration of the groundwater model for improved predictive power moving forward. Director Stewart asked if additional wells may be needed, with Ms. Miller confirming that the ten monitoring wells managed by the District along with USGS well data appears to be sufficient for the District's needs at this time.

Mr. Lambie noted that the Conservation District and Valley District are both interested in calibrating the San Bernardino Basin regional model. We expect Valley District to issue an RFP for this work later in 2024.

The Committee discussed the increased capacity for recharge resulting from construction of the new Enhanced Recharge basins. Mr. Lambie noted that the canal was engineered for 500 cfs, dependent on volume and duration. Ms. Miller stated that the new basins were designed to accept this flow for approximately three months. Discussion on recharge of additional flows that may be available following the Forecast-Informed Reservoir Operations (FIRO) process ensued.

7. PROGRAM FOR EXPANSION OF RECHARGE CAPACITY (PERC) POLICY COMMITTEE STATUS REPORT NO. 19

Mr. Lambie provided an update on recent PERC expenditures, noting that spending has been modest through late spring and early summer. He reviewed progress at the Mill Creek basins: Following discussions with Valley District, the District's grading alternative is now defined to allow an inflow of 162 cfs from the new diversion and 13 cfs from the Redlands Aqueduct. A maintenance flow sequence plan is being developed to ensure capacity is maintained while accommodating 175 cfs total inflow. Mr. Lambie stated that work to define the second and third grading alternatives is on-going with significant input from land resources, operations, and engineering teams.

Mr. Lambie reviewed timelines for Plunge Creek, Oak Creek, and Waterman projects, with hydrology modeling on track for completion. An October meeting with Flood and Valley District is planned to ensure continued alignment on project updates. Mr. Lambie stated that the Plunge and Oak Creek hydrology work is progressing quickly and is expected to conclude by mid-August. He summarized recent interactions with the Flood District and Valley District on the Joint Groundwater Recharge and Facilities Planning Agreement, noting collaborative progress on alternative grading and hydraulic modeling, particularly around Waterman and Twin Creek facilities. A new grading alternative for Waterman is now entering the hydraulic modeling phase. At Twin Creek, draft berm design has been altered to address sediment and water retention and incorporating broad-crested weirs to prevent erosion and preserve recharge capacity. Valley District also suggested elongating the Twin Creek flow path within the spreading grounds; this concept is under review given the site's high flow variability.

Director Corneille and Mr. Lambie discussed broad-crested weir designs for Twin Creek, with Director Corneille requesting information on the ability of these facilities to control overflow. Mr. Lambie noting that the design under consideration is expected to prevent erosion and manage flow loads of up to 4,000 cfs. Hydraulic modeling will be used to further assess the feasibility of the design. On the Lynwood Basin project, Mr. Lambie explained that the reduced-scale approach will rely on existing infrastructure to divert Twin Creek post-storm flows, enhancing recharge without major earthwork. Hydraulic modeling for this operational alternative will proceed accordingly.

Finally, Mr. Lambie presented an updated project schedule and cost projections for each contract and preliminary cost projections for each project, highlighting Tetra Tech's contract status. Options to stay within budget on the Tetra Tech contract include scope adjustments or additional authorization of funds. Director Stewart raised concerns about available resources for concurrent feasibility studies and cost-benefit analyses. Mr. Lambie discussed development of a decision matrix for evaluating and prioritizing the PERC projects, focusing on technical, cost, environmental, social, and legal factors. Within these

factors, proposed criteria could include recharge capacity, project timing, environmental impact, public safety, and regulatory compliance. The board agreed to refine these metrics to prioritize the most impactful factors for upcoming evaluations.

## 8. HIGH GROUNDWATER LEVELS

Ms. Miller introduced the topic of high groundwater levels, noting previous Board discussion and requests for information. She stated that Mr. Lambie would present an analysis of well level monitoring data for further discussion.

Mr. Lambie reported his extensive review of groundwater data from the District's ten wells, spanning from 2010 to the present, as well as relevant U.S. Geological Survey (USGS) readings to examine groundwater patterns and recharge effects over time. The findings highlighted consistent data quality, with adjacent wells indicating similar trends. He pointed out specific instances, such as in October 2019, where elevated water levels likely correlated with recharge operations, as reflected by the sharp groundwater rise during a typically dry season. A visual comparison with natural hydrological data from Plunge Creek, which flows without regulation, showed no corresponding increase, reinforcing the connection between District operations and the observed groundwater spike.

Additionally, Mr. Lambie noted an unusually high groundwater level in December 2017. Despite examining both District and natural flow data, no clear cause for this leve was found, making it an anomaly in the data set. He emphasized that the consistency of Plunge Creek data provides a reliable baseline, indicating natural water flow patterns in the region and serving as a valuable reference for distinguishing operational impacts on groundwater levels.

Mr. Lambie presented findings from data analyzed at a USGS well, focusing on the second interval at approximately 100 feet depth, one of six monitored vertical layers in the aquifer. He noted a clear correlation between recharge operations on the Santa Ana River system and rising shallow groundwater levels.

The data indicated that recharge activities were outpacing the natural groundwater outflow, resulting in gradually increasing water levels. This sustained rise suggests that more water is being introduced into the system than it can naturally disperse, addressing Director Stewart's question on the ultimate capacity of the Santa Ana River wash to absorb recharge.

Mr. Lambie emphasized that the USGS well cluster provided extensive, dependable data, demonstrating typical recharge from surface sources rather than upward flow from deeper aquifer layers—a common characteristic in mountain-front recharge systems. He also noted that operations teams monitor these levels closely and adjust recharge activities accordingly. When groundwater levels in critical wells (e.g., well 11H and well 4) approach thresholds, recharge is shifted to prevent impacts on nearby mining activities whenever possible. This strategic response has proven effective in managing groundwater surcharge near the mining site.

Ms. Miller confirmed that the District's response to rising groundwater levels complies with lease requirements, which involves redistributing recharge when levels approach critical points unless the system is fully saturated. She explained that these efforts focus on mitigating impacts on mining operations rather than limiting recharge. She emphasized the value of reviewing the data and noted the rapid decline

of water levels after peak recharge periods—an observation that highlights the large available storage capacity in the basin. Discussion on groundwater demand ensued. Committee members expressed appreciation for the data compilation

#### 9. WATER FLOWS IN EXCESS OF DIVERSION CAPACITY 2022-2024

Ms. Miller presented the final agenda item, addressing the board's request for data on water loss from the local sub-basin during recent years of high precipitation. She noted that Ms. Torres and Mr. Lambie compiled the information and asked Ms. Torres to explain the findings.

Ms. Torres reviewed data on river recharge levels and the water that bypassed District recharge facilities in water years 2022-2023 and 2023-2024. Due to ongoing construction projects and operational protocols to limit intake of highly turbid flows, certain high flows were not diverted. Director Corneille acknowledged the operational challenges of balancing recharge and release, especially during unique storm events like Tropical Storm Hillary, which caused significant, atypical flows.

Ms. Torres discussed monthly and annual recharge amounts at District facilities and noted that substantial recharge was achieved in both Santa Ana River and Mill Creek basins.

The discussion turned to the broader recharge strategy, where Ms. Miller emphasized the importance of utilizing all available District lands for recharge, including in-river recharge. Discussion on the benefits of FIRO to increase recharge in the future ensued.

Board members concluded by acknowledging the importance of scientific data and ongoing collaboration with federal agencies to support FIRO, though the process remains lengthy due to regulatory requirements.

#### 10. NEXT QUARTERLY MEETINGS

The next quarterly meeting is scheduled for November 5, 2024.

#### 11. ADJOURN

There was no further business, and the meeting adjourned at 11:27 A.M.

**It was moved by Director Corneille and seconded by Vice President Stewart to adjourn. The motion carried 2-0, with all directors present voting in the affirmative.**

**Vice President Stewart: Yes**

**Director Corneille: Yes**

SAN BERNARDINO VALLEY WATER CONSERVATION DISTRICT  
OPERATIONS COMMITTEE MEETING MINUTES  
AUGUST 28, 2024  
9:30 AM

Chairman Corneille called the Operations Committee meeting to order at 9:30 a.m. The meeting was held as a hybrid meeting with Zoom/teleconference attendance.

Operations Committee Members Present

Richard Corneille	San Bernardino Valley WCD
Robert Stewart	San Bernardino Valley MWD

Staff Present

Betsy Miller	San Bernardino Valley WCD
Laura Torres	San Bernardino Valley WCD
John Lambie	San Bernardino Valley WCD
David Cosgrove	San Bernardino Valley WCD
Ashima Thomas	San Bernardino Valley WCD

Others Present

None

MENTONE SHOP VERBAL UPDATE

Mr. Cosgrove reported that the contractor has vacated the Mentone shop site. The team is currently reviewing records related to the performance bond, and is developing strategies for next steps.

TETRA TECH PERC PROJECT UPDATE

Mr. Lambie provided an update on the Tetra Tech PERC project, noting delays to the schedule to date. Staff has reviewed alternatives, including a request for additional funding to complete the full scope of work or reduction in the scope such as removal of sediment transport modeling. Staff recommended additional funding to complete the scope to allow for comparison across all PERC alternatives and sites, and requested feedback from the Committee prior to presenting this item to the PERC Policy Committee and District Board.

**It was moved by Director Corneille and seconded by Director Stewart to recommend the request for additional funding for the Tetra Tech PERC contract to the PERC Policy Council and the Board. The motion carried.**

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:15 a.m.

**It was moved by Director Corneille and seconded by Director Stewart to adjourn. The motion carried.**



# San Bernardino Valley Water Conservation District

Helping Nature Store Our Water

**REVIEW DRAFT for November 5, 2024**

PERC Status Report No .20

To: PERC Policy Committee

From: John Lambie, P.E., C.E.G., Consulting Chief Engineer and Groundwater Hydrologist

Date: November 20, 2024

Subject: PERC Project Status Report

## **BACKGROUND**

The boards of the San Bernardino Valley Water Conservation District (Conservation District) and San Bernardino Valley Municipal Water District (Valley District) have agreed to draw from the best of both districts to promote a brighter future for groundwater storage and protection of threatened species in the region. This collaborative effort has been realized through the execution of the Partnership Agreement for Active Recharge Project Development under the Upper Santa Ana River Habitat Conservation Plan (Agreement).

The Agreement includes the requirement for the formation of a Partnership Agreement Policy Committee to review and advise the Conservation District staff on a number of items covered in the Agreement. The committee is to meet quarterly throughout the duration of the development of Active Recharge Transfer Projects. Major items of work in the partnership include:

- The Conservation District will provide up to 295 acres of conservation easements to the San Bernardino Valley Conservation Trust, to help offset the environmental impacts of active recharge projects being undertaken to enhance groundwater recharge and storage.
- Valley District will provide funding to the Conservation District to plan and construct recharge projects for each acre of land covered by a conservation easement.
- Valley District will fund a permanent endowment with the Conservation Trust to support the management of habitat mitigation land.
- Valley District will transfer to the Conservation District the implementation, management, and eventual ownership of the following tentative list of proposed Active Recharge Projects:
  1. Mill Creek Basins (expansion, construction, and operations)
  2. Plunge Creek Basins 1 (construction and operations)
  3. Plunge Creek Basins 2 (construction and operations)
  4. City Creek Basins (construction and operations)
  5. Waterman Percolation Basins (reconstruction and maintenance)
  6. East Twin Creek Basin (repairs and maintenance)

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### **BOARD OF DIRECTORS**

Division 1:  
Richard Corneille

Division 2:  
Dr. Hillary Jenkins

Division 3:  
Robert Stewart

Division 4:  
John Longville

Division 5:  
Melody McDonald

### **GENERAL MANAGER**

Betsy Miller

- The Conservation District will develop plans, specifications, estimates and bid packages (Construction Package) on planned projects and submit them to the Committee for review and concurrence.
- Valley District will draft, and process all required permits and any items of work required under NEPA or CEQA including Water Rights.

This status report is a summary of work completed to date on these major items and provides a look ahead at the planned work in the upcoming quarter.

**PROGRAM UPDATE**

Conservation Easement (CE) Payment Obligation

The agreement requires payment of 50% of the funds for the CE at completion of the Due Diligence which was paid on June 20, 2019. The remainder was paid on January 13, 2022, for a total of \$36,875,000.

Conservation Easement Usage Status (295 Acres initially set aside)

Covered Activity (project)	Implementing Agency	Easement Area required (ac)	Easement recordation date	Remaining Available Acreage
				295

Program Management

The following items of work have been performed:

1. A Program Management Plan to guide the long-term implementation of the program was developed and is being adhered to.
2. A planning level Memo of Understanding (MOU) was developed and adopted by SBVWCD and SBCFCD. Meetings have been held as necessary to keep the coordination and approval processes moving forward. A resolution was passed by the County Board of Supervisors to support the coordination.
3. Request for Qualifications (RFQ) process was undertaken to develop a list of qualified consultants. process resulted in a summary matrix of the fourteen consulting firms based on category and type of work for which they are qualified.
4. Requests for Proposals (RFPs) were issued for three (3) different project groupings to address eight (8) potential project locations. Three contracts were awarded.
  - i. Tetra Tech was awarded a Feasibility Study Support Services contract for the project facilities owned and operated by San Bernardino County Flood Control District (SBCFCD) Waterman Percolation Basins and Twin Creek Spreading Grounds, along with the addition of SBCFCD’s Lynwood Basins. Contract is in the amount of

\$1,530,615. Contract expenditures through August 2024 were \$1,108,627 or 72% of authorized. A contract amendment for Tetra Tech in the amount of \$148,500 was approved by the Conservation District Board of Directors on September 11, 2024 to address the increased costs of project management, hydraulic modeling and added grading evaluations at the 3 SBCFCD facilities following review by the PERC Policy Committee on September 3, 2024.

