Notice and Agenda of a Meeting of the Yucaipa Sustainable Groundwater Management Agency

Wednesday, January 23, 2019 at 10:00 a.m.

City of Yucaipa, 34272 Yucaipa Boulevard
Yucaipa, California 92399
(909) 797-2489 | www.yucaipasgma.org

I. Call to Order

II. Roll Call

III. Introductions of Board Members and Public Participants

IV. Public Comments At this time, members of the public may address the representatives of the Yucaipa Groundwater Sustainability Agency on matters within its jurisdiction.

V. Review and Approval of Meeting Minutes

A. Meeting Minutes - November 14, 2018

VI. Discussion Items

A. Election of Officers for the Yucaipa Sustainable Groundwater Management Agency [Page 3 of 137]

B. Discussion Regarding Correspondence from the City of Calimesa - Notice of Withdrawal from the Yucaipa - GSA [Page 10 of 137]

C. Review of the Todd Groundwater Infiltration Report - Bob Tincher / Tim Kellett [Page 16 of 137]

D. Overview and Discussion Regarding the Monthly Progress Report for the Preparation of the Groundwater Sustainability Plan by Dudek - Tim Kellett [Page 102 of 137]

E. Status Report on the Sustainable Groundwater Management Act Grant Supporting Work by the Yucaipa Sustainable Groundwater Management Agency - Tim Kellett [Page 103 of 137]

F. Status Report on the Preparation of a Groundwater Sustainability Plan - Dudek / Tim Kellett

G. Status Report and Discussion Regarding the Development of the USGS / Geoscience Groundwater Model - Geoscience / Tim Kellett

VII. Presentation

A. Presentation by the United States Geological Survey Groundwater Flow Model

VIII. Topics for Future Meetings

A. Yucaipa Sustainable Groundwater Management Agency

B. Technical Advisory Group

IX. Comments by Board of Directors

X. Announcements - Future Meetings

A. Wednesday, February 27, 2019 at 10:00 am - Workshop Meeting

B. Wednesday, March 27, 2019 at 10:00 am - Workshop Meeting

C. Wednesday, April 24, 2019 at 10:00 am - Workshop Meeting

XI. Adjournment

Roll Call - Board of Directors

Purveyors	Present	Primary Representative	Present	Alternative Representative
South Mesa Water Company		David Armstrong		George Jorritsma
South Mountain Water Company		- -		- -
Western Heights Water Company		Mark Iverson		Tim Green
Yucaipa Valley Water District		Joseph Zoba		Jennifer Ares
Municipals				
City of Calimesa		Lori Askew		Bonnie Johnson
City of Redlands		Cecilia Griego		- -
City of Yucaipa		Ray Casey		Fermin Preciado
Regionals				
San Bernardino Valley MWD		Doug Headrick		Bob Tincher
San Gorgonio Pass Water Agency		Jeff Davis		Tom Todd
Stakeholders				
County of Riverside		Steve Horn		Jeff Johnson
County of San Bernardino		Bob Page		- -

* Quorum requires a total of five Purveyor, Municipal, Regional Members

BYLAWS OF THE
YUCAIPA SUSTAINABLE GROUNDWATER MANAGEMENT AGENCY
(Department of Water Resources Sub-Basin No. 8-02.07)

ARTICLE I - NAME, ORGANIZATION, REPRESENTATIVES, PRINCIPAL OFFICE

Section 1.1 Name. The name of this organization is the Yucaipa Sustainable Groundwater Management Agency (hereinafter referred to as the "Yucaipa-SGMA").

Section 1.2 Organization. The Yucaipa-SGMA was formed by a Memorandum of Agreement ("MOA") in 2017 which remains in full force and effect, by and among: South Mesa Water Company, South Mountain Water Company, Western Heights Water Company and Yucaipa Valley Water District, herein collectively referred to as the "Water Purveyors"; and the City of Calimesa, the City of Redlands, and the City of Yucaipa, herein collectively referred to as the "Municipalities"; and the San Bernardino Valley Municipal Water District, and the San Gorgonio Pass Water Agency, herein collectively referred to as the "Regionals." Each of the above-described entities is individually referred to as a "Party" and collectively referred to as the "Parties".

Section 1.3 Board of Directors. Each Party shall appoint a principal representative and alternative representative, who may be changed from time to time at the sole discretion of the designating Party. The principal representative appointed to the Yucaipa-SGMA shall be a senior executive management level employee of each designating Party. In the event that the appointed representative(s) is/are no longer employed by the appointing Party, the individual will be removed as a member of the Board of Directors of the Yucaipa-SGMA. Written confirmation from the governing board shall be provided to the Yucaipa-SGMA at the Principal Office following any change in representation.

Section 1.4 Principal Office. The principal office of the Corporation is hereby fixed and located at the offices of the San Bernardino Valley Municipal Water District, 380 East

Vanderbilt Way, San Bernardino, California 92408. The Parties hereby granted full power and authority to change said principal office from one location to another. Any such change shall be noted by the Secretary.

ARTICLE II - ROLES AND RESPONSIBILITIES

Section 2.1 Sustainable Groundwater Management Act. The Parties agree to jointly implement the Sustainable Groundwater Management Act ("SGMA"), codified in certain provisions of the California Government Code, including commencing with Section 65350.5, and codified in Part 2.74 of Division 6 of the California *Water Code*, commencing with Section 10720, and amending other provisions of the California *Government Code* and California *Water Code.*

Section 2.2 Groundwater Sustainability Plan. Specifically, the Parties agree to develop, implement, and maintain a Groundwater Sustainability Plan ("Plan") prepared pursuant to the Sustainable Groundwater Management Act (Part 2.74 of Division 6 of the Water Code, beginning with Section 10720) for the Yucaipa Basin (Department of Water Resources Sub-Basin No. 8-02.07) ("Basin"),

The following general principles shall guide the Parties in the implementation of a Groundwater Sustainability Plan: (a) Adopt a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management; (b) Monitor and report groundwater conditions to demonstrate that the Plan is achieving the sustainability goal for the basin; (c) Document the effect of the implementation of the Plan on adjacent basins; (d) Modify the Plan as needed, and report on a substantial compliance to the California Department of Water Resources; (e) Establish and report sustainable management criteria, projects, and management actions; and (f) Justify that the Plan provides a sustainably managed basin for 20 years following Plan implementation without adversely affecting the ability of an adjacent basin to achieve and maintain its sustainability goal.

Section 2.3 Powers and Duties. The Yucaipa-SGMA shall exercise the following powers:

A. To adopt rules, regulations, policies, bylaws and procedures governing the operation of the Yucaipa-SGMA.

B. To establish as-needed Ad Hoc and Standing advisory committees for making recommendations to the Board of Directors. Committees shall exist for the term specified in the action creating the committee, and the Board of Directors may dissolve a committee at any time through a majority vote of the Parties.

C. To monitor all public and private groundwater production and extractions.

D. To develop a Groundwater Sustainability Plan as described in Section 2.2.

E. To prepare an Annual Groundwater Report that reflects: all public and private groundwater extractions; natural and artificial recharge; return from use; water quality issues; contamination plumes; and other parameters deemed necessary by the Board of Directors to accurately determine the quantity and quality of the groundwater conditions in the Yucaipa Basin (Department of Water Resources Sub-Basin No. 8-02.07).

F. To determine the amount of additional artificial recharge for the Basin from imported sources as a complement to native sources, and to plan for the development and application of such additional sources of recharge.

G. By a majority vote, the Board of Directors may elect to exercise the following powers for a duration determined or modified as needed:

   a. To contract for the services of engineers, attorneys, planners, financial consultants, and separate and apart therefrom, to appoint agents and representatives to employ such other staff persons as necessary.

   b. To determine, assess, collect, account, and audit annual groundwater extraction charges to recover expenses related to groundwater recharge, administrative expenses, data collection, and report preparation as determined by the Board of Directors.

   c. To cooperate, act in conjunction, and contract with the United States, the State of California, or any agency thereof, counties, municipalities, public and private corporations of any kind (including without limitation, investor-owned utilities), and individuals, or any

of them, for any and all purposes necessary or convenient for the purposes of the Yucaipa-SGMA.

d. To accumulate operating and reserve funds and invest the same as allowed by law for the purposes of the Yucaipa-SGMA.

e. As may be permitted by law, to apply for and accept grants, contributions, donations and loans, including under any federal, state or local programs for assistance in developing or implementing any of its projects or programs in connection with any project untaken by the Yucaipa-SGMA.

f. To implement a cost-sharing methodology in a manner that qualifies as a pass-through charge under the Constitutional requirements of Proposition 218 and similar revenue-raising requirements.

g. To exercise any power necessary or incidental to the foregoing powers in the manner and according to the procedures provided for under the law applicable to the Parties to this Agreement.

ARTICLE III - MEETINGS

Section 3.1 Regular Meetings. The Parties shall hold regular quarterly meetings on the fourth Wednesday in January, April, July, October for the purpose of conducting routine business matters. The Parties by resolution may fix and adjust the time, date, and place of holding such meetings.

Section 3.2 Workshops and Special Meetings. The Parties may schedule, and conduct workshops and special meetings as needed at the direction of a majority of the Board of Directors. The Parties by resolution may fix the time, date, and place of holding such meetings.

Section 3.3 Voting Methodology. The voting structure for matters pertaining to the establishment and implementation of the administrative components of the Yucaipa-SGMA shall be by simple majority (51%) of the voting Parties, wherein each Water Purveyor, Municipality and Regional holds a single vote.

Section 3.4 Fees and Compensation. Representatives from each Party shall receive no compensation or expenses from the Yucaipa-SGMA.

Section 3.5 Ralph M. Brown Act. Notwithstanding any of the provisions of these Bylaws to the contrary, all meetings shall be subject to the Ralph M. Brown Act, commencing at Section 54950 of the Government Code of the State of California.

Section 3.6 Conduct of Meetings. The President or, in the absence of the President the Vice President, or, in the absence of the Vice President the Secretary, or, in the absence of the Secretary a Chairperson chosen by a majority of the Parties present, shall preside over the meeting.

Section 3.13 Quorum. A majority of the Parties constitutes a quorum for the transaction of business.

ARTICLE IV - OFFICERS

Section 4.1 Officers. The officers of the Yucaipa-SGMA shall be a President, a Vice President, a Secretary, a Treasurer.

Section 4.2 Election. The officers shall be chosen at the first Regular Meeting held each calendar year and each shall hold office until the officer shall resign, be removed, or be otherwise disqualified to serve, or the officer's successor is elected.

Section 4.3 Removal and Resignation. Any officer may resign, or may be removed, with or without cause, at any time. Vacancies caused by death, resignation or removal of any officer may be filled by a majority vote of the Parties.

Section 4.4 President. The President shall preside at all meetings of the Parties.

Section 4.5 Vice President. In the absence of the President, the Vice President shall perform all the duties of the President.

Section 4.6 Secretary. The Secretary shall keep a book of minutes of all meetings, with the time and place of holding, the names of those present, and actions taken by the Parties.

Section 4.7 Treasurer. The Treasurer shall keep and maintain adequate and correct books of account showing the receipts and disbursements of the Yucaipa-SGMA, and an account of its cash and other assets, if any. Such books of account shall at all reasonable times be open to inspection by any Director.

The Treasurer shall deposit all moneys of the Yucaipa-SGMA with such depositories as are designated by the Parties and shall disburse the funds of the Yucaipa-SGMA as may be ordered, and shall render to the Parties, regular statements of the financial condition of the Yucaipa-SGMA.

ARTICLE V - MISCELLANEOUS

Section 5.1 Execution of Documents. The Parties may authorize any officer or officers as agent or agents, to enter into any contract or execute any instrument in the name of and on behalf of the Yucaipa-SGMA and such authority may be general or confined to specific instances; and unless so authorized, no officer, agent or other person shall have any power or authority to bind the Yucaipa-SGMA by any contract or engagement or to pledge its credit or to render it liable for any purpose or to any amount.

Section 5.2 Inspection of Bylaws. The Yucaipa-SGMA shall keep in its principal office the original or a copy of these Bylaws, as amended or otherwise altered to date, certified by the Secretary, which shall be open to inspection by members of the public at all reasonable times during office hours.

Section 5.3 Fiscal Year. The fiscal year of the Yucaipa-SGMA shall begin July 1 of each year and end on the last day of June of the succeeding year.

Section 5.4 Construction and Definitions. Unless the context otherwise requires, the general provisions, rules of construction and definitions contained in the Law shall govern the construction of these Bylaws. If any section, subsection, sentence, clause or phrase of these Bylaws, or the application thereof, is contrary to the Law, the provisions of the Law shall prevail. Without limiting the generality of the foregoing, the masculine gender includes the feminine and neuter, the singular number includes the plural and the plural number includes the singular, and the term "person" includes a corporation as well as a natural person.

Section 5.5 Amendments. New Bylaws may be adopted, or these Bylaws may be amended or repealed by the vote of the Parties. No amendment to these Bylaws shall be effective until approved by the Parties.

Approved and adopted on May 23, 2018.
Amendment No. 1 to Section 1.3 approved on October 24, 2018.

City Of Calimesa

City Council Minutes of the Regular Meeting of
November 19, 2018

CALL TO ORDER **6:00 p.m. by Mayor Hewitt.**

ROLL CALL: MAYOR HEWITT, MAYOR PRO TEM DAVIS, COUNCIL MEMBER CLARK, COUNCIL MEMBER HYATT AND COUNCIL MEMBER MOLINA.

ABSENT: NONE

STAFF: CITY MANAGER JOHNSON, ASSISTANT CITY ATTORNEY KEARNS, CITY CLERK GERDES, PUBLIC WORKS DIRECTOR ASKEW, CITY ENGINEER THORNTON, PLANNING MANAGER LUCIA, DEPUTY FIRE CHIEF RODRIGUEZ, AND POLICE CHIEF PEMBERTON.

PLEDGE OF ALLEGIANCE

Pledge of Allegiance was led by Council Member Hyatt and dedicated to the memory of Darrell Teeters.

PRESENTATIONS

Federal Lobbyist Update – *David Turch, Turch & Associates*

David Turch of Turch & Associates provided an update of the Federal Legislative Actions, Bills and Earmarks for Calimesa.

West of Devers SCE Project Update – *Aileen Flores and Debrah Bishop, SCE*

Aileen Flores and Debrah Bishop of Southern California Edision provided an update to Council of the "West of Devers Project" which includes removal, replacement and upgrade of 48 miles of transmission lines from Palm Springs west to El Casco and eventually to the San Bernardino Substation. Debrah stated that 19 towers had been installed to date. A toll free number of 888-226-9916 was provided for customers to call.

COMMUNICATIONS FROM THE PUBLIC

None.

APPROVAL OF THE AGENDA

MOTION BY COUNCIL MEMBER MOLINA, SECONDED BY COUNCIL MEMBER HYATT, CARRIED 5-0 TO APPROVE THE AGENDA AS PRESENTED.

CONSENT CALENDAR

The following Consent Calendar items are expected to be routine and non-controversial. Council will act upon them at one time without discussion. Any Council Member or staff member may request removal of an item from the Consent Calendar for discussion.

1. APPROVAL OF CITY COUNCIL ACTION MINUTES.
   a) City Council action minutes of November 5, 2018 regular meeting.

2. RECEIVE AND FILE CITY COMMISSION & BOARD MINUTES.
   a) Planning Commission action minutes of September 10, 2018
   b) Planning Commission action minutes of October 8, 2018.

3. APPROVAL OF WARRANT REGISTERS.
   a. Check Register Report with a total of $84,305.77 - (Check Nos. 32981 to 33008)
   b. November 1, 2018 Council Payroll of $1,707.75
   November 1, 2018 Payroll of $54,329.51

4. WAIVE FULL READING OF ANY PROPOSED ORDINANCES ON THE AGENDA.

   This permits reading the title only in lieu of reciting the entire text of the Ordinances. This does not take policy action on the Ordinances or approve or disapprove any Ordinances on the agenda.