- ii. Q3 was awarded a Feasibility Study Support Services contract for Mill Creek, City Creek, Bledsoe Creek, and Cook Creek with the inclusion of engineering design services up to 65% design on the best alternative for a total contact amount of \$2,190,644. City Creek diversion improvements were removed from the contracted scope of services. The contract includes preliminary engineering for all three sites. Contract expenditures through September 2024 were \$768,973 or 35.1% of authorized.
- iii. CASC Engineering was awarded the Feasibility Study Support Services contract for the Plunge Creek and Oak Creek in the amount of \$786,880. A contract amendment to perform an additional scope of work for statistical analysis of historic hydrology was executed in July 2024, for \$46,300 for a total authorized budget then of \$833,980. Contract expenditures through September 30, 2024, were \$447,272 or 53.6% of authorized.

Active Recharge Transfer Projects (as listed in the Agreement) PS&E Status						
Project Name	Project Priority	Current Plan Phase	CEQA Status	Required Agreements / Permits w/ status	Construction Target date	Recent Activity
Mill Creek Basins	1	Best Alternative Identification	Not started	ACOE – Not started SBCFCD – Not Started	FY25/26	<p>Hydraulic modeling for the 3 project alternatives is active. Flow rates were established at a peak flow for native water out of Mill Creek (162 cfs) and Santa Ana River (SAR) water (13cfs) under current configurations. Four scenarios of flow routing were evaluated under Alternative 1 to assess basin maintenance opportunities. Alternative 2 defined basins that would benefit from enlargement and augmented the basin layout to control and direct flows spilling from the SW corner of the Spreading Grounds back into the basins north of there. Alternative 3 modeling is being initiated to route flow through 4 large new basins situated west of current Basin 11 on what would be the west side of the new South Boundary Canal feature that is common to all 3 project alternatives.</p> <p>Two additional project hydrologies are under development to test on each of the three project alternatives: (1) the project typical hydrograph of Mill Creek water, and (2) a FIRO based hydrograph of 85 cfs of SAR water delivery combined with a diversion rate of Mill Creek native water. These hydrologies are under development by the Conservation District and Q3 and will be utilized after the maximum design flow of 175 cfs.</p>

Active Recharge Transfer Projects (as listed in the Agreement) PS&E Status						
Project Name	Project Priority	Current Plan Phase	CEQA Status	Required Agreements / Permits w/ status	Constructi on Target date	Recent Activity
Plunge Creek Basin 1 &2 (now Plunge Creek Quarry Basins)	3	Preliminary Design	Not started	RRM – Initiated Concept Level Discussion SBCFCD – Initiated through Q100 Study	Not determined	<p>The project hydrologic sizing analysis for average annual yield was completed October 8, 2024. The “project” hydrograph of a median flow event was identified from among the real data hydrographs. Numerical modeling in 1D for the hydraulic routing initiated in late October.</p> <p>The sediment transport analysis has been completed and is under review by District staff.</p>

<p>Waterman Percolation Basins</p>	<p>3</p>	<p>Operational Alternative and Grading Alternative Designs – Hydraulic Testing</p>	<p>Not started</p>	<p>SBCFCD - Initiated through MOU</p>	<p>Not determined</p>	<p>Meeting held with Flood District and Valley District staff on September 11, 2024, of the Joint Implementation Committee called for in the “Joint Groundwater Recharge and Facilities Planning Agreement” between those two agencies. This Committee meeting addressed specific project alternatives as draft figures to identify fatal flaws. Two alternatives have been developed, an operational alternative of Existing Conditions and a grading alternative. The grading alternative at Waterman Basins was presented in both words and images of its key features to keep the Joint Implementation Committee informed and to gather feedback on any design inconsistencies.</p> <p>Three project hydrographs have been identified for testing over each alternative: the project design 24-hour storm hydrographs, a 6-day balanced hydrograph of a storm size with volume greater than the retention capacity of the alternative(s), a flat hydrograph of FIRO directed water at 78 cfs consistent with existing infrastructure.</p> <p>Geotechnical data on potential infiltration rates was reviewed along with Valley District data on Waterman Percolation Basins water deliveries to establish a project design maximum percolation rate and a basin clogged condition percolation rate.</p> <p>Hydraulic modeling has begun with the design storm and the balanced hydrograph for both the operational conditions alternative for gate settings and the revised grading alternative and diversion developed by Conservation District staff and consultant Tetra Tech.</p>
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Active Recharge Transfer Projects (as listed in the Agreement) PS&E Status						
Project Name	Project Priority	Current Plan Phase	CEQA Status	Required Agreements / Permits w/ status	Construction Target date	Recent Activity
Twin Creek Spreading Grounds	2	Operational Alternative and Two Grading Alternative Designs – Hydraulic Testing	Not started	SBCFCD – Initiated through MOU	Not determined	<p>Two grading alternatives were presented to the Joint Implementation Committee on Sept. 11 prior to hydraulic modeling to seek comment for fatal flaws. See Waterman Percolation Basins for comment elements of collaborative project-partner meetings, hydrologic modeling, and infiltration testing.</p> <p>Two grading alternatives have been developed: 1) Revised existing berms on northern sediment and water Holds 1 and 2 to maintain flood stage at “existing conditions”, and 2) Revised berm concepts for sediment management to use broad crested concrete weirs perpendicular to flow of the creek at shallow depths. An operational alternative of Existing Conditions is also being modeled.</p> <p>Three project hydrographs have been identified for testing over each alternative: the project design 24-hour storm hydrographs, a 6-day balanced hydrograph of a storm size with volume greater than the retention capacity of the alternative(s), Waterman model output of water from a flat hydrograph of FIRO directed water at 78 cfs will be influent to Twin Creek Spreading Grounds.</p>

Additional Active Recharge Transfer Projects (not listed in the ARTP Agreement) Status						
Project Name	Project Priority	Current Plan Phase	CEQA Status	Required Agreements / Permits w/ status	Construction Target date	Recent Activity
Lynwood Basins	1	Hydraulic Modeling of Project Hydrology	Not started	SBCFCD – Initiated through MOU	FY 2025/2026	<p>An operational alternative for non-storm event runoff to be directed to Lynwood Basins using existing interties to Twin Creek Spreading Grounds was developed and reviewed with the Joint Implementation Committee. Alternative would utilize actuated gates and electronic controls on the interties.</p> <p>Two hydrologies for testing: (1) residual runoff from Twin Creek 24-hour storm hydrograph and (2) Waterman model output of water from a flat hydrograph of FIRO directed water at 78 cfs will be influent to Twin Creek Spreading Grounds and directed into Lynwood Basins via a gate on the intertie between the two. Tetra Tech initiated hydraulic modeling in late October.</p>
Oak Creek Basins	1	Preliminary Design	Not started	SBVMWD– Initiated SBCFCD – Initiated through MOU	FY 25/26	<p>See Plunge Creek Basin 1 &amp; 2 for update to hydrologic analysis of a project hydrology for sizing.</p> <p>Oak Creek Basin grading was revised in October to avoid jurisdictional dam status for the depth of water and size of hold.</p> <p>Numerical modeling in 1D for hydraulic routing initiated in late October.</p>

Other recent activity included an update to the Active Recharge East forum of stakeholders on October 29, 2024, of much of the same material to be presented at the PERC Policy Committee meeting on November 20, 2024.

<b>Planned Work for Next Quarter</b>	
<b>Project</b>	<b>Planned Activity</b>
Mill Creek Diversion	<p>Complete design hydraulic modeling on Alternatives 1, 2, and 3.</p> <p>Model to account for gradually clogging basins.</p> <p>Work with the consulting team on volume takeoffs for each of three grading alternatives.</p> <p>Generate information with the consulting team at Q3 for project prioritization.</p> <p>Initiate preparation of Feasibility Study Report</p>
Plunge Creek Quarry Basins	<p>Develop diversion sizing for Plunge Creek Basin concept(s), complete project hydraulic modeling</p> <p>Meet with SBCFCD on project concepts. Meet with City of Highland and discuss both Plunge and Oak Creek Project sites.</p> <p>Generate information with the consulting team at CASC for project prioritization</p> <p>Initiate Feasibility Study report</p>
Oak Creek Basins	<p>Complete sediment transport studies (presently in District review).</p> <p>Develop diversion size and basin number and sizing. Perform hydraulics modeling of flow scenarios including basins clean and basins clogged conditions.</p> <p>Generate information with the consulting team at CASC for project prioritization.</p> <p>Plan for preliminary design and feasibility study for potential Small Storage Grant funding in Spring 2025.</p>
Waterman Percolation Basins	<p>Perform hydraulic modeling of the diversion and grading alternative.</p> <p>Prepare quantity takeoffs for earthwork.</p> <p>Generate information with the consulting team at TetraTech for project prioritization.</p> <p>Initiate Feasibility Study report</p> <p>Meet with Joint Implementation Committee</p>

<b>Planned Work for Next Quarter</b>	
<b>Project</b>	<b>Planned Activity</b>
Twin Creek Spreading Grounds	Complete hydraulic modeling of the three project hydrologies over the three project alternatives: two grading and one operational Prepare quantity takeoffs for earthwork Generate information with the consulting team at TetraTech for project prioritization Initiate Feasibility Study report Meet with Joint Implementation Committee
Lynwood Basins	Perform hydraulic modeling of the operational alternative for two hydrologic cases Generate information with the consulting team at TetraTech for project prioritization Initiate Feasibility Study report Meet with Joint Implementation Committee

## PERC Project Prioritization

The review of projects and project alternatives is focused on identifying what are the highest priority projects to implement rather than which, if any, projects should be removed from consideration. Each of the project alternatives can enhance groundwater recharge and thereby the primary goal is that their execution be prioritized rather than projects being eliminated.

Each project alternative considered under PERC is assessed on its ability to utilize native runoff in the upper Santa Ana watershed. Each PERC project alternative is evaluated on the increase in the volume of native water that it could recharge. Each project alternative has value in increasing water supplies and water supply resiliency. Thus, the challenge and the goal here is to prioritize the projects that merit the first efforts to initiate them to increase water supply resiliency.

The critical objective for PERC is to increase the certainty of achieving groundwater recharge. Recharge certainty, which can be referred to as “firm yield”, depends upon two things: a source of native water and the capacity to recharge it. A project alternative with high recharge-capacity and less-reliable sources of water has a lower firm-yield. Similarly, a project alternative with high source water availability but that exceeds the water retention to recharge capacity has a consequential lower firm-yield. Firm yield is the fundamental benefit from a prospective PERC project alternative.

There are additional benefits that can be generated from a PERC project that are considered in the project prioritization. Additional benefits from project alternatives may include habitat improvements for threatened and endangered species or conversely a degree of habitat loss for the same. Other potential project benefits include issues such as salt and nutrient management, or groundwater pollution management. These benefits or issues that would arise from project implementation are considered in the prioritization methodology developed for this phase of PERC projects.

The methodology and particulars of the PERC project prioritization analysis are detailed herein. Considerations for project prioritization include elements such as the availability of funding sources or the opportunity to implement a project quickly and thereby increase recharge capacity sooner. A variation on firm yield is the opportunity cost of water that is not rechargeable due to lack of capacity and results in a loss of that water from the San Bernardino Subbasin. Quickly developing recharge capacity may reduce those opportunity costs of lost water; such a goal in setting out criteria in project prioritization may focus on rate capacity increases via lower yield projects versus prioritizing project with greater firm yield that may take longer to implement. The methodology to project prioritization is developed to take many different project facets such as these, develop project indicators

around them, and unify an objective analysis to common metrics using the subjective weighting of what facets are deemed by the project stakeholders to be the most important.

## Methodology

There is a large body of literature on multiple-objective decision-making in land and water use management (El-Swaify and Yakowitz eds., 1996). The state-of-practice in multi-objective project assessments is to develop a specific decision-support tool that considers the most relevant factors and does that in a defined and objective manner while using the subjective weighting given to the different facets that are a common consideration for each of the project alternatives, for example legal issues to implement or operate it. Such a decision tool is referred to generally as a Multiple-Objectives Decision-Support-System or MODSS. The Conservation District has employed a MODSS that implements a multiple accounts analysis (MAA) methodology, for natural resource projects (Mendoza, G.A. and H. Martins, 2006), to score the PERC project alternatives against specific criteria (a.k.a. Indicators). This will produce a ranking of project alternatives that can be used to prioritize them for implementation efforts.

A decision support tool combines a number of different factors into a common framework that provides a transparent, consistent, and thereby defensible methodology to rank project alternatives by relative priority. The relative value placed by project stakeholders on different characteristics of project alternatives within the decision support tool is always subjective; this begins at the outset with which project aspects are identified and considered important to their valuation. But once these somewhat subjective decisions on what is important and how important are agreed upon, then the MODSS is applied uniformly and objectively to provide a ranking of the project alternative. The relative importance of groups of project characteristics such as costs, is set via a weighting assigned to that group; those groups can be subdivided into component parts such as capital costs and operations & maintenance costs (O&M) with their own subaccount weightings. These weightings can readily be re-assessed based on stakeholder feedback. In addition, the considerations for assessing the project aspects can be revisited but the issues under consideration are best decided early in an MAA tool. Providing a consistent framework for analysis of projects using sometimes subjective and sometimes divergent criteria is one of the principal values of an MAA tool.

The goal in multi-objective decision-making for resource projects is typically to rank projects based on their estimated outcomes against the range of criteria deemed of importance by the stakeholders.

## Multiple Accounts Analysis (MAA) Applied to PERC Program Project Alternatives

The MAA has been applied across eleven (11) project alternatives and not simply the six different project locations. What this means is that the three project alternatives for

groundwater recharge at the Twin Creek Spreading Grounds compete not just among themselves but across all project alternatives. What this enables is recognition that a project alternative at the Twin Creek Spreading Grounds with higher long-term yield may rank lower in priority but may have merit to prioritize subsequently over a project at another location such as lower Plunge Creek. At the same time a project alternative with a lower yield and a lower priority at the same location would effectively be eliminated.

The MAA methodology considers a series of principal criteria (Accounts). For the PERC program evaluations five Accounts have been identified as important and relevant to ranking project alternatives. The five Accounts are:

1. Technical Aspects
2. Cost Aspects
3. Environmental/Natural Resources Aspects
4. Social Aspects
5. Legal Aspects

Each of the five Accounts listed is given a subjective weighting that defines its relative importance to the project ranking. These weightings as to relative importance to the project ranking are easily modified based on stakeholder feedback.

Within each of these five Accounts are the project aspects that further drive the ranking of each of the project alternatives. These more detailed aspects are referred to as Sub-Accounts, for example Operations & Maintenance costs (O&M) under Cost Aspects. Each of the identified Sub-Accounts is considered for each project alternative even if some of the Sub-Accounts are not material for a particular project alternative. A preliminary framework of the five Accounts and the Sub-Accounts identified follows here in Table 1.

Table 1 – PERC Project Accounts and Related Sub-Accounts	
Account	Sub-Accounts
Technical Aspects	Groundwater Recharge-Benefit (Acre-Feet/Year, AFY)
	Infiltration-rate-capacity increase (cubic feet per second, cfs)
	Recharge benefit on a “firm yield” 50-year horizon (Acre-Feet)
Cost Aspects	Capital Costs
	O&M Costs

Table 1 – PERC Project Accounts and Related Sub-Accounts	
Account	Sub-Accounts
Environmental/ Natural Resources Aspects	Salt & Nutrient Mgt. Plan Impacts
	River HCP Benefits
	SAR Wash HCP Benefits
	Sediment Transport Impacts
Social Aspects	Risks Due to Groundwater Mounding
	Job Creation
	Open Space Creation
	Public Safety Hazards of Project
Legal Aspects	CEQA
	Permits Required- Requirements
	Land Availability
	Water Rights

Sub-Accounts are given fractional weighting values within an Account. The number of Sub-Accounts and their weightings within each Account are independent of the Sub-Accounts and their respective weightings within other Accounts. As an example, O&M costs may be weighted as more important than capital costs (for which grants are often available) to the overall ranking among project alternatives of cost impacts than O&M costs are. What comprises the Cost Aspects scoring via weightings of Sub-Accounts is completely independent of what comprises the Technical Aspects scoring and weighting for its Sub-Account such as groundwater recharge benefit. But these different project characteristics come together comparatively in the MAA via the weightings adopted for each Account.

Underlying the Sub-Accounts at the foundational level for an MAA ranking system are what are referred to as “Indicators”. An Indicator is a criterion that provides one performance metric for a Sub-Account. A tangible example of an Indicator would be a project’s yield or net benefit in groundwater recharge in acre-feet of water per year as a projected average

yield. There can be one or many Indicators per Sub-Account. Indicators are weighted as to their rated significance to the scoring of a Sub-Account.

### MAA Weightings and Values

Table 2 (below) presents statements of Significance and a range of weights that might then be assigned to Accounts or Sub-Accounts in keeping with the subjective judgement of the overall significance for that Account in the project ranking. Similarly, judgements of an Indicators significance are shown with potential weights for the level of significance deemed appropriate for a particular Indicator.

<b>Table 2 – General Ranges of Weighting Values</b>		
<b>Significance</b>	<b>Account and Sub-Account Weighting Values</b>	<b>Indicator Weighting Values</b>
Low Value	0.05 to 0.2	1
Moderately-Low Value	0.2 to 0.4	2
Moderate Value	0.4 to 0.6	3
Moderately-High Value	0.6 to 0.8	4
High Value	0.8 to 1.0	5

This three-tiered approach to project prioritization creates an objective ranking system among the somewhat subjective identification of project aspects of importance (i.e., Sub-Accounts) and the somewhat subjective weights assigned to the groups of aspects (i.e., Accounts) by the stakeholders. A common set of somewhat subjective ratings creates an objective ranking of the project alternatives. This is grounded in consistent application of these weightings that incorporate stakeholder input.

### Indicator Scoring

Indicators represent a variety of project-level criteria with objective ratings for the range of values for that Indicator. Each Indicator generates an objective scoring value using a common scale. The range of values for any particular Indicator are placed into “bins” for scoring. For example, out of a hypothetical range of estimated capital costs from \$2 million to \$75 million, the MAA would generate seven (7) bins and assign a corresponding and common range of seven Indicator scoring values from +7 to 1. This common scoring scale enables vastly different project criteria to be brought together into the MAA.

Table 3 describes Indicator bin scoring.

<b>Table 3 – Indicator Bin Scoring Values and Descriptors</b>	
<b>Indicator Scoring Bin</b>	<b>Bin General Descriptor of Relative Project Performance</b>
+7	Best in Class
+6	Very Good
+5	Good
4	Average
3	Below Average
2	Lower Range
1	Lowest Range

Note that the general descriptors are for relative performance of a project on one Indicator. A “Lowest Range” project Indicator score does not mean that a project is not worthwhile.

In practice what this means, is that once the Indicators within a Sub-Account are established, then the range of outcomes for that particular Indicator are classified into “bins” with a numeric value for the sake of comparison. An example here would be rating CEQA requirements from the highest of a rigorous Environmental Impact Report (1) to the lowest of a Categorical Exemption for a project alternative (+7) onto this same common numeric scale by placing those projections of CEQA level of effort into one or more of the seven bins utilized. The use of bins and common Indicator scoring integer-values enables a semi-objective numerical scaling among irregular values for project aspects. This enables project outcomes for components such as infiltration-rate capacity increases in cfs to be scored objectively alongside CEQA permitting level-of-effort. The objective ranking is the outcome of application of a uniform process to all project alternatives considered.

For each project alternative the Sub-Account score results from the Indicator bin values for each aspect of that Sub-Account. The Sub-Account and Account weights then produce a score for the project as a whole as well as producing individual Account scores. The project alternative with the highest overall score may be considered the highest priority project. There may also be prioritization based upon individual Account outcomes such as the length of time necessary to increase recharge capacity may be considered determinative among projects with similar overall prioritization scores.

An example of the MAA is provided in Section **TBD** to illustrate how it would rank three hypothetical project alternatives.

## MAA Accounts, Sub-Accounts and Indicators for PERC Projects

The following is a description of the five Accounts, their Sub-Accounts and Indicators within those Sub-Accounts. This provides the framework and Section TBD describes the weighting values and those assigned to this version of the MAA.

### Technical Aspects Account

The Technical Aspects Account has been used in this MAA to describe the principal project objective, increasing groundwater recharge. Other project characteristics that might be deemed “technical” such as risks from groundwater mounding” are intended to be addressed elsewhere in this MAA. The range of outcomes for different Sub-Accounts is unknown at this time. What has been identified are Sub-Accounts and their respective Indicators. Recharge benefits include a start-time rating of potential recharge benefits on a common horizon such as 50-years. There are three Sub-Accounts that have been identified to date that can be used to evaluate the relative ability of a project alternative to generate groundwater recharge. The following are the Sub-Accounts and associated Indicators.

- Groundwater Recharge Benefit
  - Acre-Feet/Year – What is the relative value of the project specific estimated average groundwater recharge based on the water availability for the project alternative
  - Optimization of Recharge – What percentage (%) of the native water available at a project location can the project utilize
- Infiltration Rate Capacity Increase
  - Net increase in Infiltration-Rate - Increased rate at which water can recharge as a rate capacity in cfs.
  - Ease of Maintenance – Mechanisms in place to maintain the infiltration rate capacity
  - Timeline to Implement – Number of years forecast to be necessary to generate the rate increase (time horizon probably in 5-year increments)
- Recharge Benefit from Firm Yield
  - Acre-Feet of Water Recharged – Net recharge forecast from project alternative on a 50-year planning horizon (also the lowest frequency stormflow event modeled over a project alternative for recharge yield)

### Cost Aspects Account

The Cost Aspects have been simplified into two Sub-Accounts, Capital cost or O&M Costs. The availability of grant or other funding sources to cover each type of project costs is taken into consideration as an Indicator. The following are the Sub-Accounts and associated Indicators.

- Capital Cost
  - Capital cost – Ranking of overall project alternative design, permitting, and construction costs into bins (e.g., \$5MM to \$10MM)
  - Grant Funding – Ranking of % of project costs that might be available from a specific funding source
  
- O&M Costs
  - O&M Costs – Ranking of annual O&M Costs (e.g., \$0.25MM to \$0.5MM). Principal costs are anticipated to be facility maintenance for clogging by fine-grained material; this will include personnel, equipment maintenance, and materials handling costs.
  - O&M Funding – Ranking of % of project O&M costs that might be available/recoverable from a specific funding source

### Environmental/Natural Resources Aspects Account

The environmental and natural resources aspects of PERC projects are tied to known regional issues at this time to develop Sub-Accounts. More areas of impact may be recognized by the project partners and stakeholders early in this process and added to the MAA as early in the development process as possible. There are four Sub-Accounts that have been identified as above with corresponding Indicators on their impacts. The following are the four Sub-Accounts and associated Indicators.

- Salt & Nutrient Mgt. Plan Impacts
  - Proximity to a SNMP Monitoring Well – the distance of a project facility from a monitoring well used to identify concentrations of total dissolved solids (TDS) or nitrate
  - Potential for Impact to Zone of Contribution to a Water Supply Well – Combined factor of mapped distance between a project location and a water supply well and the rated groundwater recharge for the project alternative in ac-ft/year
  
- Conservation and Habitat Benefits
  - Santa Ana River Contribution – Estimated project alternative net impacts on baseflow in the Santa Ana River related to the Upper Santa Ana River Wash HCP (positive impacts, negative impacts, and no impacts), from recharge of project water
  - Habitat Restoration – Rated terrestrial area of disturbance beneficial to threatened or endangered species such as the San Bernardino Kangaroo Rat (in acres)

- Species/Habitat Impacts – Estimated area of habitat losses or gains from impoundment of recharge water **to threatened or endangered species** (limit to these?), includes ponded and wetted areas for habitat (**in acres**).
- Sediment Transport Impacts
  - U.S. ACOE Sediment Management – Rated reduction in sediment loading to Prado Dam impoundment by project, as estimated in cubic yards/year.

## Social Aspects Account

The Social Aspects focuses on impacts to people and places that people go. This includes issues such as risks of high groundwater negative impacts and job creation from project maintenance needs. Some projects may generate new Open Space opportunities by providing a connected land corridor for a project to a waterway, notably Oak Creek Basins. It also includes public safety hazards from the project, typically drowning risks; note that no flood mitigation is projected for PERC projects and thus no reduction of public safety hazards from flood level stormflows. PERC project designs have been focused on generating no discernible impact to the height of floodwater during a maximum probable flood. Four potential Sub-Accounts for assessing direct project impacts to people are identified.

- Risks Due to Groundwater Mounding
  - Proximity to Infrastructure – Distance of project percolation from roads and buildings that could be adversely impacted by percolating water
  - Proximity to Aggregate Mines – Pit flooding as a consequential impact
  - Increased Potential for Soil Liquefaction – Rating on potential for liquefaction induced damages from project (as compared to liquefaction risks for project internal damage due to berm collapse)
  - Potential Effects on Existing Groundwater Contaminant Plumes (expressly omitted)
- Job Creation
  - Number of Jobs Forecast from Construction – Rated in FTE over a 5-year horizon
  - Number of Jobs Forecast from Project Operations – Rated in annual FTE
- Creating Open Space
  - Interconnection of Publicly Accessible Areas – Yes or No Condition. Yes conditions would be rated in miles or acres of Open Space generated by the constructed project (note this is different from habitat impacts to threatened or endangered species)
- Public Safety Hazards from Project
  - Drowning Risks – Rated on increase of area with ponded water (in acres) and ponded water depth in feet to a threshold level (e.g. waist depth). Access to all projects is assumed irrespective of the presence of barriers.

## Legal Aspects Account

PERC projects invoke a number of legal issues for their implementation. Not the least of these legal issues is the permit requirements. There are a number of permits that may be required for a project to be implemented and operated. In addition, issues of land availability for project siting are considered. Also, issues associated with impacts to existing water rights are considered. Four Sub-Accounts have been identified as listed below with the broader group of permit requirements set as Indicators while the CEQA requirement is placed into its own Sub-Account. Consideration of legal issues, most especially permit requirements, is also factored into the timeline projections under the Technical Account.