5. TRAVEL EXPENSES

   RECOMMENDATION: That the City Council move to approve the Travel Expenses Report for October 2018.

6. TREASURER'S REPORT FOR THE QUARTER ENDED SEPTEMBER 30, 2018

   RECOMMENDATION: That the City Council receive and file the Investment Report for the Quarter ended September 30, 2018.

7. FINAL TRACT MAP 32702

   RECOMMENDATION: That the City Council:
   1) Adopt Resolution 2018-62, approving Final Tract Map 32702;
   2) Accept the map dedication of Lots "A" through "H" for street and public utility purposes;
   3) Authorize the City Clerk to sign the statement on the map that acknowledges the City Council's approval.

8. FINAL TRACT MAP 32702-5

   RECOMMENDATION: That the City Council:
   1) Adopt Resolution 2018-63, approving Final Tract Map 32702-5;
   2) Accept the map dedication of Lots "A" through "J" for street and public utility purposes;
   3) Authorize the City Clerk to sign the statement on the map that acknowledges the City Council's approval.

MOTION BY COUNCIL MEMBER MOLINA, SECONDED BY MAYOR PRO TEM DAVIS CARRIED 5-0 TO APPROVE THE CONSENT CALENDAR AS PRESENTED.

CHAMBER OF COMMERCE REPORTS

Chamber President DuVall reported the following: Chamber Breakfast, October 9, 2018, Chamber Board meeting, October 10, 2018, Candidate Forum, October 17, 2018, Ice Cream Social at Mesa Grande Academy, October 18, 2018, Christmas Parade meeting, October 24, 2018, Sr. Center Boutique Ribbon Cutting, October 24, 2018, Riverside County Volunteer Award Dinner, October 24, 2018. She thanked Mayor Hewitt for being selected as a volunteer award winner. She further reported a fundraiser held at the Plantation on the Lakes on October 26, 2018. She announced travel training routes to Disneyland and Oceanside, distribution of welcome bags to homes and business owners, Christmas Parade on December 15, 2018 and Annual Installation Dinner, January 10, 2019.

POLICE CHIEF COMMENTS & REPORTS

Chief Pemberton reported 4,927 calls for service for 2018, stating calls were down from prior year. He further repoted 121 arrests to date for 2018.

FIRE CHIEF COMMENTS & REPORTS

Deputy Fire Chief Rodriguez reported 1,554 calls for service since January 1, 2018. He further reported 13 plan checks were completed for October and one annual inspection.

MAYOR & COUNCIL MEMBER REPORTING OF COUNTY & REGIONAL MEETINGS

This is the time for comments, announcements and/or reports on meetings attended at public expense as required by AB 1234.

Council Member Molina reported that she attended the RTA Budget and Finance Committee and Annual RTA Board Meeting.

Council Member Hyatt reported that he attended a SCAG meeting where they discussed the "hyperloop" transportation project. He further reported that he attended a RCTC meeting where they spoke about a "per square foot warehouse fee" and a north/south connection at the I-10 and 60.

BUSINESS ITEMS

9. APPROVAL OF FUNDING, CONSTRUCTION AND ACQUISITION AGREEMENT AND JOINT COMMUNITY FACILITIES AGREEMENT FOR COMMUNITY FACILITIES DISTRICT 2018-1 (SUMMERWIND TRAILS).

RECOMMENDATION: That the City Council:

1. ***Funding, construction and Acquisition Agreement for Community Facilities District 2018-1 (Summerwind Trails)***
2. ***Resolution No. 2018-64, a Resolution of the City Council of the City of Calimesa approving the form of a Joint Community Facilities Agreement by and among the City of Calimesa, San Gorgonio Land, LLC And Yucaipa Valley Water District***

Pertaining to the City of Calimesa Community Facilities District No. 2018-1 (Summerwind Trails)

3. ***Authorize staff to make administrative changes to agreements prior to final execution***

City Manager Johnson presented the agenda report.

After Council discussion the following actions were taken:

MOTION BY COUNCIL MEMBER MOLINA, SECONDED BY COUNCIL MEMBER HYATT, CARRIED 5-0 TO APPROVE THE FUNDING, CONSTRUCTION AND ACQUISITION AGREEMENT FOR COMMUNITY FACILITIES DISTRICT 2018-01(SUMMERWIND TRAILS)

MOTION BY COUNCIL MEMBER MOLINA, SECONDED BY COUNCIL MEMBER HYATT, CARRIED 5-0 TO ADOPT RESOLUTION NO. 2018-64, A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CALIMESA CALIFORNIA, APPROVING THE FORM OF A JOINT COMMUNITY FACILITIES AGREEMENT BY AND AMONG THE CITY OF CALIMESA, SAN GORGONIO LAND, LLC AND YUCAIPA VALLEY WATER DISTRICT PERTAINING TO THE CITY OF CALIMESA COMMUNITY FACILITIES DISTRICT NO. 2018-01(SUMERWIND TRAILS)

MOTION BY COUNCIL MEMBER HYATT, SECONDED BY COUNCIL MEMBER MOLINA, CARRIED 5-0 TO AUTHORIZE STAFF TO MAKE ADMINISTATIVE CHANGES TO AGREEMENT PRIOR TO FINAL EXECUTION.

10. AGREEMENT WITH RIVERSIDE COUNTY FOR IMPROVEMENTS TO CHERRY VALLEY BLVD. INTERCHANGE.

RECOMMENDATION: That the City Council approve Amendment 1 - Service Agreement by and between County of Riverside and City of Calimesa for Cherry Valley Boulevard /Interstate10 Interchange Improvements.

City Manager Johnson presented the agenda report.

After Council discussion the following action was taken:

MOTION BY COUNCIL MEMBER HYATT, SECONDED BY COUNCIL MEMBER MOLINA, CARRIED 5-0 TO APPROVE AMENDMENT 1 – SERVICE AGREEMENT BY AND BETWEEN THE COUNTY OF RIVERSIDE AND CITY OF CALIMESA FOR CHERRY VALLEY BOULEVARD/INTERSTATE 10 INTERCHANGE IMPROVEMENTS.

Assistant City Attorney Kearns recused himself from Item No. 11 due to a potential conflict of interest and left the room.

11. GROUNDWATER SUSTAINABILITY AGENCY MEMBERS' REQUEST FOR CONFIRMATION OF THE NOTICE OF WITHDRAWAL FROM THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE YUCAIPA SUB-BASIN

NO. 8-02.07.

RECOMMENDATION: That the City Council confirm the Notice of Withdrawal from the Groundwater Sustainability Agency for the Yucaipa Sub-Basin No. 8-02.07 and authorize the Mayor to execute the letter of confirmation.

City Manager Johnson presented the agenda report.

After Council discussion the following action was taken:

MOTION BY COUNCIL MEMBER HYATT, SECONDED BY COUNCIL MEMBER MOLINA, CARRIED 5-0 TO CONFIRM THE NOTICE OF WITHDRAWAL FROM THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE YUCAIPA SUB-BASIN NO. 8-02.07 AND AUTHORIZE THE MAYOR TO EXECUTE THE LETTER OF CONFIRMATION.

Assistant City Attorney Kearns returned to the meeting.

COUNCIL MEMBERS' COMMENTS & REPORTS

This is the time for additional general comments, announcements, reports on meetings attended at public expense as required by AB 1234, requests of staff, and other issues of concern to Council Members may be presented briefly at this time. The Council may not legally take action on any item presented at this time other than to direct staff to investigate a complaint or place an item on a future agenda unless (1) by a majority vote, the Council determines that an emergency situation exists, as defined by Government Code § 54956.5 or (2) by a four-fifths vote, the Council determines that there is a need for immediate action and the need for action arose subsequent to the agenda being posted as required by Government Code § 54954.2(b).

Council Member Clark announced that he attended the Sr. Center Thanksgiving Dinner, adding it was a great event with a great meal.