- CEQA
  - Type of Filing – CEQA filings are rated in seven increments ranging from a contested and defensible Environmental Impact Report to a project type that can be designated as Categorically Exempt under CEQA rules.
- Permits Required-Requirements
  - U.S. Fish and Wildlife Service ESA Permit Requirements – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - California Department of Fish & Wildlife CESA (2081) Permit Requirements – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - California Department of Fish & Wildlife LSA/1600 Permit Requirement – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - Regional Water Quality Control Board 401 Permit Required – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - Army Corps of Engineers 404 Permit Required – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - Army Corps of Engineers 408 Permit Required – Yes/No criterion but if Yes then rated on rated difficulty in obtaining permit
  - California Division of Safety of Dams (DOSD) – Jurisdictional Dam (few if any under consideration) criteria
  - San Bernardino Flood Control District – Permit requirements for project alternatives can be for major construction or minor construction. Additional permit requirements from Flood Control District for maintenance requirements for projects within the maximum probable flood zone (i.e., not levee protected) will be considered into a relative scoring of timing.
- Land Availability
  - Property Ownership by Partner Agencies – Rated criterion on Yes/No with No then rated on the expected degree of difficulty in acquiring property access. Only current project location with this condition is Plunge Creek with mining rights interference with project execution

- Water Rights
  - Support for utilization of water rights not yet Licensed – Engineered recharge rating for maximum diversion rate (cfs) and/or maximum estimated annual recharge volume (acre-feet in a water year)
  - Prospective Interference with Existing Water Rights – would exist for waterways with senior water rights such as Mill Creek (not implemented in initial PP Model Here)

<b>Table 4 –Draft Project Ranking Criteria and Weights Matrix</b>					
<b>Account</b>	<b>Account Weight</b>	<b>Sub-Account</b>	<b>Sub-Account Weight</b>	<b>Indicator</b>	<b>Indicator Weight</b>
<b>Technical Aspects</b>	<b>1</b>	Groundwater Recharge-Benefit (Ac-Ft/Year)	<b>1</b>	Ac-Ft/Year	5
				Optimization (% of Available Runoff)	2
		Infiltration-rate-capacity increase (cfs)	<b>0.7</b>	Net cfs	5
				Ease of Maintenance	2
				Timeline to Implement	4
Recharge benefit on a “firm yield” 50-year horizon (Ac-Ft)	<b>0.5</b>	Acre-Feet	5		
<b>Cost Aspects</b>	<b>1</b>	Capital Cost	<b>0.9</b>	Capital Cost	5
				Funding Sources for Capital	5
		O&M Costs	<b>0.9</b>	Operation and Maintenance Costs	5
				Funding Sources for O&M	5
<b>Environmental/ Natural Resources Aspects</b>	<b>0.6</b>	Salt & Nutrient Mgt. Plan Impacts	<b>1</b>	Proximity to an SNMP Monitoring Well	5
				Potential for Impact to Zone of Contribution to a Water Supply Well	3
		Conservation and Habitat Benefits	<b>1</b>	Santa Ana River Contribution	5
				Habitat Restoration	5
				Species/Habitat Impacts	3

<b>Table 4 –Draft Project Ranking Criteria and Weights Matrix</b>					
<b>Account</b>	<b>Account Weight</b>	<b>Sub-Account</b>	<b>Sub-Account Weight</b>	<b>Indicator</b>	<b>Indicator Weight</b>
		Sediment Transport Impacts	1	U.S. ACOE Sediment Management	5
<b>Social Aspects</b>	<b>0.5</b>	Risks Due to Groundwater Mounding	1	Proximity to Infrastructure	4
				Proximity to Aggregate Mine(s)	2
				Increased Potential for Soil Liquefaction	1
		Personnel Needs/Job Creation	0.5	Number of Jobs Forecast for Construction	3
				Number of Jobs Forecast from Operational Needs	3
		Open Space	0.2	Yes (acres)/ No	4
		Public Safety Hazards of Project	0.5	Ponded Water Depth	5
<b>Legal Aspects</b>	<b>0.2</b>	CEQA	1	Type	4
		Permits Required-Requirements	1	U.S. FWS Permit Requirements	4
				CDFW CESA (2081) Permit Requirements	4
				CDFW LSA/1600 Permit Requirement	4
				US ACOE/RWQCB 401 Permit Required	4
				US ACOE 404 Permit Required	4
				US ACOE 408 Permit Required	4
				CA DOSD Jurisdictional Dam	4
				San Bernardino Flood Control District	4
		Land Availability	1	Property Ownership by Partner Agencies	4

Table 4 –Draft Project Ranking Criteria and Weights Matrix					
Account	Account Weight	Sub-Account	Sub-Account Weight	Indicator	Indicator Weight
		Water Rights	1	Support for utilization of water rights not yet Licensed	4

### Example of this Multiple Accounts Analysis

Three hypothetical PERC project alternatives are evaluated herein as an illustrative example of how this proposed MAA would evaluate and rank such projects. Figure Y illustrates a hypothetical set of outcomes for the five Accounts as a bar chart and then the overall weighted Matrix score as a red dot.

Figure Y - Illustrative Example of Site Ratings by Account and Relative Overall Scoring for Project Alternatives

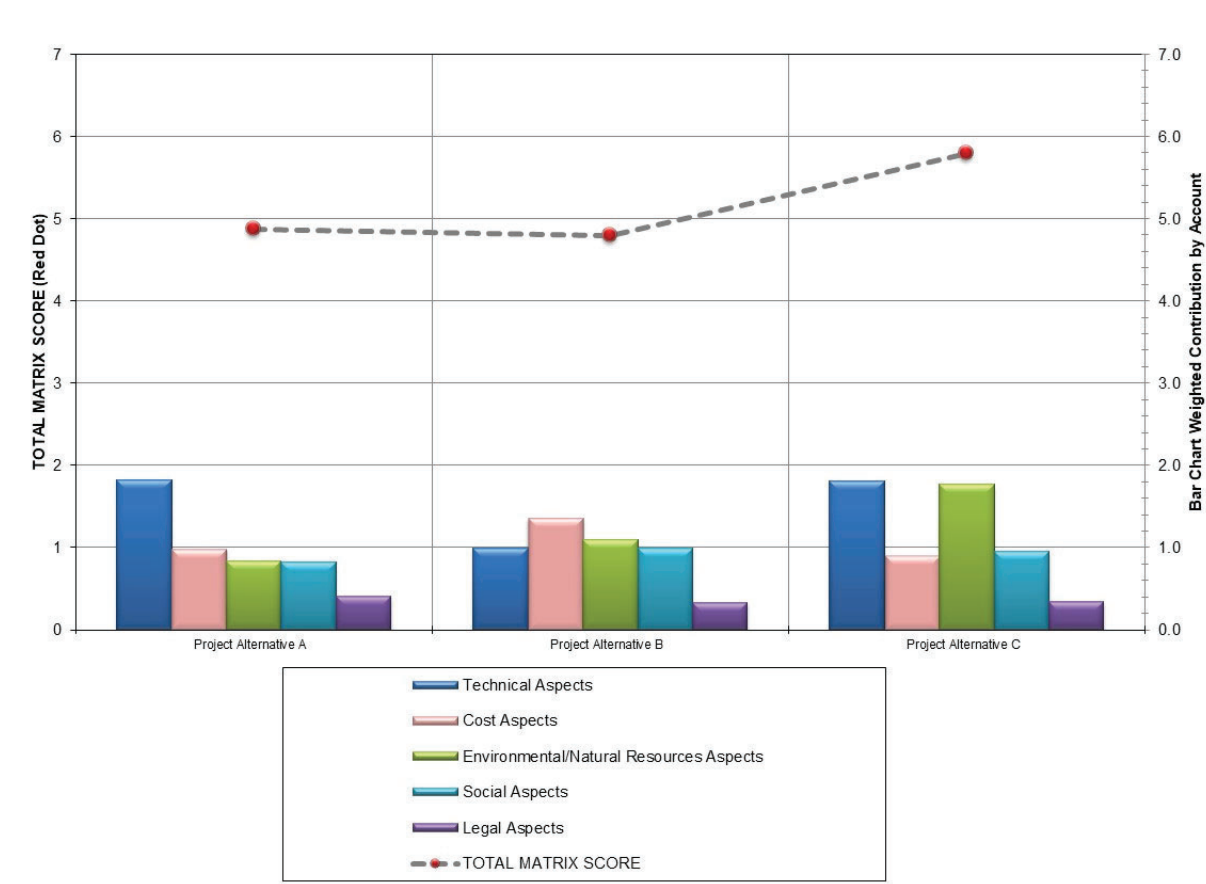


Table 5 below provides the hypothetical Indicator values with this MAA’s Account and Sub-Account weights that produced these hypothetical project rankings, followed by a discussion of the project alternative characteristics and the outcomes in this hypothetical.

Table 5 – Multiple Accounts Analysis Matrix - Illustrative Example

Account	Account Weight	Sub-Accounts	Sub-Account Weight	Indicator	Indicator Weight	Project Alternative A		Project Alternative B		Project Alternative C	
Technical Aspects	1	Groundwater Recharge-Benefit (Ac-Ft/Year)	1	Ac-Ft/Year	5	7	Best in Class	2	Lower Range	6	Very Good
				Optimization (% of Available Runoff)	2	5	Good	4	Average	6	Very Good
				Subaccount Rating		6.43		2.57		6.00	
				Weighted Subaccount Value		2.92		1.17		2.73	
		Infiltration-rate-capacity increase (cfs)	0.7	Net cfs	5	6	Very Good	2	Lower Range	7	Best in Class
				Ease of Maintenance	2	5	Good	4	Average	7	Best in Class
				Timeline to Implement	4	5	Good	6	Very Good	2	Lower Range
				Subaccount Rating		5.45		3.82		5.18	
		Weighted Subaccount Value		1.74		1.21		1.65			
		Recharge benefit on a "firm yield" 50-year horizon (Ac-Ft)	0.5	Acre-Feet	5	6	Very Good	4	Average	7	Best in Class
				Subaccount Rating		6.00		4.00		7.00	
				Weighted Subaccount Value		1.36		0.91		1.59	
Account Rating				6.02		3.29		5.97			
Account Value Weight		1.52		1.00		1.81					
Cost Aspects	1	Capital Cost	0.9	Capital Cost	5	3	Below Average	6	Very Good	3	Below Average
				Funding Sources for Capital	5	1	Lowest Range	2	Lower Range	3	Below Average
				Subaccount Rating		2.00		4.00		3.00	
		Weighted Subaccount Value		1.00		2.00		1.50			
		O&M Costs	0.9	Operation and Maintenance Costs	5	5	Good	6	Very Good	3	4
				Funding Sources for O&M	5	4	Average	4	Average	3	Below Average
Subaccount Rating				4.50		5.00		3.00			
Weighted Subaccount Value		2.25		2.50		1.50					
Account Rating		3.25		4.50		3.00					
Account Value Weight		0.98		1.36		0.91					
Environmental /Natural Resources Aspects	0.6	Salt & Nutrient Mgt. Plan Impacts	1	Proximity to an SNMP Monitoring Well	5	4	Average	4	Average	5	Good
				Potential for Impact to Zone of Contribution to a Water Supply Well	3	6	Very Good	4	Average	6	Very Good
				Subaccount Rating		4.75		4.00		5.38	
		Weighted Subaccount Value		1.58		1.33		1.79			
		Conservation and Habitat Benefits	1	Santa Ana River Contribution	5	2	Lower Range	4	Average	5	Good
				Habitat Restoration	5	6	Very Good	1	Lowest Range	7	Best in Class
				Species/Habitat Impacts	3	4	Average	1	Lowest Range	5	Good
		Subaccount Rating		4.00		2.15		5.77			
		Weighted Subaccount Value		1.33		0.72		1.92			
		Sediment Transport Impacts	1	U.S. ACOE Sediment Management	5	5	Good	4	Average	6	Very Good
Subaccount Rating				5.00		4.00		6.00			
Weighted Subaccount Value				1.67		4.00		6.00			
Account Rating				4.58		6.05		9.71			
Account Value Weight		0.83		1.10		1.77					
Social Aspects	0.5	Risks Due to Groundwater Mounding	1	Proximity to Infrastructure	4	7	Best in Class	7	Best in Class	7	Best in Class
				Proximity to Aggregate Mine(s)	2	7	Best in Class	7	Best in Class	7	Best in Class
				Increased Potential for Soil Liquefaction	1	7	Best in Class	7	Best in Class	7	Best in Class
				Subaccount Rating		7.00		7.00		7.00	
		Weighted Subaccount Value		3.18		3.18		3.18			
		Personnel Needs/Job Creation	0.5	Number of Jobs Forecast for Construction	3	7	Best in Class	7	Best in Class	7	Best in Class
				Number of Jobs Forecast from Operational Needs	3	5	Good	3	Below Average	5	Good
				Subaccount Rating		6.00		5.00		6.00	
		Weighted Subaccount Value		1.36		1.14		1.36			
		Open Space	0.2	Yes (acres) No	4	7	Best in Class	7	Best in Class	7	Best in Class
Subaccount Rating				7.00		7.00		7.00			
Weighted Subaccount Value		0.64		0.64		0.64					
Public Safety Hazards of Project	0.5	Ponded Water Depth	5	1	Lowest Range	7	Best in Class	5	Good		
		Subaccount Rating		1.00		7.00		5.00			
		Weighted Subaccount Value		0.23		1.59		1.14			
		Account Rating		5.41		6.55		6.32			
Account Value Weight		0.82		0.99		0.96					
Legal Aspects	0.2	CEQA	1	Type	4	7	Best in Class	5	Good	2	Lower Range
				Subaccount Rating		7.00		5.00		2.00	
				Weighted Subaccount Value		1.75		1.25		0.50	
		Permits Required-Requirements	1	U.S. FWS Permit Requirements	4	7	Best in Class	7	Best in Class	7	Best in Class
				CDFW CESA (2081) Permit Requirements	4	7	Best in Class	7	Best in Class	7	Best in Class
				CDFW LSA /1600 Permit Requirement	4	7	Best in Class	7	Best in Class	7	Best in Class
				US ACOE/RWQCB 401 Permit Required	4	7	Best in Class	7	Best in Class	7	Best in Class
				US ACOE 404 Permit Required	4	7	Best in Class	7	Best in Class	7	Best in Class
				US ACOE 408 Permit Required	4	7	Best in Class	7	Best in Class	7	Best in Class
				CA DOSD Jurisdictional Dam	4	7	Best in Class	7	Best in Class	7	Best in Class
				San Bernardino Flood Control District	4	7	Best in Class	7	Best in Class	7	Best in Class
		Subaccount Rating		7.00		7.00		7.00			
		Weighted Subaccount Value		1.75		1.75		1.75			
		Land Availability	1	Property Ownership by Partner Agencies	4	7	Best in Class	7	Best in Class	7	Best in Class
				Subaccount Rating		7.00		7.00		7.00	
Weighted Subaccount Value		1.75		1.75		1.75					
Water Rights	1	Support for utilization of water rights not yet Licensed	4	6	Very Good	3	Below Average	7	Best in Class		
		Subaccount Rating		6.00		3.00		7.00			
		Weighted Subaccount Value		1.50		0.75		1.75			
		Account Rating		6.75		5.50		5.75			
Account Value Weight		0.41		0.33		0.35					
TOTAL MATRIX SCORE						4.87		4.79		5.79	



**San Bernardino Valley  
Water Conservation District**

Helping Nature Store Our Water

**FACILITIES  
MAINTENANCE PLAN**

**Mill Creek Groundwater Recharge Facility**

<b>Last Updated</b>	October 2024
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**San Bernardino Valley  
Water Conservation District**  
Helping Nature Store Our Water

## **FACILITIES MAINTENANCE PLAN**

### **Mill Creek Spreading Facility**

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## Introduction

The San Bernardino Valley Water Conservation District (the “District”) operates water recharge facilities in two areas: the Santa Ana River and Mill Creek. The purpose of this Facilities Maintenance Plan is to document current conditions and provide guidelines regarding operation and maintenance procedures for the Mill Creek Spreading Facility.