Council Member Molina announced that she attended the Veteran's Day Ceremony at the Yucaipa Community Park, adding that Congressman Ruiz was the Keynote speaker. She further announced that she attended a "Travel Training" with a trip to Disneyland and Oceanside and expressed her desire to train the community on how to travel out of town on public transportation, utilizing the area bus companies that connect. She further announced a "Veterans Fundraising Dinner" to adopt a wing at the VA Hospital and distribute gifts to the Veterans. She further announced "Santa in the Parks" for December 4, 5 & 6, 2018.

Council Member Hyatt spoke regarding "Uber in the City" and a presentation on a future Council agenda. He announced that he attended the Riverside County Volunteer Award event, adding that his wife Brenda was presented with a volunteer award from Supervisor Marion Ashley. He further announced that he attended the Sr. Center Thanksgiving Dinner, stating it was a great event with great food from Kafe Royale.

Mayor Hewitt announced that he attended and spoke at the Veteran's Day Ceremony, adding it was a great event with a large crowd.

CITY MANAGER REPORTS

None.

RECESS TO CLOSED SESSION

Assistant City Attorney Kearns announced the closed session items and Mayor Hewitt recessed the meeting to Closed session at 7:13 p.m.

CLOSED SESSION ITEMS

A. CONFERENCE WITH LEGAL COUNSEL – EXISTING LITIGATION
Pursuant to paragraph (1) of subdivision (d) of Section 54956.9 –
Name of Case: Alliance for Constitutional Sex Offense Laws, Inc v. City of Calimesa, Case No. RIC 1819994

CLOSED SESSION ANNOUNCEMENT

A. No Reportable Action.

ADJOURNMENT

Meeting adjourned at 7:40 p.m. to the Regular Meeting of the City Council on Monday, December 3, 2018, at 6:00 p.m.

Respectfully Submitted,

Darlene Gerdes, City Clerk

MOTION BY COUNCIL MEMBER HYATT, SECOND BY COUNCIL MEMBER MOLINA, CARRIED 5-0 TO APPROVE THE MINUTES OF NOVEMBER 19, 2018 REGULAR MEETING AS PRESENTED.

APPROVED: December 3, 2018

IN COOPERATION WITH:
SAN GORGONIO PASS WATER AGENCY
CITY OF CALIMESA
CITY OF YUCAIPA
CITY OF REDLANDS
SOUTH MESA WATER COMPANY
WESTERN HEIGHTS WATER COMPANY
YUCAIPA VALLEY WATER DISTRICT

FINAL

INFILTRATION TESTING AT ELEVEN INVESTIGATION SITES IN THE YUCAIPA BASIN

YUCAIPA, CALIFORNIA

January 2019

TODD GROUNDWATER

2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
510.747.6920
ww.toddgroundwater.com

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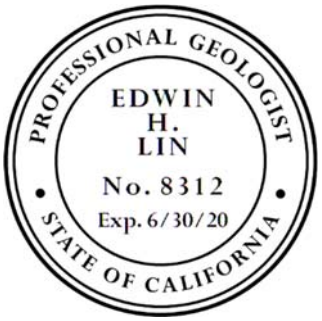

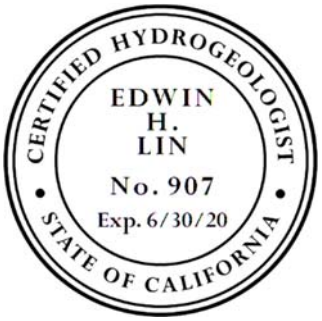

Edwin H. Lin, PG, CHG

Principal Hydrogeologist

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1. INTRODUCTION

The San Bernardino Valley Municipal Water District (Valley District) and its partner agencies are evaluating the feasibility of recharging State Water Project (SWP) water and recycled water and enhancing local stormwater capture in the Yucaipa Basin. Successful management of the Yucaipa Basin conjunctively with available surface water supplies will increase the basin safe yield to meet projected groundwater demands and help to achieve sustainability goals and management criteria to be established in the Yucaipa Basin Groundwater Sustainability Plan (GSP).

In March 2018, Valley District contracted Todd Groundwater to perform infiltration tests at (up to) thirteen sites in the Yucaipa Basin. Infiltration testing represents an important step in evaluating site recharge capacity and feasibility. Short-term tests using field-scale test basins were selected to balance the need to test a reasonably-sized area at each investigation site, while considering the substantial number of sites and water delivery constraints of local fire hydrants used for test water. Combined with the current understanding of the basin hydrogeologic conditions, infiltration test results were used to satisfy the following project objectives:

- Confirm site infiltration capacity and recharge suitability. Favorable conditions are characterized by (1) predominantly coarse-grained (sand/gravel) vadose zone lithology that allow unhindered vertical migration of recharge water to the water table; (2) sufficient depth to water and horizontal distance from vertical hydraulic barriers (e.g., faults) to accommodate future recharge mounding; and (3) an upgradient location relative to groundwater production areas/pumping depressions

- Develop planning-level estimates of long-term infiltration rates to support future evaluation and design of recharge facilities to optimize groundwater water level, storage, and safe yield and water quality benefits in the Yucaipa Basin

- Recommend additional field investigations (e.g., monitoring well construction and pilot scale testing) to address remaining knowledge gaps at high-priority investigation sites

Guidelines for implementation of infiltration testing were developed in a Work Plan developed by Todd Groundwater (Todd, 2017). Due to the inability to gain access to one privately-owned site (Garden Air Creek) and the de-prioritization of a second site due to its downgradient location in the Yucaipa Basin (Wildwood Creek at 6th Street), infiltration testing was conducted at only eleven of the original thirteen investigation sites included in the Work Plan. Two infiltration tests were conducted at the Oak Glen Creek Basins to assess the significance of surficial low-permeability sediments on infiltration rates. Accordingly, a total of twelve infiltration tests were completed.

This report describes the infiltration test methods, activities, and results. Calculated infiltration rates are presented along with preliminary estimates of long-term infiltration

rates for a full-scale recharge basin to support the Yucaipa Basin GSP process. Knowledge gaps and recommendations for additional investigation work at favorable recharge sites are also presented to support the design of new recharge facilities and rehabilitation of existing recharge/storm detention basins.

1.1. Scope of Work

The scope of work for the investigation included the following activities:

1. Attendance at a pre-construction meeting (held on May 15, 2018) to confirm site access for heavy machinery; delineate test basin excavation limits and dimensions; confirm preferred water source, pressure, and anticipated delivery rates; and review procedures for test basin construction, soils management requirements, conveyance and instrument setup, and site security fencing and traffic control.

2. Refinement of detailed site-specific work plans to accommodate physical constraints prior to field mobilization, and determination of the optimal test sequence based on site prioritization and intra-site proximity to consolidate equipment requirements and minimize rental costs.

3. Fabrication of two flow control systems/skids and associated valves and switches for automated flow and water level control and alert functions.

4. Implementation of twelve infiltration tests at eleven sites (conducted over a twelve-week period from July 9 to October 1, 2018). Activities included (a) mobilization and demobilization of equipment and heavy machinery, (b) excavation and backfill of an approximately 1,000-square foot (ft^2) by 5-foot deep test basin, and (c) installation of test equipment, site monitoring components, security fencing, and traffic ramps and signage to ensure reliable collection of field data and public safety.

5. Routine site visits to document flow rates/volumes and non-routine site visits to troubleshoot/address equipment issues and modify the test approach to maximize the value of collected data.

6. Project Management. Todd Groundwater subcontracted Drewelow Remediation Equipment Inc. (DRE) (Escondido, California) to fabricate the flow control systems/skids and implement the field infiltration testing. Todd Groundwater provided overall project management, field supervision, and schedule coordination for the project.

1.2. Previous Investigations

Over the past several years, Valley District and its partner agencies have been proactive in building the technical foundation for developing a groundwater recharge program in the Yucaipa Basin. Recent studies and investigations have improved the understanding of local

hydrogeologic conditions, including the geologic structure of the basin, vadose zone and aquifer characteristics, location and hydraulic effect of geologic faults, groundwater level trends, and groundwater quality distribution (Geoscience, 2014b; USGS, 2001 and 2016). Additionally, estimates of groundwater storage, usable storage, and safe yield (Geoscience, 2014a and 2015) have revealed the need to manage the groundwater basin conjunctively.