The Mill Creek Spreading Facility is located on the south side of Mill Creek, upstream of the confluence with the Santa Ana River, and is primarily used to recharge waters from Mill Creek. Limited Santa Ana River water can also be recharged in the Mill Creek Facility from the Redlands Aqueduct, and State Project water can be delivered by the San Bernardino Valley Municipal Water District (SBVMWD) in three locations within the spreading facility: the Zanja Tate Meter Station, the Crafton Unger Turnout, and the Redlands Aqueduct.

The Mill Creek Spreading Facility is made up of 59 percolation basins and 3 settling ponds (1, 2, & 12) with a total of 66 acres of wetted basin area. The purpose of the settling ponds is to remove sediments before the water is distributed through overflow gates into the percolation basins.

At present, the District recharges water primarily during the rainy season in winter and spring and when water is released from the Seven Oaks Dam. Imported water is occasionally available, and its usage has historically increased in times when native water is less available.

## Maintenance Activities

Routine maintenance activities are conducted both outside and within the percolation basins when necessary. These activities include maintenance of the spreading basins, canals, access roads, intake structures and weirs/gates. Within the percolation basins, repairs and general upkeep are of the utmost importance and essential to ensuring efficient groundwater recharge.

The maintenance activities below have been prioritized based on key criteria to ensure effective resource use, safety, and recharge optimization. In wet periods, priority is given to maximizing the basins’ capacity for immediate recharge, minimizing maintenance to keep basins functional and available for capturing stormwater. Conversely, during dry periods, more extensive maintenance is performed to ensure the basins are in top condition for future recharge opportunities. These priorities help balance short-term operational needs with long-term recharge goals.

Key factors considered in basin maintenance prioritization include:

**Safety:** Ensuring safe conditions for maintenance workers and the public by addressing hazards such as erosion, vegetation overgrowth, and debris accumulation.

**Cost:** Allocating funds efficiently by balancing maintenance needs with available budget resources, prioritizing essential repairs that maximize recharge.

**Recharge Maximization:** Maximizing percolation rates during rainy periods.

**Environmental Impact:** Minimizing disturbance in accordance with our operating permits.

**Infrastructure Longevity:** Performing regular upkeep on basin structures to prevent costly repairs and

extend the lifespan of these critical recharge facilities.

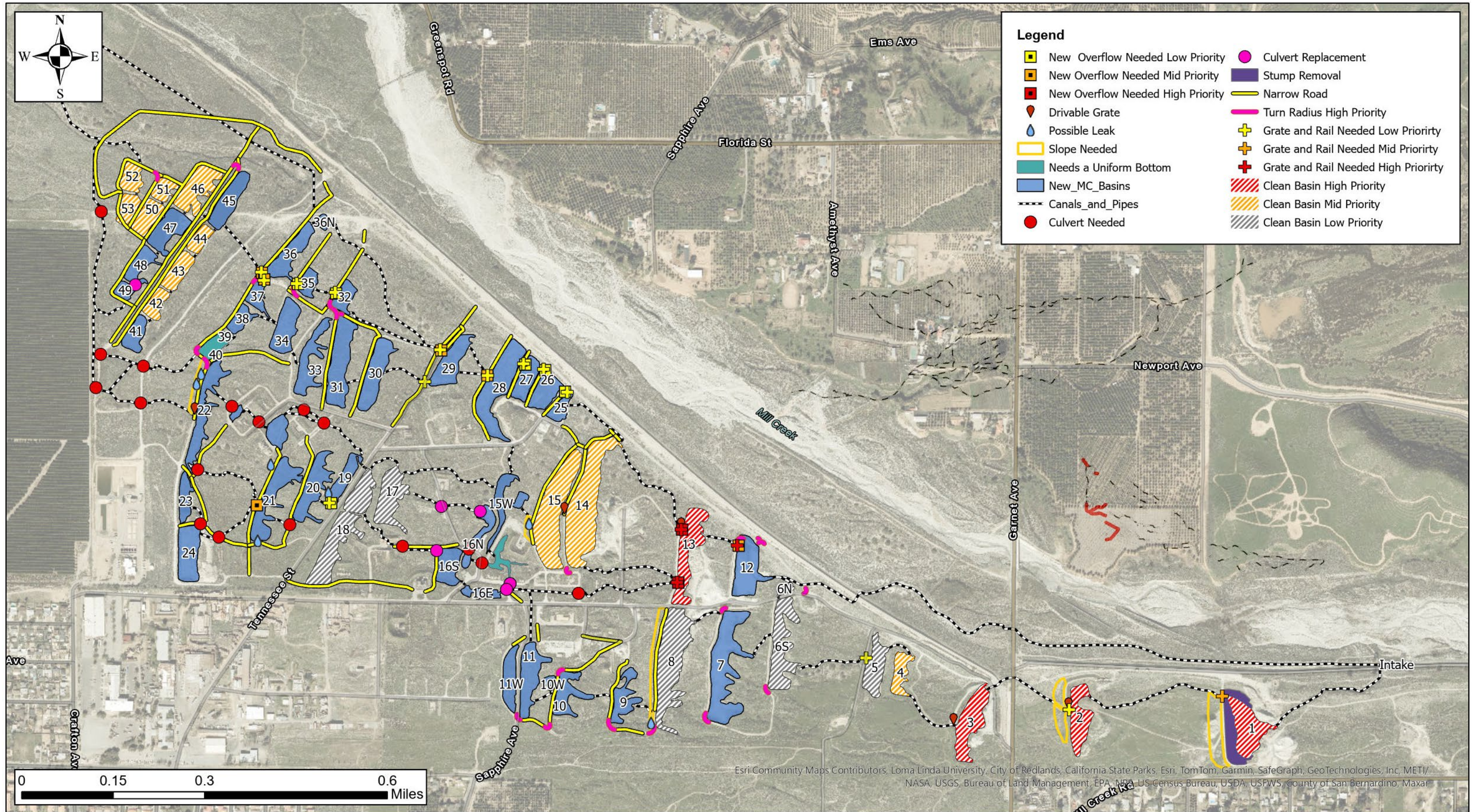
This approach ensures that the District's recharge basins are maintained effectively, balancing immediate water capture needs with sustainable, long-term groundwater management.

**Table 1** summarizes Mill Creek Spreading Facility maintenance activities by year type (wet and dry) and time period (current, 3-year, and 5-year). Facility locations referenced in the tables, such as numbered basins, are shown in **Figure 1**, Mill Creek Facility Maintenance Map.

**Table 1. Mill Creek Wet Year Maintenance Activities**

Activity	Wet Years			Dry Years		
	Current Year	3-Year Plan	5-Year Plan	Current Year	3-Year Plan	5-Year Plan
<b>Clear</b>						
Overgrown Canals				Annual		
Inspection Path				Annual		
Weed Abatement				Annual		
<b>Grade</b>						
Roads				Annual		
Existing Access Ramps				Annual		
<b>Spray</b>						
Invasives				Annual		
Approximately 3 feet around every overflow for safety				Annual		
<b>Clean</b>						
Basins	12	12	12	1, 2, 12, 13, 14, 15, 16S, 22, 39, 40, 42-53	1, 2, 3, 4, 5, 6S, 8, 17, 18	22, 23, 24, 30s
Catwalks and Rails over Culverts/Overflows	1, 2, 5, 12, 13, 19, 25, 26, 27, 28, 29, 32, 35, 36, 37	(n/a)	(n/a)	1, 2, 3, 14, 15, 28, 29	12, 21, 28, 29, 36, 37	2, 5, 19, 25, 26, 27, 32, 35
<b>Fix</b>						
Repair	<ul style="list-style-type: none"> <li>Slide gate under levee wall that leads to Basin 12</li> <li>10S overflow</li> </ul>	(n/a)	(n/a)	<ul style="list-style-type: none"> <li>Diversion sluice gate spalling</li> <li>Intake (silica sand)</li> <li>Gate under levee leading to 12</li> </ul>	<ul style="list-style-type: none"> <li>Old #3 Gate</li> </ul>	(n/a)
Raise Road	(n/a)	<ul style="list-style-type: none"> <li>12 (North Side)</li> <li>40</li> <li>46</li> </ul>	(n/a)	(n/a)	<ul style="list-style-type: none"> <li>10 (N corner)</li> <li>12 (N corner)</li> <li>40 (S corner)</li> <li>46 (W corner)</li> </ul>	(n/a)
Replace Overflow	(n/a)	(n/a)	(n/a)	(n/a)	<ul style="list-style-type: none"> <li>13 to 25 overflow</li> <li>Drivable culvert, culvert, drivable weir, or weir</li> <li>13 to 14 &amp; 16E drivable culvert with diversion gates</li> <li>8 to 13 drivable culvert with new gate</li> </ul>	(n/a)

Figure 1. Mill Creek Facility Maintenance Map



Esri Community Maps Contributors, Loma Linda University, City of Redlands, California State Parks, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, Bureau of Land Management, EPA, NPS, US Census Bureau, USDA, USFWS, County of San Bernardino, Maxar

## **REQUEST FOR PROPOSALS**

### **MODEL DEVELOPMENT AND CALIBRATION OF THE SAN BERNARDINO AND RIALTO-COLTON GROUNDWATER SUBBASINS**

#### **INTRODUCTION**

San Bernardino Valley Municipal Water District (SBVMWD), the San Bernardino Valley Water Conservation District (Conservation District) and the City of San Bernardino Municipal Water Department (City of San Bernardino) seek to engage a qualified consulting firm (Consultant) to refine and calibrate portions of the most recent version of a groundwater model of the upper Santa Ana River (SAR) watershed. Specifically, two alluvial groundwater basins commonly referred to as the Rialto-Colton Basin (defined in DWR Bulletin 118 as subbasin 8-002.04 'Upper Santa Ana Valley – Rialto-Colton') and the San Bernardino Basin Area ('DWR subbasin 8-002.06 Upper Santa Ana Valley - Bunker Hill').

Currently, there is a watershed model in the US EPA's HSPF simulation code that evaluates surface-water runoff and gauged and ungauged inflows to the upper SAR from its upper watershed and tributaries, and there is a related and existing groundwater model prepared using the United States Geological Survey (USGS) MODFLOW 2005 NWT simulation code. Each of these two wide-scale regional-models are being updated by the Conservation District with support from City of San Bernardino, to extend the simulation period to 1912 through 2023, the historic period of Conservation District's engineered recharge operations. The three project partners seek proposals from qualified firms to extract a portion of the latest wide-scale regional model to create a new groundwater flow model in MODFLOW of an area encompassing the San Bernardino Basin Area (SBBA) and the Rialto-Colton Basin, that will be collectively referred to as the San Bernardino Basins Model (SBBM).

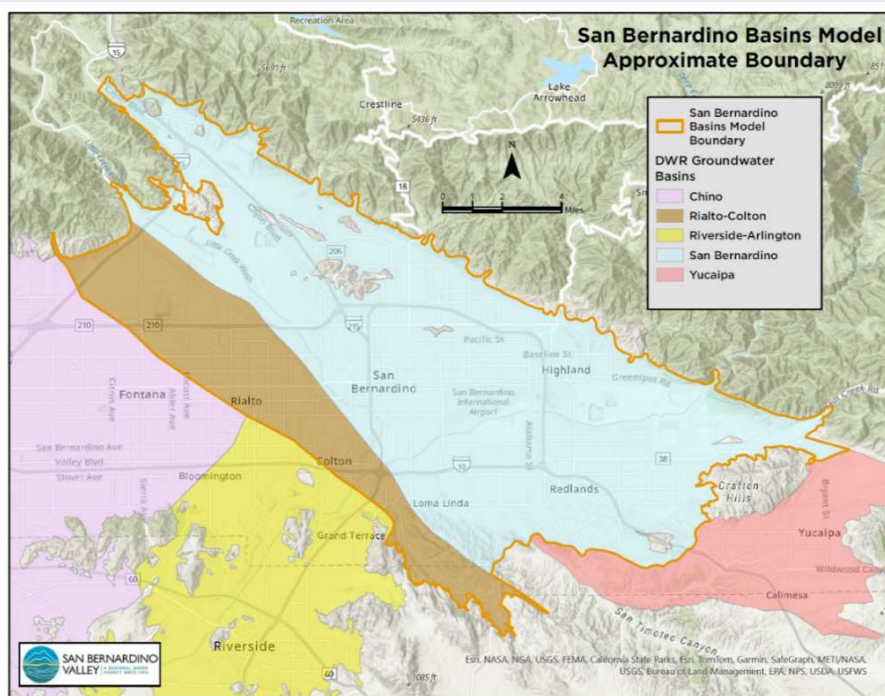


Figure 1- Area to be included in the SBBM

This Request for Proposals (RFP) is groundwater modeling services as described below.

The schedule for this RFP process is as follows:

Task	Due Date
Release RFP	October 17, 2024
Deadline for RFP questions	October 28, 2024
Responses to Questions	November 4, 2024
Firms submit proposals	November 18, 2024 by 6:00 PM Pacific Daylight Time
Proposers notified of interviews, if needed	December 3, 2024
Interviews, if needed	December 11, 2024

The Consultant is responsible for assembling a team that meets all the requirements outlined in this RFP.

The Consultant shall demonstrate the qualifications and experience necessary to complete all aspects of the Scope of Work described in this RFP. If applicable, the Consultant or its key personnel shall hold the appropriate license for the discipline and services required in this RFP on the date the proposal is submitted.

## **HISTORY OF GROUNDWATER MODELS IN THE UPPER SANTA ANA RIVER WATERSHED**

SBVWMD, Conservation District, and City of San Bernardino have used one or more groundwater models to support technical analyses of a range of groundwater issues and concerns for aquifers and groundwater basins in the region. These issues include management related to a Superfund site and corresponding Consent Decree within the City of San Bernardino, support for water-supply projects within a Habitat Conservation Plan across the entire Upper Santa-Ana-River watershed above Prado Dam (Upper SAR), salt and nutrient management planning for the Upper SAR, and conjunctive use management of the groundwater aquifer in the DWR’s defined San Bernardino Basin. Development and use of numerical groundwater basin models in the Upper SAR and the San Bernardino Valley began around 1980 and continues to the present day

Numerical groundwater models of each of the six individual groundwater basins defined by DWR in the Upper SAR<sup>1</sup> have been developed and have evolved through time. These include groundwater flow models developed by the USGS for the SBBA ((Danskin, et al, 2006) and subsequent refinements to the SBBA (Stantec, 2008, Geoscience, 2009 and Geoscience, 2020) and the USGS Rialto- Colton Groundwater Basin (Woolfenden and Kozcot, 2001) and subsequent refinements to the SBBA (Geoscience, 2015 and 2020, Stantec, 2023). The current scope for this RFP is for model refinement and calibration to a new SBBM domain consisting of the San Bernardino Basin and the Rialto-Colton Basin depicted in Figure 1 above.

### **Historic San Bernardino Basin Groundwater Models**

The following Table 1 lists most of the groundwater models and model efforts in the SBBA over the last approximately 20 years (from Stantec, 2023, Table 1-1).

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<sup>1</sup> San Bernardino Basin, Rialto-Colton Basin, Yucaipa Basin, Chino Basin, Riverside-Arlington Basin, and Temescal Basin

Table 1 – San Bernardino Basin Model History					
Model Iteration Name	Pub. Date	Simulation Period	Uppermost Layer Type	Model Row & Column Dimensions	Description
USGS Basin Flow Model	2006	1945-1998	Confined	112 x 184	USGS Model for San Bernardino Basin Area (Danskin et al, 2006)
Original NGFM/RBFM	2008 to 2009	1945-1998	Confined	944 x 1,472	USGS Model with Cell Size 102.5x102.5 ft (without HFB and STR Packages)
		1946-2000	Confined	944 x 1,472	Five Layers Based on Lithologic Model with new K values Five Layers Based on Lithologic Model with new K values, HFB and SFR Packages Annual Calibration - 1946 to 2000
		1946-2000	Confined	470 x 1,472	Rotated grid 27-degrees, Annual Calibration - 1946 to 2000
Refined NGFM/RBFM	2015	1983-2015	Confined	470 x 1,472	Updated layer properties extended model through 2015
SBBA Model v2.0	2020	1966 - 2016	Unconfined	-	SBBA v.2.0 Model updated through 2016 in conjunction with regional model (see Table 3)
Extracted SBBA Model v4.1	2021	1966-2016	Unconfined	470 x 1,472	SBBA extracted from overarching regional model (see Table 3), inherits boundary conditions changes to Underflow, Outflow and Inflow and Stream Flow package Updates made to SBBA for local pumping well allocation and changes made to layer elevations near well EPA112. Subsequent changes were made to hydraulic conductivity (Layers 1,2 and 4), updates to specific yield and storage, and calibration data set, pumping changes to 9th street North and South

For the latest SBBA model update the City of San Bernardino worked in conjunction with SBVMWD in 2021 to update the parameters in the San Bernardino Basin through the year 2016 and sought to manually adjust parameters to improve the model calibration in a few select areas. These combined efforts were published in Stantec, 2023.

## Historic Rialto-Colton Basin Groundwater Models

Groundwater flow models of the Rialto-Colton Groundwater Basin have been developed over the past 25 years. The following Table 2 describes two related groundwater models of the Rialto-Colton Subbasin. The model development through the simulation year 2014, Rialto-Colton 2 below, was contracted by SBVWMD with funding from multiple parties. The objective of those efforts was to develop a Joint Groundwater Model with a flow component as well as a solute transport component for perchlorate to evaluate various groundwater management and groundwater remediation program scenarios on existing perchlorate plumes in the Rialto-Colton Basin (Geoscience, 2015). This expanded upon prior numerical groundwater flow model development by the USGS (Woolfenden and Koczot, 2001).

Table 2 – Rialto-Colton Basin Model History					
Model Iteration Name	Pub. Date	Simulation Period	Uppermost Layer Type	Model Row & Column Dimension	Description
Rialto Colton 1	2001	1945-1996	Un-confined	90 x 90 (820 ft on a side square model grid cells)	Four-layer transient model focused on impacts of fault system and river channel deposits on groundwater movement from engineered recharge (Woolfenden and Koczot, 2001)
Rialto-Colton 2	2015	1945-2014	Un-confined ?	278 X 938 (102.5 ft on a side square model grid cells)-	Seven-layer model with grid rotated 27-degree rotation. Annual inputs for 1945 to 1969 and monthly from 1970 to 2014 (Geoscience, 2015)

## Historic to Current Regional Hydrologic Models of Groundwater and Surface Water in the Upper Santa Ana River Watershed

In 2020 SBVWMD generated a pair of broad regional models of surface water and groundwater across the upper SAR watershed and alluvial basins. Funding for this effort was provided by multiple parties in the watershed. The modeling effort included updating an existing surface water model developed by the Santa Ana Watershed Project Authority (SAWPA) in HSPF to the time period 1966-2016. Concurrently, information from five existing groundwater models was placed into one model domain comprised of 18 million cells using the USGS MODFLOW2005 simulation code. The Integrated Santa Ana River Model (ISARM v.1.0) was used as a management tool to determine what factors can contribute to reduced

streamflow in the Upper SAR and was used to evaluate the potential effects on groundwater levels and water storage across the SAR Watershed upstream of Prado Dam of a variety of proposed or conceptual water-supply projects, including Upper SAR HCP Covered Activities. The history of modeling of the upper Santa Ana River watershed and groundwater basins is listed in Table 3.

<b>Table 3 – Upper Santa Ana River Watershed and Groundwater Model History</b>					
Model Iteration Name	Pub. Date	Simulation Period	Uppermost Layer Type	Model Row & Column Dimension	Description
SAWPA Watershed Model, v. 1.0	2020	2007 - 2015	NA	-	HSPF watershed model roughly calibrated to gages on the lower main stem Santa Ana River (Geoscience, 2020)
Upper Santa Ana River Watershed Model, v. 1.1	2020	1966-2016	NA	-	HSPF watershed model roughly calibrated to gages on the lower main stem Santa Ana River. Used in groundwater model to provide estimates of ungauged tributary inflows and overland precipitation runoff. Provides inputs for the MODFLOW SFR package. Earlier version also expanded to Integrated Santa Ana River Model domain Refined land-use considerations for applied flow return flow (Geoscience, 2020)
ISARM v.1.0	2020	1966-2016	Confined	1,642 x 2,243	Regional model combined including SBBAV2.0 -Grid maintains the 27-degree rotation. The term “integrated” in its name refers to the combining of 5 regional models for different subbasins. ISARM does not use an integrated mathematical solution for surface water and groundwater; further it is not a coupled model with the HSPF watershed model as in IHM; it is two distinct models. (Geoscience, 2020)

Upper SAR Watershed Model v.1.2	In Progress 2024	1912-2023	NA	-	Extrapolates precipitation from PRISM datasets and local rain gage, updated land use coverages over historic period, calculates ungagged flows and overland runoff for ISARM v.1.2
ISARM, v.1.1	In Progress 2024	1912-1965, 1966-2023	Un-confined	1,642 x 2,243	Updates to the MODFLOW2005 model parameterization from SBBA Model v. 4.1. Mathematical solver updated to NWT to enable unconfined flow in Layer 1.  Builds out datasets for 112 years, begins with ISARM v.1.0, revises locations of Conservation District recharge basins over time

The ISARM v.1.0 model is described in the following reports prepared by Geoscience and Stantec:

- Upper Santa Ana River Integrated Model Summary Report (Geoscience, September 2020)
- Upper Santa Ana River Integrated Model Technical Memorandum No. 3: Model Calibration (Geoscience, February 2020)
- San Bernardino Basin Area Groundwater Flow Model Update Report (Stantec, 2023); see Tables 1-1, 5-1, 5-2, 5-3 and 6-5 for model construction, MODFLOW package build data sources, model inflow/outflow packages used)

The sources of model input parameters and the process of generating the model input files for the model of SBBA prepared by Stantec (Stantec, 2023) is summarized in Table 4.

<b>Table 4 - SBBA/ISARM to SBBM Model Build Input Information</b>				
<b>Modflow Parameter</b>	<b>Model Component</b>	<b>Corresponding MODFLOW Package SBBA</b>	<b>Description of Input Data</b>	<b>SBBM Build</b>
Inflow/ Recharge	Gauged Stream Flow <sup>(1)</sup> (Streambed Percolation)	(SFR) <sup>(2)</sup>	Gauged streamflow data from USGS stream gauges	Import from ISARM / Watershed Model construct SFR package
	Ungauged Tributary Inflow and Recycled Water Runoff	(SFR) <sup>(2)</sup>	Estimates of ungauged tributary and recycled water runoff	Import from ISARM / Watershed Model construct SFR package
	Areal Recharge from Precipitation (Infiltration)	RCH	Tabular Aerial precipitation data	Import from ISARM and add to RCH package
	Recharge from Local Runoff Generated from Precipitation	RCH	Estimate of Recharge from Local runoff of Precipitation	Import results from ISARM / Watershed Model and add to RCH package
	Underflow Inflow (Yucaipa Basin)	WEL <sup>(3)</sup>	Estimate of subsurface inflow from Yucaipa basin	Tabular ISARM Model Results to be added to WEL package
	Recharge from Ungauged Mountain Front Runoff	WEL	MTN front recharge estimated from watershed areas along model boundaries and internal no flow	Import from ISARM WEL package and add to WEL package for SBBM

			areas (Shandin / Perris Hill, etc.)	
	Artificial Recharge / Imported (Spreading Basins)	WEL	Artificial Recharge at Spreading Grounds	Import from ISARM WEL package and add to WEL package for SBBM
	Return Flow at the Wellhead from Groundwater Pumping <sup>(6)</sup>	WEL	% of water from application (irrigation, indoor/outdoor water use, pipe leakage in the basin)	Import from ISARM WEL package and add to WEL package for SBBM
	Applied Flow - from Groundwater Pumping <sup>(7)</sup>	RCH	% of water from application (irrigation, indoor/outdoor water use, pipe leakage in the basin)	Import results from ISARM RCH package and add to SBBM RCH package
Outflow/ Discharge	Groundwater Pumping	WEL	Monthly Production data in Tabular format	Import from ISARM WEL package and add to WEL package for SBBM
	Underflow Outflow (San Jacinto Fault)	CHD / HFB <sup>(4)</sup>	Estimate of Underflow leaving SBBA through San Jacinto Fault	Simulated variable based on fault package
	Underflow Outflow (Barrier E)	CHD / TBD <sup>(4)</sup>	Estimate of Underflow leaving	TBD

			SBBA through Barrier E	
	Evapotranspiration	ET	ET rate	Rate used in ISARM to be assigned to ET package
	Streamflow	(SFR) <sup>(2)</sup>	Water leaving model through streamflow out	Model-Calculated <sup>(5)</sup>
Hydraulic Conductivity	Hydraulic Conductivity	UPW	Hydraulic Conductivity	Import from ISARM write values to UPW
Storage	Storage	UPW	Storage	Import from ISARM write values to UPW
Specific Yield	Specific Yield	UPW	Specific Yield	Import from ISARM write values to UPW
Layer Elevation	Layer Elevation	UPW	Layer Elevation	Import from ISARM write values to UPW
Faults	Faults	HFB	Faults	Import from ISARM write values to HFB
MODFLOW Version	MODFLOW Version	MODFLOW 2005 / NWT <sup>(8)</sup>	NA	Modflow Version
MODFLOW Solver	MODFLOW Solver	NWT-XMD <sup>(9)</sup>	NA	Solver

Notes

(1) Streamflow from USGS Gage Stations

(2) Watershed Model Calculates Inputs to the Stream Flow Routing package (SFR)

(3) This is a simulated boundary condition and time transient heads are exported to the SBBA for use in the well package

(4) This is a simulated boundary condition between the Rialto Colton Basin Model in the SBBA model, and are exported as time transient constant heads and simulated in the Local Model through the CHD package. In the SBBM this would be a fault (HFB) barrier/condition

(5) Calculated by Modflow 2005 during simulation.