Yucaipa Valley Water District has been recharging in the Yucaipa Basin for the past decade. However, only two studies have directly tested the infiltration capacity of surficial sediments, findings from which are useful for interpreting infiltration test results for this investigation. In 1969, the USGS performed a 26-day pilot-scale infiltration test at the Wilson Creek Basins (Mooreland, 1970). The test involved creating a 100-feet square test pit by scraping the upper 1-foot of basin sediment into a 4-foot high berm. A total of 27 acre-feet of water over a wetted area ranging from 3,000 to 5,125 ft^2 was infiltrated. Ponded water levels in the test pit ranged up to 3 feet and averaged less than 1 foot. Results indicated an infiltration rate of approximately 16 feet/day (after initial adsorptive forces and air entrainment influences were removed), with a gradual decline to approximately 12 feet/day after 14 days, and 9 feet/day after 26 days. Declines were attributed to the development of a shallow perching condition about 30 feet below ground surface caused by apparent fine-grained sediments and observed in a shallow piezometer during testing.

From December 2017 through January 2018, the City of Yucaipa, Yucaipa Valley Water District (YVWD), Valley District, and San Bernardino County Flood Control District (SBCFCD) performed full-scale infiltration testing at the three basins (two detention basins to the west and easterly debris basin) comprising the Oak Glen Creek Basins (City of Yucaipa, et al., 2018). SWP water was used to pre-wet all three basins for eleven days prior to testing. Testing consisted of isolating each basin sequentially until a steady-state recharge rate was achieved in all three basins. Results revealed steady-state infiltration rates of 4.3 feet/day in the upper, eastern debris basin, 3.3 feet/day in the middle basin (the same basin tested for this investigation), and 1.8 feet/day in the lower, western basin. It is noted that the full-scale infiltration testing was conducted on the undisturbed basin bottoms (with no removal of historically accumulated fine-grained clogging materials).

In addition to local investigations, foundational research in clogging dynamics in surface spreading basins (Phipps, D.W., Lyon, S., and Hutchinson, A., 2007; see Appendix A) and discussions with Orange County Water District (OCWD) (Adam Hutchinson, Recharge Planning Manager, personal communication, November 7, 2018) were used to predict initial and long-term infiltration rates for full-scale recharge basins at each investigation site. Descriptions are provided in the site-specific results of the assumptions used to account for unknown variables, including the dimensions of a full-scale recharge facility, site recharge goals and active spreading period, and approach/frequency of basin maintenance.

2. INVESTIGATION SITES AND TEST METHODOLOGY

2.1. INVESTIGATION SITES

Figure 1 show the locations of the eleven investigation sites in the Yucaipa Basin for which infiltration testing was completed. Site information is summarized in **Table 1**, including the assessor's parcel number, test basin location relative to previously-established Yucaipa Subbasin boundaries (Geoscience 2014a), regulatory jurisdiction, geographic coordinates, water source, and site directions.

The eleven investigation sites include undeveloped parcels and storm detention basins/channel reaches along Oak Glen Creek, Wilson Creek, and Wildwood Creek. Sites are owned by the San Bernardino County Flood Control District (5 sites), City of Yucaipa (5 sites), and South Mountain Water Company (1 site). All sites are located within an approximately 3-mile radius of downtown Yucaipa, California.

Six investigation sites ("SBCFCD Permit Sites" in Table 1) are located within stream channels (Wilson Creek, Oak Glen Creek, and Wildwood Creek) or existing storm detention basin facilities under jurisdiction of SBCFCD. All six sites are located on parcels owned by SBCFCD except for the Wildwood Creek Basins, which are owned by the City of Yucaipa.

Of the five sites not under the jurisdiction of SBCFCD, four investigation sites are owned by the City of Yucaipa (Tennessee Street Basins, Chapman Heights Basins, Dunlap Channel, and a parcel south of Wildwood Creek near California Street adjacent to EX-5). One site is owned by the South Mountain Water Company (adjacent to exploratory borehole EX-7).

2.2. INFILTRATION TEST METHODOLOGY

Infiltration tests involved the temporary construction of an approximately 1,000-square-foot (ft^2) test infiltration basin, installation and connection of a flow control system (skid) to a local fire hydrant to automate filling and maintenance of a constant ponded water level, and monitoring of added water volumes over an approximate 2-week testing period.

Testing was conducted at two investigation sites at a time, with site setup and test initiation staggered one week apart. This process was repeated as needed to complete twelve infiltration tests at the eleven investigation sites. The field program design provided the following advantages: (1) the contractor was on a fixed weekly schedule for test basin excavation, equipment mobilization/demobilization and monitoring activities, and (2) materials and labor (including fire hose, manifolds, basin trees, and traffic ramps/signage) were required for exactly two sites for the duration of the project.

Table 1

Investigation Site Information

Investigation Site	Yucaipa Subbasin	Owner	APN	Longitude[1]	Latitude[1]	USGS 7.5' Quad	TRS and 1/4 Section (San Bernardino)	Site Topography	Water Source	Directions
SBCFCD Permit Sites										
Wilson Creek Basins (EX-1)	Gateway	SBCFCD	032-105-227	-117.030015	34.051027	Yucaipa	1S/1W-30N	Within Existing Basin	YVWD Hydrant	1000 feet north of Oak Glen Road, 1,400 feet west of Fremont Street, third basin (including debris basin) west of Fremont St
Oak Glen Creek Basins (EX-2)	Gateway/ Wilson Creek	SBCFCD	032-131-112	-117.032033	34.044858	Yucaipa	1S/1W-31D	Within Existing Basin	YVWD Hydrant	off Eucalyptus Ave, 800 feet east of Bryant Street; second (middle) basin from Bryant Street
Wilson Creek III (EX-3)	Gateway	SBCFCD	030-319-104	-117.043082	34.043637	Yucaipa	1S/2W-36F	New Temporary Basin	YVWD Hydrant	1,800 feet south of Oak Glen Road, 600 feet north of Persimmon Ave at low elevation point east shoulder of 2nd Street;
Wildwood Creek Basins (EX-4)	Oak Glen	City of Yucaipa	124-227-103	-117.019498	34.014135	Yucaipa	2S/1W-7H	Within Existing Basin	SMWC hydrant	500 feet south of Wildwood Canyon Road, 3,800 feet east of Bryant Street
Wildwood Creek at California St (EX-5)	Calimesa	SBCFCD	031-922-103	-117.038309	34.014324	Yucaipa	2S/2W-12H	Within Existing Channel	SMWC hydrant	500 feet downstream (west) of California Street overpass
Oak Glen Creek at Western Heights (EX-9)	Western Heights	SBCFCD	031-801-328	-117.081389	34.030639	Yucaipa	2S/2W-3C	Within Existing Channel	YVWD Hydrant	250 feet upstream (northeast) of Avenue D overpass
Non-SBCFCD Permit Sites										
Tennessee Street Basins	(northwest of) Western Heights	City of Yucaipa	029-940-118	-117.105355	34.034223	Yucaipa	1S/2W-32R	Within Existing Basin	YVWD Hydrant	150 feet north of Tennessee Street, 700 feet west of 16th Street
Chapman Heights Basins	(northwest of) Western Heights	City of Yucaipa	029-932-105	-117.091425	34.037633	Yucaipa	1S/2W-33K	New Temporary Basin	YVWD Hydrant	300 feet northeast or intersection between Chapman Heights Road and 13th Street
Dunlap Channel	Western Heights	City of Yucaipa	030-103-207	-117.096333	34.030576	Yucaipa	2S/2W-4C	Within Existing Channel	WHWC hydrant	100 feet north of 14th Street and 280 feet east of Avenue D
City of Yucaipa at California St (EX-5)	Calimesa	City of Yucaipa	031-922-105	-117.037877	34.013731	Yucaipa	2S/2W-12H	New Temporary Basin	SMWC hydrant	300 feet west of California Street and 200 feet south of Wildwood Creek
10th St and Avenue E (EX-7)	Calimesa	South Mountain Water Company	031-806-107	-117.079686	34.025108	Yucaipa	2S/2W-3L	New Temporary Basin	YVWD Hydrant	100 feet east of 10th street between Avenue E and Washington Drive

Notes:
SBCFCD - San Bernardino County Flood Control District
YVWD - Yucaipa Valley Water District
WHWC – Western Heights Water Company
SMWC – South Mesa Water Company
1 - North America Datum 1983

The construction of each test infiltration basin was accomplished using a backhoe loader and involved earthwork, temporary soils management, and backfilling and final grading. With the exception of one test, basins were excavated to 5 feet below ground surface (feet-bgs) with excavated material stockpiled next to the basin. Native material was used to create shallow berms for one test at the Oak Glen Creek Basins to test the infiltration through undisturbed sediment at the ground surface. Ponded water depths typically ranged from 2.5 and 3.0 feet.