(6) Return Flow at the wellhead (3% of production for the well) after Danskin et al, 2006 for any wells with production that leaves the model basin

(7) Applied flow - Return flow based on pumping volumes, land use and water application

(8) NWT = Stand-alone Program using the Newton-Rapshon formulation for MODFLOW 2005 (Niswonger, 2011)

(9) NWT =NWT program utilizing the XMD linear solution Method (Niswonger, 2011)

WEL = MODFLOW Well Packagae

RCH = MODLFOW Recharge Package

STR = MODFLOW Stream Package

SFR = MODFLOW Stream Flow Routing Package

CHD = MODFLOW Constant Head

Package

ET = MODFLOW Evatranspiration

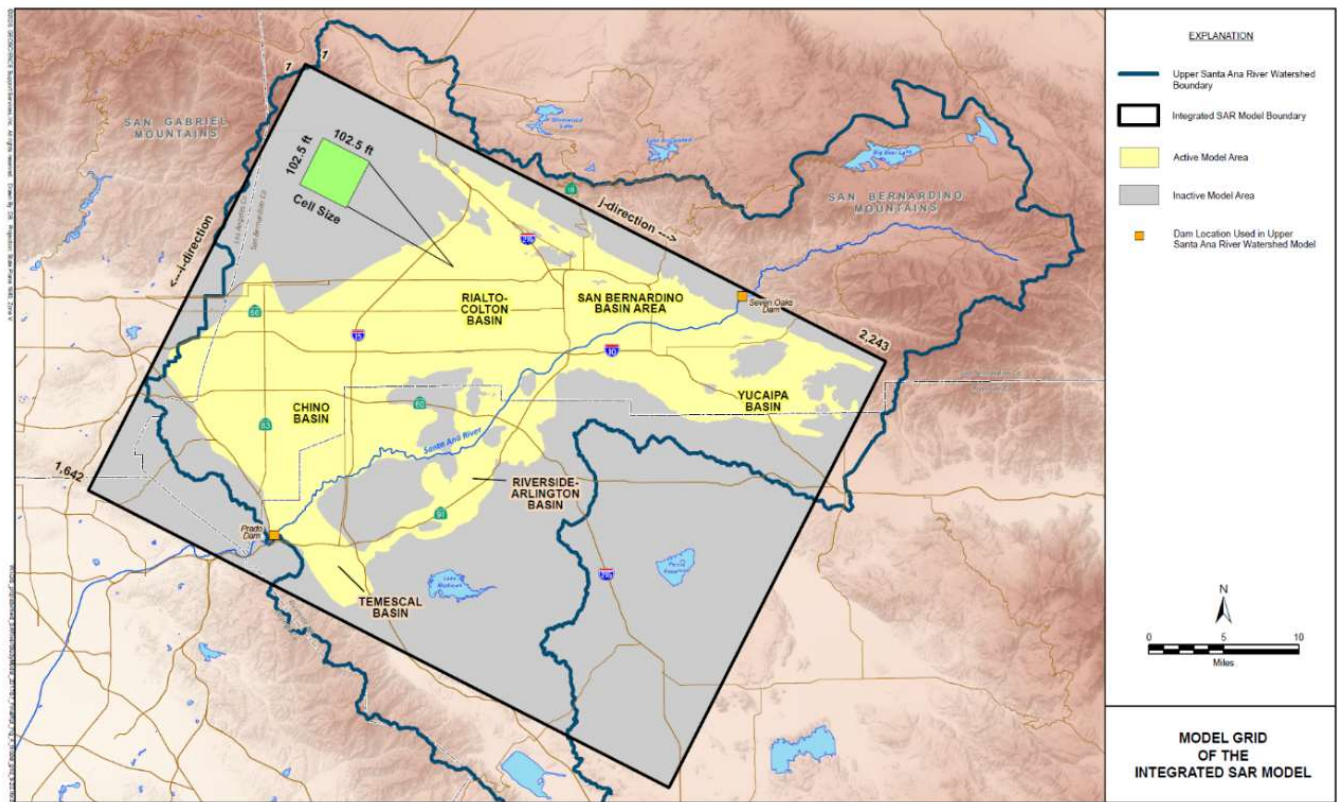
Package

LPF = Layer Property Flow Package

UPW = Upstream-Weighting Package

HFB = Horizontal Flow Barrier

This Figure shows the extent and discretization of the ISARM model domain.



SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT  
UPPER SANTA ANA RIVER INTEGRATED MODEL - SUMMARY REPORT

FIGURE 4

GEOSCIENCE

Development of ISARM v.1.0 from the preceding individual models involved the following:

- Reviewing the individual conceptual models for each groundwater model and identifying similarities and differences
- Developing an approach for extending model layers across existing model boundaries
- Developing a hydrogeologic conceptual model that included the previously identified geologic units and fault features and correlated model layers between groundwater basins within this regional model area and the previously identified sources of inflow and outflow to the groundwater systems; this included use of a three-dimensional (3-D) lithologic model
- Transforming the information within the prior groundwater flow models to the cell size and orientation of the Integrated Model
- Updating the input groundwater model datasets to the ISARM v. 1.0 simulation period of January 1966 through December 2016

- Updating the simulation period for the Upper SAR HSPF surface-water model for the simulation period and rechecking calibration of predicted Upper SAR flows
- Removing underflow boundary conditions in the subbasin models that were no longer needed in a regional combination of model domains
- Conducting simulations and manually adjusting some model parameters to reduce model prediction residuals between observed and simulated conditions (i.e., iterative calibration)

Because the ISARM v.1.0 model and the current ISARM v.1.1 consist of 18 million mathematical model cells and simulates in monthly time steps over a multi-year period, the model's computer run time ranges from 4 to 9 days depending on the numerical solver utilized.

As listed in Table 1, the City of San Bernardino utilized a portion of the ISARM v.1.0 in 2021 to 2023 to update their model of the San Bernardino Basin to SBBA Model v. 4.1 (Stantec, 2023). City of San Bernardino use this model for their on-going groundwater management of the Newmark and Muscoy Plumes of the Newmark Superfund Site and Consent Decree. The City of San Bernardino's modeling and groundwater management consultant, Stantec, extracted the SBBA portions from ISARM v.1.0 and updated them. This led to SBBA Model v.4.1 with a pass back of those changes to contribute to ISARM v.1.1. City of San Bernardino is currently updating the simulation period for this San Bernardino groundwater basin subdomain of the Integrated Model to go from 1966 through WY 2023.

Concurrently, the Conservation District is extending the datasets and simulation period for ISARM v.1.1 and the inter-related Upper SAR Watershed Model v.1.1. City of San Bernardino has provided updated datasets to 2023 for ISARM v.1.1. Conservation District also made some modest revisions in ISARM v.1.1 to reflect the varying locations over time of its engineered recharge.

## **DEVELOPMENT AND CALIBRATION OF A NEW SAN BERNARDINO BASINS MODFLOW MODEL**

SBVMWD, the Conservation District and the City of San Bernardino are collaborating on developing and refining a new groundwater model for the San Bernardino Basin Area and Rialto-Colton Basin, the San Bernardino Basins Model (SBBM). Development of the SBBM is to be based on using ISARM v.1.1 as a starting point. The baseline model simulation is to be developed from ISARM v. 1.1 but for the more limited prediction period of 1966-2023. While the final work products of ISARM v.1.1 are not yet available, they will be available for development of the SBBM. For the purposes of responding to this RFP, the work products from development of ISARM v.1.0 are available for respondents to review and understand the modeling scope requested.

The model domain for the SBBM is to be an excerpt of the ISARM domain with its grid resolution, much like the model extraction of the SBBA v. 4.1 domain from the ISARM.

### **SBBM Uses and Objectives**

The principal objective for the SBBM is to support groundwater subbasin storage optimization. Subbasin storage optimization requires a good understanding of the natural sources of recharge from precipitation, stream-aquifer interaction, and recharge off of the mountain fronts adjoining the groundwater subbasins. A reliable understanding of natural recharge and natural discharge is needed to then be able to look at the history and future of both engineered recharge of native and non-native water (e.g., State Water Project imported water) and existing and planned groundwater extraction for water supplies. Groundwater storage for water supply resiliency in conjunctive use programs is a key component of the regional water supply plan and the SBBM is needed to help with water resource best management.

Other objectives for the SBBM include:

- Simulation of groundwater flow directions under historic and future conditions,
- Simulation of chemical fate and transport such as dilutionary modeling for total dissolved solids
- Support any needs for solute transport modeling in MT3D

For the current scope of work, no predictive simulations for future conditions are required. Thus, calibration simulation periods will be found within the 1966- 2023 total model time period, and model validation simulations will be for the entire period. Any simulation of future conditions projects would be in a subsequent scope of work. The current scope is to create and calibrate a model of existing and known historic conditions.

It is currently envisioned that the SBBM will utilize the MODFLOW2005 simulation code. However, if another MODFLOW simulation code may offer improvements toward the objective, then respondents are invited to propose that as an optional task approach to model construction (Task 2 in the work breakdown structure in this RFP)

The anticipated aerial extent of the SBBM model domain is illustrated in Figure 1.

### **Model Refinement and Calibration Concepts**

The anticipated approach to model refinement and calibration will use a sensitivity analysis of a number of parameter types and groupings such as hydraulic conductivity, vertical anisotropy, specific yield, specific storage, mountain front recharge, recharge, canal leakage, streambed conductance, and streambed roughness. Use of scaled sensitivity to assess parameter significance for matching streamflow observations in lower reaches and for head matching in aquifer layers is also anticipated. It is anticipated that a certain number of the parameters most affecting model predictions to observations will be calibrated over this most recent period

The most recent period of data collection and simulation from 2017 through 2023 is anticipated to be the period for calibration using automated parameter-estimation. There are very high-quality data for groundwater recharge and groundwater level responses in the upper Santa Ana River alluvial fan deposits (the Wash) and other portions of the model domain. Those data may be useful in identifying the hydraulic response time of the aquifer to recharge or extraction stresses. An initial calibration period will be identified by the selected consultant in coordination with the three project partners.

The calibration objectives are to improve model simulation precision to two model predicted outcomes vs field measurements, monthly Santa Ana River flows at the E Street Gage (Station ID 11059300) and monthly hydraulic heads at a large number of wells within different layers throughout the SBBM domain. After initial calibration to a selected simulation period, subsequent model-validation runs may indicate that parameter refinement in a second calibration period might improve overall model precision and accuracy. The task and work breakdown structure provided allows for this as optional task work.

### **Goals for the San Bernardino Basins Model**

The high level goals for the SBBM include:

- Improve the simulation of historic groundwater elevations over the model period as compared to the aforementioned existing models of the SBBM area
- Refine the simulation of groundwater and surface water exchange and assess the relative precision and accuracy of simulated vs actual surface-water flows

- Evaluate model recharge estimates for mountain front recharge (MFR) from portions of the San Bernardino and San Gabriel Mountains and adjoining foothills via calibration testing
- Create a groundwater flow model suitable for analyzing SBBA and Rialto-Colton Basin management scenarios, including basin refilling and storage programs (such as recharge of State Water Project water, increased recharge of local stormwater, and recharge of recycled water).
- Create a groundwater flow model capable of supporting separate groundwater chemical fate and transport assessments (this current scope of work does not include transport simulations; future work could utilize the groundwater flow model for total dissolved solids, nitrate, or other constituents).

### **Steering Committee for SBBM Development**

The SBVMWD, Conservation District and City of San Bernardino will establish a Steering Committee to provide a forum for collaboration on the steps and outcomes of refinement and additional calibration of an SBBM Model. The role of the Steering Committee is to facilitate discussion, information exchange, and collaboration on the technical aspects of constructing, refining, and recalibrating the SBBM.

The Steering Committee is anticipated to include at least the following representatives:

- Staff from SBVMWD
- Staff from Water Conservation District
- Staff from City of San Bernardino
- A staff person from the USGS with experience in SBBA hydrogeology
- Climate Change Modeler for Conservation District, Dr. Zoi Dokou, Sacramento State University
- City of San Bernardino may also designate their groundwater management and modeling consultant to participate in the Steering Committee
- A facilitator with experience in groundwater modeling

The facilitator will prepare the agendas for the Steering Committee meeting, facilitate the meetings, and prepare meeting minutes. The facilitator's work is not included in this scope of work. The scope of work identifies plans for six (6) Steering Committee meetings to be conducted in a virtual meeting format such as through Microsoft Teams or Zoom. The respondent should assume that each Steering Committee will have a duration of two hours.

### **SCOPE ELEMENTS FOR SBBM DEVELOPMENT**

The elements in the scope of work for development of the SBBM generally include the following:

- Extract information and data from the ISARM v.1.1 model to a new SBBM domain with the same lateral and vertical grid structure along with other grid characteristics for faults and waterbodies
- Develop a model calibration plan
- Conduct a simulation of the newly constructed SBBM from 1966-2023 and perform an initial model sensitivity analysis to parameter adjustments both temporal variables such as rainfall recharge and non-temporal parameters such as hydraulic conductivity
- Refine the model calibration plan
- Work together with a Steering Committee on the model refinement and calibration,
- Conduct model calibration using PEST or similar automated calibration methods over selected simulation period(s) for non-temporal parameters such as hydraulic conductivity
- Validate model calibration over the period from 1966 to 2023 by assessing its residuals on simulated and observed monthly flows and monthly hydraulic heads.
- Prepare a technical memorandum documenting the development of the SBBM and calibration with an evaluation of the model's utility toward the goals listed
- Deliver to SBVMWD, Conservation District and City of San Bernardino a complete set of computer files for the SBBM model simulation period of 1966 to 2023 inclusive of raw data files and geospatial data files

### **SBBM Development Project Scope of Work**

The following tasks identify the Scope of Work.

#### **Task 1 – Project Management, Project Kickoff and Background Review**

This task includes the consultant's project management activities, monthly web-based meetings with the SBVMWD project manager and Conservation District's technical lead, preparing for and participating in the Kickoff Meeting, and reviewing background documents and information.

The consultant should assume monthly web-based meetings will occur over a 10-month period.

**Deliverables:** Kickoff Meeting Agenda, Kickoff Meeting minutes with Action Items, monthly meeting agendas, and monthly meeting minutes with Action Items

#### **Task 2 – Simulation Domain Construction**

This task includes utilizing the ISARM v.1.1 model input files for the simulation period of 1966 to 2023. The consultant shall prepare new input files for the SBBM by removing the groundwater basins from ISARM v.1.1 that are not included in the SBBM boundary (Chino Basin, Riverside-Arlington Basin, Temescal Basin, and Yucaipa Basin). The consultant shall develop boundary conditions that are required for the SBBM, including inflow to the SBBM

from the Yucaipa Basin and outflow from the SBBM to the downgradient Riverside and Chino basins. The consultant shall make other modifications to the ISARM v.1.1 files as needed to prepare the model input files for the SBBM. The consultant shall conduct an initial simulation of the SBBM from 1966 to 2023 using the temporal data from ISARM v.1.1 and examine and describe it numerically and graphically.

**Deliverables:** Draft technical memorandum (TM) of the model construction process and outcomes. TM to include model outcome based graphics of: simulation residuals for hydraulic heads by spatial groups (assume 20 groups), simulation residuals for the E Street Gage in the Santa Ana River for each month over the simulation period, estimated inputs and outputs of water over the simulation period such as the net inflow and outflow of water in the San Bernardino Basin for the entire simulation period (i.e., a mass-balance graphic of the components in the simulated water budget).