Test basins were constructed with an approximate 1-to-1 horizontal-to-vertical slope on one sidewall for public safety. At the completion of infiltration testing, each test basin was backfilled with the excavated material, and the site was returned to its original, pre-disturbed grade.

General mobilization, testing, and demobilization tasks at each investigation site are summarized below:

- Excavation of a test recharge basin at each site;
- Movement and staging of vehicles and heavy equipment along access routes and in vicinity of infiltration test basin;
- Temporary storage of excavated soils adjacent to the test basin;
- Installation of construction fencing to ensure public safety and prevent vandalism of water hoses and flow control equipment;
- Placement of traffic-rated ramps (to protect fire hose crossing public roads, driveways, and/or sidewalks) and traffic-control signs to direct vehicular and pedestrian traffic;
- Discharge of water into the test basin up to 14 days;
- Backfilling the test basin with excavated material to return the site to pre-disturbed grade.

2.3. Water Source, Flow Control, and Telemetry System

Average vertical infiltration rates at each site ranged from less than 1 feet per day (feet/day) up to approximately 50 feet/day. This equated to test water needs ranging from less than 5 gallons per minute (gpm) up to 200 gpm. Higher infiltration rates occurred in basins underlain by a thick deposit of coarse-grained vadose zone sediments (e.g., within existing larger flood control facilities, Oak Glen Creek Basins, and Wildwood Creek). Lower infiltration rates occurred in test basins underlain by finer-grained sediments.

To accommodate the potentially broad range of test water needs, a direct connection to a local fire hydrant owned by either Yucaipa Valley Water District (YVWD), South Mesa Water company (SMWC), or Western Heights Water Company (WHWC) was used to supply test water for each infiltration test. The use of a hydrant precluded the need for onsite water storage and provided adequate positive pressure in the water conveyance system to maintain flows into the basin required to achieve constant-head conditions. Water retailers include YVWD, SMWC, and WHWC.

Additionally, a robust, automated engineered water conveyance and flow control system with remote terminal unit (telemetry system) was fabricated by DRE and installed at each test basin. The flow control system provided the following benefits:

1. The flow rate was typically automatically controlled, providing a high range of discharge rates to match variable infiltration rates during testing and from site-to-site. Due to very high infiltration capacities at two sites, the largest 3" manual valve was opened partially to ensure constant water levels were maintained.
2. The flow rate range was controlled by adjustment of the pressure regulator setting and hand valves to accommodate variable pressure from different water sources.
3. No water storage tank was needed.
4. The system was installed with built-in telemetry to provide real-time flow rates into the basin, ponded water level, and notifications of exceedances of low-water and high-water level thresholds.
5. The system precluded Valley District or DRE staff to manually monitor flow volume and pond height.
6. Redundancy of flow meters at the hydrant connection and on two 1-inch and one 3-inch discharge lines allowed for flow rates entering the test basin to be reliably tracked.
7. The flow control system was supported by the edge of the test basin with two supporting feet at the bottom of the basin. The small footprint did not influence the infiltrating area of the test basin.

The conveyance system includes a totalizing flow meter, backflow prevention device, and hand valves (supplied by the owner of each hydrant). Water was conveyed from the hydrant by a combination of 4-inch diameter fire hose to an engineered manifold made with rigid steel pipe. A 4-inch diameter flexible fire hose was needed to maintain water pressure over the distances (generally between several hundred feet up to 1,500 feet) and head differences between the hydrant and test basin. A digital paddle meter was installed on the 4" diameter line before a manifold that separated the flow into three individual discharge pipes (one 3-inch diameter pipe and two 1-inch diameter pipes). A hand valve on the 3" diameter discharge line, and float valves and totalizing flowmeters on each 1" diameter line allowed for flow into the test basin to be automatically controlled to maintain ponded water depths typically between 2.5 and 3.0 feet. The three individual flowmeters were used to verify flows from the single fire hydrant flowmeter.

The system would also be equipped with high and low water level sensors and telemetry to communicate if water levels fell below 1 feet or exceeded 4 feet. Additionally, a low-pressure sensor upstream of the pressure regulator on the 4-inch manifold provided an automated warning if pressure from the fire hose dropped below a certain threshold, indicating that the water source itself or the fire hose was compromised and not able to

provide water to the test basin. The low-pressure alarm was never triggered during the field investigation.

2.4. Monitoring Activities

The telemetry built in to the engineered water conveyance and flow control system minimized the need for onsite monitoring. Nevertheless, documentation of water meter readings for each test basin and maintenance of the systems was needed, especially at three sites where flows into the test basin fell below the minimum threshold of the digital paddle meter (approximately 25 gpm). For these three tests, routine twice-weekly site visits by DRE staff were supplemented by additional site visits by Valley District staff to document water meter readings and calculate average vertical infiltration rates for time periods between meter readings.

It is likely that recharged water reached the water table at some investigation sites during or following infiltration testing. Groundwater level monitoring was conducted during testing at one site (Wildwood Creek Basins), where an existing piezometer (YRP-PZ3; constructed in EX-4) is located relatively close to the test basin, and the depth to water (104 feet-bgs in 2014) is shallow enough that a measurable groundwater level response was expected. Confirmation of such a water level response is useful for validating the vertical migration of recharge water and inferring the degree of horizontal spreading of recharged water below the test basin. Water level monitoring in existing piezometers at the Wilson Creek Basins and Oak Glen Creek Basins was not performed, due to the significant horizontal distance between the piezometer and test basin and relatively deep water table at both sites (272 and 302 feet-bgs in 2014, respectively).

2.5. Best Management Practices

All field activities were conducted to ensure minimal disturbance to native vegetation and minimize soil erosion along channel banks. The following site management practices were implemented to satisfy requirements specified by the SBCFCD:

- No sediments were discharged to the storm drain system or receiving waters.
- Sediments generated on the construction site were retained.
- No construction-related materials, waste, spills, or residue were discharged to streets, drainage facilities, receiving waters, or adjacent property by wind or runoff.
- Non-stormwater runoff from equipment, vehicle washing, or any other activity were contained within the project site.
- Erosion from slopes and channels were prevented.
- Grading was not conducted during the wet season (October 1st through May 31st). All erosion-susceptible slopes were protected to prevent sediment discharge from the project site. Straw wattles were used to contain temporary stockpiled soils.

3. INFILTRATION TEST RESULTS

Infiltration testing was conducted over an uninterrupted 12-week period from July 9 to October 1, 2018. A synopsis of each infiltration test is presented on **Figures 2 through 13** and depict calculated infiltration rates, cumulative water volume added, and pond water levels over time, along with selected field photographs. Key conclusions, remaining knowledge gaps, and recommendations for additional investigation work are included in the bottom right text box of each figure.

Table 2 summarizes the results of all twelve infiltration tests, including the test period, basin dimensions, infiltrating area, total volume of infiltrated water, and calculated one-dimensional vertical infiltration rates. Investigation sites are arranged in the order that tests were completed. Infiltration rates from the main constant-head tests were calculated based on data near the end of each test after flow rates had stabilized and become effectively asymptotic (discussions of infiltration rate trends are discussed further in respective site-specific discussions later in this section). As shown in the table, infiltration rates were calculated based on an infiltrating area equal to the basin bottom footprint only (high infiltration rate) as well as based on an infiltrating area equal to the basin bottom footprint and saturated sidewall area (low infiltration rate). An average rate from the constant-head test based on calculated high and low infiltration rates is also presented.

All infiltration tests were concluded by shutting off the water source to the test basin and tracking the rate of pond level decline (herein referred to as a falling-head test). In one test basin with a low infiltration rate (Wildwood Creek at California Street), two falling-head tests were conducted. Differences in pond water levels recorded every hour during draining were used to calculate infiltration rates in units of feet/day based on an infiltrating area of the basin bottom footprint only. For test basins with very high infiltration rates, only one or two hourly measurements were recorded. In contrast, for test basins with low infiltration rates, up to 10 or more hourly measurements were recorded. The high and low infiltration rates calculated from the falling-head test are presented in Table 2. Infiltration rates calculated from the falling-head test are not considered as reliable as those calculated from constant-head tests due to the change in driving head when the basin is draining, but they do provide a good confirmation of the accuracy of metered flows during the constant-head test.

Table 2

Yucaipa Basin Infiltration Tests Results

Test Site	Adjacent Exploratory Boring	Test Start	Test End	Basin Dimensions			Test Basin Infiltrating Area		Total Infiltrated Water		Infiltration Rate Constant-Head Test			Infiltration Rate Falling-Head Test[c]	
				Length (ft)	Width (ft)	Ave. Pond Depth (ft)	Bottom Only (ft^2)	Bottom + Sidewalls (ft^2)	Gallons	Acre-Feet	High[a] (ft/d)	Low[b] (ft/d)	Average (ft/d)	High (ft/d)	Low (ft/d)
Tennessee Street Basins		7/9/2018	7/23/2018	32	30	2.5	960	1,270	871,782	2.68	12.3	9.2	10.8	11.1	9.5
Dunlap Channel		7/16/2018	7/30/2018	33	30	2.5	990	1,305	22,895	0.07	0.1	0.1	0.1	0.19	0.18
Chapman Heights Basin		7/23/2018	8/6/2018	37	33	2.5	1,221	1,571	974,084	2.99	11.5	8.8	10.2	9.5	7.3
10th Street and Avenue E	EX-7	7/30/2018	8/13/2018	39	36	2.1	1,404	1,719	1,451,335	4.45	13.4	12.0	12.7	11.5	9.8
Wildwood Creek at California Street	EX-5	8/6/2018	8/20/2018	42	21	2.5	882	1,197	270,060	0.83	4.0	2.9	3.5	3.1	2.4
Wilson Creek Basins	EX-1	8/13/2018	8/27/2018	32	29	3.0	928	1,294	882,120	2.71	8.7	6.1	7.4	7.4	5.5
City of Yucaipa at California Street	EX-5	8/20/2018	9/3/2018	33	32	3.0	1,056	1,446	1,646,180	5.05	18.5	13.6	16.0	16.8	14.5
Wilson Creek III	EX-3	8/27/2018	9/10/2018	45	20	2.0	900	1,160	3,426,110	10.51	59.2	44.8	52.0	N/A; too fast	
Oak Glen Creek Basins - Excavated	EX-2	9/3/2018	9/17/2018	32	32	2.5	1,024	1,344	1,974,600	6.06	24.1	17.9	21.0	19.7	19.7
Wildwood Creek Basins	EX-4	9/10/2018	9/24/2018	29	28	3.0	812	1,154	4,040,929	12.40	45.8	32.2	39.0	31.2	28.3
Oak Glen Creek Basins - Bermed	EX-2	9/17/2018	10/1/2018	34	34	1.6	1,156	1,374	639,130	1.96	6.1	5.2	5.6	6.6	5.2
Oak Glen Creek at Western Heights	EX-9	9/24/2018	10/1/2018	46	20	2.0	920	1,184	50,632	0.16	1.6	1.2	1.4	1.6	1.5

Notes:
a - High infiltration rate for constant-head test calculated based on infiltrating area equal to basin bottom only
b - Low infiltration rate for constant-head test calculated based on infiltrating area equal to basin bottom and sidewalls
c - Falling-Head Infiltration Rates calculated from measured water level decline based on infiltrating area of basin bottom only

It is recognized that in a homogeneous and unbounded vadose zone, measured infiltration rates for a field-scale test basin will be higher than infiltration rates for a full-scale basin due to a greater contribution of horizontal flow beneath the field-scale test basin. Additionally, physical clogging of a recharge basin is likely to reduce infiltration rates over time. These factors were considered to predict initial and long-term infiltration rates at each investigation site for a full-scale basin, as shown below in **Table 3**. Assumptions used to develop these estimates are described in more detail below.

Table 3

Estimated Initial and Long-Term Infiltration Rates for a Full-Scale Basin

Test Site	Adjacent Exploratory Boring	Constant-Head Field-Scale Infiltration Rate	Estimated Full-Scale Infiltration Rate	
		Average (ft/d)	Initial[a] (ft/d)	Long-Term[b] (ft/d)
Tennessee Street Basins		10.8	5.4	2.7
Dunlap Channel		0.1	0.1	0.03
Chapman Heights Basin		10.2	5.1	2.5
10th Street and Avenue E	EX-7	12.7	6.4	3.2
Wildwood Creek at California Street	EX-5	3.5	1.7	0.9
Wilson Creek Basins	EX-1	7.4	3.7	1.8
City of Yucaipa at California Street	EX-5	16.0	8.0	4.0
Wilson Creek III	EX-3	52.0	26.0	13.0
Oak Glen Creek Basins - Excavated	EX-2	21.0	10.5	5.2
Wildwood Creek Basins	EX-4	39.0	19.5	9.8
Oak Glen Creek Basins - Bermed	EX-2	5.6	2.8	2.8
Oak Glen Creek at Western Heights	EX-9	1.4	0.7	0.4

a - Initial Full-Scale Infiltration Rate is estimated to be 50 percent of average constant-head infiltration rate from field-scale testing to account for decreased horizontal flow component in full-scale test basin.
b - Long-Term Full-Scale Infiltration Rate is estimated to be 50 percent of the Initial Full-Scale Infiltration Rate to account for expected physical clogging of the basin bottom from SWP water. For "Oak Glen Creek Basins (EX-2) - Bermed", long-term infiltration rate is the same as initial full-scale infiltration rate, because the basin bottom is already significantly clogged. Actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.

The degree to which field-scale infiltration rates may overestimate full-scale basin infiltration rates is dependent on the relative difference in basin sizes. The future recharge basin area at each investigation site is currently unknown, and site-specific consideration was outside the scope of this study. For this study, a uniform factor of 50 percent is applied to infiltration rates from field-scale infiltration tests to predict infiltration rates in a full-scale

recharge basin. This factor is recommended based on discussions with OCWD (Adam Hutchinson, Recharge Planning Manager, personal communication, November 7, 2018) and is applied to the average infiltration rate calculated from the constant-head test to provide an "initial" full-scale infiltration rate for each site (second-to-last column in Table 2). It is important to recognize that this scale-up factor does not account for the potential impacts to surface infiltration rates from possible low-permeability hydraulic boundary conditions (e.g., clay layers in the deeper vadose zone or clay gauge associated with nearby geologic faulting) that can inhibit radial flow of recharge water and increase recharge mounding beneath the recharge basin. Additional field investigations, such as pilot-scale infiltration testing, is needed to address the influence of hydraulic boundary conditions, including faults.

Accurate prediction of the effects of clogging on long-term infiltration rates in a full-scale recharge basin relies on a clear understanding of the site-specific recharge goal, anticipated active spreading period, and approach and frequency of basin maintenance. These factors are effectively unknown at this time. Recent research has improved the understanding of clogging dynamics to allow operators to reliably predict infiltration rate declines and optimize basin maintenance when site-specific information for active recharge basins are available. Key governing factors include the intrinsic permeability of sediments comprising the basin bottom and the suspended solids load in source water. A study by OCWD (Phipps, D.W., Lyon, S., and Hutchinson, A., 2007, see Appendix A) indicated that approximately 90 percent of the infiltration rate decline over time in selected OCWD basins were attributable to the accumulation of suspended solids mass on the basin floor and its interface with sediment on the basin floor.