### **Task 3 – Model Calibration Plan Development**

This task will produce a written calibration plan developed in an iterative fashion to a working draft calibration plan that may be updated further as the work in this task proceeds. The consultant shall review the non-temporal parameters in the initial SBBM and develop an approach to conducting a sensitivity analysis of model simulation residuals to changes in those non-temporal parameters from the simulation conducted in Task 2. Similarly, the consultant shall review the temporal parameters for rainfall recharge and mountain front recharge that are under constrained by data over the simulation period and develop an approach to conducting a sensitivity analysis (note it is assumed that temporal data that is constrained by data such as tributary inflows on a streamflow gage will not be subjected to sensitivity analysis or calibration adjustments). The consultant shall perform sensitivity analyses on the initial SBBM for both temporal and non-temporal parameters identified and present those to the model development Steering Committee (S.C. Meeting 1). The consultant shall seek to reach consensus with the Steering Committee on the sensitivity analyses and any subsequent sensitivity analyses to be conducted. The consultant will then analyze the results of the sensitivity analyses, prepare a presentation illustrating the results of the sensitivity analyses, develop recommendations regarding the approach to model calibration, and the proposed approach for model calibration. The consultant shall develop a draft calibration plan and meet with the Steering Committee to review the results of the full sensitivity analyses and the proposed calibration approach (S.C. Meeting 2). The consultant shall identify their recommended initial calibration time period. The consultant shall seek to reach consensus with the Steering Committee on the calibration approach adopted.

**Deliverables:** Model sensitivity graphics, draft calibration plan technical memorandum (TM), final calibration plan TM, Steering Committee Presentation

### **Task 4 – Model Calibration**

The consultant shall conduct model calibration simulations to enhance the calibration of both simulated hydraulic heads to observed and simulated monthly flow rates in the Santa Ana River at the E Street Gage and the observed monthly flow rates. Calibration to flow rates in the Santa Ana River at E Street would be during non-storm conditions. The calibration should focus on (1) areas where calibration wells indicate the difference between the model simulated head and measured head value is greater than 50 feet, (2) the area of the Conservation District's Santa Ana River and Mill Creek spreading grounds. Model calibration simulations shall be conducted using PEST. The consultant may also conduct calibration simulations based on the consultant's professional judgment.

The consultant shall then develop a presentation illustrating the results from the calibration simulations, relevant information from the simulations, and the consultant's evaluation of the model calibration especially as related to the sensitivity analysis. These items will then be reviewed with the Steering Committee (S.C. Meeting 3).

**Deliverables:** Steering Committee Presentation

#### **Task 5 – Model Validation and Presentation**

The consultant shall then conduct a simulation for the time period from 1966 to 2023. The consultant shall analyze the results from the simulation and the degree to which the model is calibrated. The consultant shall develop a presentation on these items and present the results to the Steering Committee. The consultant and Steering Committee will evaluate and discuss if further model calibration effort is needed (S.C Meeting 4).

**Deliverables:** Steering Committee Presentation

#### **Task 6 – Further Model Calibration**

In the event that further model calibration is needed, the consultant shall conduct additional model simulations. The consultant should assume that a 10-year calibration period will be used to evaluate four model parameters in improving model calibration with the simulation setup and simulation time needed. The consultant should assume that one additional Steering Committee meeting will be held in this task and the consultant will prepare a presentation for this meeting (S.C. Meeting 5).

**Deliverables:** Steering Committee Presentation

#### **Task 7 – Draft Report Preparation**

The consultant shall prepare a draft report documenting the development of the SBBM and the calibration and model validation process. The report shall document the process for preparing the model build for each model input component identified in Table 4 and the processes used to post process model output. The report shall include discussion of the calibration and model validation process such that the lessons learned from these activities are documented.

The consultant should assume that one additional Steering Committee meeting will be held in this task and the consultant will prepare a presentation for this meeting (S.C. Meeting 6).

**Deliverables:** Draft SBBM Development Report, Steering Committee Presentation

#### Task 8 – Final Report Documentation and Closeout

Prepare the final report documentation based on the comments provided on the draft report prepared in Task 7.

**Deliverables:** Final SBBM Development Report. The consultant shall provide a complete set of MODFLOW input and output files to SBVMWD.

#### Optional Tasks

##### **Optional Task A - Develop a Model Graphical User Interface and Users Manual**

Utilize a commercially-available model graphical user interface (GUI) such as GWVistas to manage and update MODFLOW input datasets. The goal of this task is to enable partner agencies to be able to utilize the model for scenario examination over the historic records of water conditions with changed conditions such as recharge of new sources of water.

For this optional task the consultant would prepare a Model User's Manual. The Model User's Manual shall summarize the key steps to update and run the SBBM on hypothetical conditions using the chosen GUI to generate revised model inputs for scenario testing over the historic simulation period. The User's Manual would identify the process steps inside and outside the GUI to execute model simulations in pre-processing and post-processing model files and information.

**Deliverables:** The consultant shall provide a complete set of input files for the GUI such as GWVistas and all supporting GIS coverage and data components. Draft Model User's Manual and Final Model User's Manual that responds to comments on draft.

##### **Optional Task B - Verification of Mountain Front Recharge (MFR)**

Mountain front recharge is recognized by the project partners as under constrained by data. The approach developed by USGS in Danskin et al., 2006 has been extended into the current ISARM v. 1.1 and by extension into the planned SBBM. While the calibration sensitivity of MFR is anticipated to be addressed in the primary scope of work there is uncertainty about the locations for MFR and the magnitude of MFR.

Respondents are invited to propose methods and costs to perform additional assessments of MFR such as chloride mass-balance modeling to verify and/or quantify MFR, and what the schedule and data requirements are for the proposed scope.

**Deliverables:** To be determined.

### **Optional Task C – MODFLOW Simulation Code Selection**

Respondents are invited to propose alternative MODFLOW simulation codes to MODFLOW 2005 in this optional task. Any scope proposal should provide an explanation of expected benefits of an alternate code selection along with a proposed scope of work and fees to migrate the model input files and model interface files to an alternative code.

**Deliverables:** To be determined.

### **PROPOSAL DOCUMENTS AND CLARIFICATIONS**

If a Consultant interested in submitting a proposal requires clarification of this RFP, the Consultant shall notify Greg Woodside at San Bernardino Valley explaining the item or items they seek clarification regarding by email (email to [gregw@sبvmwd.com](mailto:gregw@sبvmwd.com)) by the date and time shown in this RFP. If the point in question is not clearly expressed in the RFP, San Bernardino Valley staff will publish an addendum providing clarification.

Clarifications will be distributed by email to each entity receiving this RFP.

### **Proposal Submittal**

All proposal documents must be submitted via email to Greg Woodside at [gregw@sبvmwd.com](mailto:gregw@sبvmwd.com) by the date and time shown in this RFP. Once the file(s) have been submitted and received, the submission is complete. Respondents will receive an email confirming receipt.

### **EVALUATION PROCESS AND CRITERIA**

Successful proposals will be well organized, sufficiently detailed and concise. The total proposal length shall not exceed 25 pages, excluding the rates sheet, price proposal and resumes.

Proposed work shall include all deliverables, including the deliverables outlined as the responsibility of the proposer.

Proposed budgets shall be broken out by task, including for optional tasks. If a proposal is being submitted for one or more additional tasks not identified in the Scope of Work, the proposal shall detail the scope of work and deliverables for such task(s).

### **Proposal Format and Content**

We recommend the following proposal structure, although the formatting of the proposal is at the discretion of the proposing firm.

1. **Approach to Work** – Provide a summary of your proposed approach to the work. Also provide any significant details in your approach to the tasks in the work

breakdown structure provided in the Scope of Work.

2. **Qualifications & Experience of the Team** – Identify the proposed project manager and proposed staff to complete this work. Include an organizational chart identifying each team members contribution, a summary of their qualifications, education, and expertise as it relates to the Scope of Work.

Proposers should clearly detail their qualifications to perform the Scope of Work.

Accordingly, the proposal should detail:

- Experience providing computer generated groundwater modeling services and water budgets.
- Demonstrated experience working on similar projects involving existing model refinements and calibration and the use of PEST to aid in model calibration.
- References verifying client satisfaction with similar services rendered.

Relate your experience to the scope of work provided in this RFP with at least three specific example project descriptions and the dates of service. Provide recent examples that do not exceed the past five years, and identify the staff members performing the work that are included on the proposers project team.

3. **Availability and Scheduling** – Describe your firm’s availability to perform the scope of work outlined for each task and include a schedule for each task. Include a Gantt Chart illustrating the work flow and task interdependences. Please be realistic about the actual availability of qualified staff.
4. **References** – For the proposed staff, list at least two relevant projects for which they held similar roles as what is described herein, and include the agency, staff contact name, email address, and telephone number for each. The proposal should list at least three relevant projects as references. References should include organization name, address, contact name, phone number, email address, and brief description of products/services provided (including dates of services). Describe briefly how that reference project work was similar to this project’s scope.
5. **Price Proposal** – Please include the billable hour for time and materials per assigned project manager and employees and a total price at the bottom of your cost proposal for your proposed team to perform the requested Scope of Work. The Proposer shall state specifically what is being furnished, such as materials, labor, software, and other equipment necessary to the complete the Scope of Work or expected number of hours with hourly rate.

## Disclosure of Conflict of Interest

Consultant shall disclose to SBVMWD any interest, direct or indirect, which could conflict in any manner or degree with the performance of service required. A potential conflict of interest may include, but is not limited, work related to projects in the project area, or contracts with parties who may have a financial interest in the outcome of the project. At SBVMWD's discretion, a potential conflict of interest may be waived or factored into the final award decisions and/or a modified Scope of Work.

## LINKS TO ACCESS/DOWNLOAD COPIES OF COMPUTER FILES

The links below may be used to access and download a copy of the files indicated.

File(s)	Link
Geoscience, 2020 reports on Integrated Model	<a href="#">ISARM Summary Report Sep-20.zip</a>
Stantec, 2023 Report	<a href="#">SBBA Model Update Report Stantec - 090823 w-o App_small.pdf</a>
Integrated Model files (zipped file) – this is for the Baseline simulation (1966 to 2016).	<a href="https://gofile.me/5ZO6N/Nq6pMSUaF">https://gofile.me/5ZO6N/Nq6pMSUaF</a>
Geoscience, 2015 report on Rialto-Colton Basin Model	<a href="#">Rialto Colton Basin Model Summary Report_1Dec15.pdf</a>
USGS, 2006 Report (Danskin, W.R., K.R. McPherson, and L.R. Woolfenden, 2006)	<a href="https://pubs.usgs.gov/of/2005/1278/">https://pubs.usgs.gov/of/2005/1278/</a>

If you have questions about these links, please contact Adekunle Ojo ([adekunleo@sbvmwd.com](mailto:adekunleo@sbvmwd.com)) or Greg Woodside ([gregw@sbvmwd.com](mailto:gregw@sbvmwd.com)).

## EVALUATION AND SELECTION

The following criteria and allocations may be used to evaluate the submitted proposals.

<b>CRITERIA</b>	<b>MAXIMUM POINTS</b>
Performing comparable work in refining and calibrating groundwater models with surface water interaction or integration	30
Demonstration of ability to meet project scope and objectives through the approach	20
Qualifications/experience of project team	30
References	15
Cost	5
Total	100

Evaluation of proposals shall be based upon a competitive selection process. Proposals will be reviewed by SBVMWD staff, Conservation District staff, and City of San Bernardino staff. SBVMWD, Conservation District, and City of San Bernardino may also utilize other parties or firms to assist with review of the proposals. A primary focus during review of the proposals will be on the experience and qualifications of the staff and firm in work performed on similar groundwater modeling projects. Interviews may be requested to distinguish between top-scoring firms. The Consultant’s proposed fee is not an overriding consideration in the evaluation process. San Bernardino Valley reserves the right to issue additional RFPs or other solicitations and, to modify or abandon this project before the award of the contract.

**Interview**

Interviews may be scheduled with select firms following the initial review of the proposals. The interview must be attended by the actual team members that will work on the project, including any key sub-consultants. The interview will consist of a 20-minute presentation by the project team, followed by a 30-minute question-and-answer period. Interviews may be web-based or in-person.

**CONTRACT**

A sample copy of San Bernardino Valley’s Agreement for Consulting Services is attached (Attachment 1) for your information. Upon approval by San Bernardino Valley’s Board of Directors, the selected Consultant is required to promptly execute the agreement. The selected Consultant must notify San Bernardino Valley immediately if they are unwilling to sign the contract so that San Bernardino Valley can begin negotiations with another firm.

## **REFERENCES CITED**

- Danskin, W.R., K.R. McPherson, and L.R. Woolfenden, 2006. Hydrology, Description of Computer Models, and Evaluation of Selected Water-Management Alternatives in the San Bernardino Area, California. U.S. Geological Survey Open-File Report 2005-1278, in cooperation with San Bernardino Valley Municipal Water District.
- GEOSCIENCE, 2009. San Bernardino Basin Area Refined Basin Flow Model and Solute Transport Model. Prepared for the San Bernardino Valley Municipal Water District, dated September 30.
- GEOSCIENCE, 2015. Development of a Joint Groundwater Model for the Rialto-Colton Groundwater Basin. Prepared for the San Bernardino Valley Municipal Water District, December 1.
- GEOSCIENCE, 2020. Santa Ana River Waste load Allocation Model Update Summary Report. Prepared for the Santa Ana Watershed Project Authority
- GEOSCIENCE, 2020. Upper Santa Ana River Integrated Model Summary Report. Prepared for the San Bernardino Valley Municipal Water District. September
- GEOSCIENCE, 2020. Upper Santa Ana River Integrated Model Technical Memorandum No. 3: Model Calibration. Prepared for the San Bernardino Valley Municipal Water District.
- Stantec, 2008. Draft Newmark Groundwater Flow Model Report, Newmark Groundwater Contamination Superfund Site, San Bernardino, California. Stantec Consulting Services, November 5, 2008.
- Stantec, 2023 "SAN BERNARDINO BASIN AREA GROUNDWATER FLOW MODEL UPDATE REPORT, Prepared for City of San Bernardino Municipal Water Department, Submitted to US EPA under Cooperative Agreement V-00T73801-0 SB, September 8
- Woolfenden, L.R. and Koczot, K.M. , 2001 . Numerical Simulation of Ground-Water Flow and Assessment of the Effects of Artificial Recharge in the Rialto-Colton Basin, San Bernardino County, California. U.S. Geological Survey Water-Resources Investigation Report 00-4243. Prepared in cooperation with San Bernardino Valley Municipal Water District.

## **ATTACHMENTS**

- ATTACHMENT 1: Sample copy of San Bernardino Valley's Agreement for Consulting Services