The physical clogging potential of SWP water was recently characterized by Valley District by analyzing the total suspended solids (TSS) concentration of a sample collected from the Yucaipa Turnout of the SWP East Branch Extension. The TSS concentration of the SWP water was 1.4 mg/L, which is well below TSS concentrations of Santa Ana River water in the OCWD study. An additional clogging factor - algal growth - has also been observed in local SWP water recharge basins by the San Bernardino County Water Conservation District (SBCWCD) (personal communication, Richard Corneille, November 21, 2018). Basin design and operations will need to address long-term basin clogging through a combination of pre-treatment design solutions and a basin maintenance program.

For planning purposes, a "long-term" full-scale infiltration rate is predicted for all tests by reducing the initial full-scale infiltration rate by 50 percent. The 50 percent assumption accounts for currently unknown site-specific variables including the site recharge goal, active spreading period, and the frequency of basin maintenance over time.

3.1. INVESTIGATION SITE SUMMARIES

Conclusions integrating infiltration test results and local hydrogeologic conditions for each investigation site are presented along with recommendations for additional work below.

Generally, a site with favorable long-term recharge potential requires a combination of high surface infiltration rates and available land to construct a reasonable-sized recharge facility. A pilot-scale infiltration test is recommended if the size of a full-scale recharge project is significantly larger (e.g., 1 acre or more) than the field-scale test infiltration basin. Pilot testing will generally require excavation of a recharge basin commensurate in size with the intended full-scale recharge basin, conveyance and metering of test water sufficient to fill and maintain a constant-head, and accurate measurement of pond water levels. The pilot-scale infiltration test should be implemented over at least a 2 to 3-month period to identify potential site vadose zone storage capacity constraints, particularly if there are nearby geologic faults or hydraulic barriers. Installation of monitoring wells on both sides of a mapped fault or barrier is recommended to confirm groundwater levels beneath the site and the hydraulic connection across the fault/barrier during pilot recharge testing.

3.1.1. Tennessee Street Basin

A synopsis of the infiltration testing completed at the Tennessee Street Basin is shown on **Figure 2**. As shown on Figure 1, the site is located northwest of the Western Heights Subbasin, the northwestern boundary for which generally coincides with the Western Heights Fault. Despite its upgradient location relative to the Western Heights Subbasin and Western Heights Fault, the site is favorably located if recharge water can migrate below regional clay layers in the Western Heights Subbasin and replenish aquifers that support local groundwater production. No exploratory borings were drilled in 2014 near this site, and depth to groundwater is unknown.

Results of infiltration testing indicate that the site is suitable for recharge. The average infiltration rate from constant-head testing is 10.8 feet/day (based on stabilized rates observed after 9 days of testing), which is verified by measured infiltration rates from the falling-head test (9.5 to 11.1 feet/day).

A full-scale basin initial infiltration rate is predicted at 5.4 feet/day, and a full-scale long-term infiltration rate is predicted at 2.7 feet/day.

Pilot-scale infiltration testing involving installation of monitoring wells north and south of the Western Heights Fault is recommended, if the size of a potential full-scale recharge project is significantly larger than the existing storm detention basin.

3.1.2. Dunlap Channel

A synopsis of the infiltration testing completed at the Dunlap Channel is shown on **Figure 3**. As shown on the Figure 1, the site in the Western Heights Subbasin along the margins of a pumping depression centered approximately one mile east of the site. As shown on the cross section in the upper right corner of Figure 2 (modified from Geoscience 2014b), the site is underlain by thick and regionally extensive clay layers in the vadose zone. A nested USGS monitoring well (Dunlap Well) indicates that depth to groundwater in the area is about 400 feet-bgs.

Results of infiltration testing indicate that the site is not suitable for recharge. The average infiltration rate from constant-head testing is only 0.1 feet/day (based on stabilized rates observed after 4 days of testing), which is verified by measured infiltration rates from the falling-head test (0.18 to 0.19 feet/day).

Full-scale basin initial and long-term infiltration rates are predicted to be less than 0.1 feet/day.

Development of a recharge facility and any additional investigations are not recommended at this site.

3.1.3. Chapman Heights Basin

A synopsis of the infiltration testing completed at the Chapman Heights Basin is shown on **Figure 4**. As shown on Figure 1, and similar to the Tennessee Street Basin site, this site is located north of the Western Heights Subbasin, the northwestern boundary which generally coincides with the Western Heights Fault. Despite its upgradient location relative to the Western Heights Subbasin and Western Heights Fault, the site is favorably located if recharge water can migrate below regional clay layers in the Western Heights Subbasin and replenish aquifers that support local groundwater production. No exploratory borings were drilled in 2014 near this site, and depth to groundwater is unknown.

Results of infiltration testing indicate that the site is suitable for recharge. The average infiltration rate from constant-head testing is 10.2 feet/day (based on stabilized rates observed after approximately 9 days of testing), which is generally verified by measured infiltration rates from the falling-head test (7.3 to 9.5 feet/day). The cause of the slight decline in infiltration rate after Day 10 is unknown, it but does not appear to be significant.

A full-scale basin initial infiltration rate is predicted at 5.1 feet/day, and a full-scale long-term infiltration rate is predicted at 2.5 feet/day.

Pilot-scale infiltration testing involving installation of monitoring wells north and south of the Western Heights Fault is recommended, if the size of a potential full-scale recharge project is significantly larger than the existing storm detention basin.

3.1.4. 10th Street and avenue E (EX-7)

A synopsis of the infiltration testing completed at the 10th Street and Avenue E Basin is shown on **Figure 5**. As shown on Figure 1, this site straddles the Western Heights and Calimesa Subbasin boundary, which coincides with the northeast-trending Chicken Hills Fault. The potential value of this site for recharge is contingent on the hydraulic connection between the Calimesa Subbasin and the Western Heights Subbasin across the Chicken Hill Fault. The relative location and proximity of the site to several mapped traces of the Chicken Hills Fault to the west/northwest indicate that groundwater replenishment benefits may be limited to the downgradient portion of the Calimesa Basin. Exploratory boring EX-7 was drilled in 2014 south of Avenue E and the test site. Depth to groundwater was measured at

115 feet-bgs, similar to water levels east of the fault in the Calimesa Subbasin, and 300 feet higher than in the Western Heights Subbasin, indicating that the hydraulic connection between the site and Western Heights Subbasin is likely poor.

Results of infiltration testing indicate that the site is suitable for recharge. The average infiltration rate from constant-head testing is 12.7 feet/day (based on relatively stabilized rates observed after 12 days of testing), which is generally verified by measured infiltration rates from the falling-head test (9.8 to 11.5 feet/day).

A full-scale basin initial infiltration rate is predicted at 6.4 feet/day, and a full-scale long-term infiltration rate is predicted at 3.2 feet/day.

Pilot-scale infiltration testing involving installation of monitoring wells west and east of the Chicken Hills Fault is recommended, if the size of a potential full-scale recharge project is significantly larger than the existing storm drainage area.

3.1.5. Wildwood Creek at California Street (EX-5)

A synopsis of the infiltration testing completed at the Wildwood Creek at California Street is shown on **Figure 6**. The site in the eastern portion of the Calimesa Subbasin with no nearby geologic faults. Based on the lithologic log of exploratory boring EX-5 located about 400 feet to the southeast, the site is underlain by generally permeable sand and gravel deposits. Only a few minor clay layers were observed in the vadose zone. Depth to water in YRP- EX-5 was 342 feet-bgs in 2014.

Results of infiltration testing indicate that the site is not suitable for recharge. The average infiltration rate from constant-head testing is 3.5 feet/day (based on stabilized rates observed almost immediately after the start of testing), which is verified by measured infiltration rates from two falling-head tests (2.4 to 3.1 feet/day).

Full-scale basin initial and long-term infiltration rates are predicted to be less than 1.7 and 0.9 feet/day, respectively. Low infiltration rates appear to be due to a clayey silt layer, the top of which occurs at a depth of 10 to 12 feet below the channel floor. Dry soil conditions were observed below the clayey silt layer at the end of testing. The fine-grained material may be associated with sediment load from natural stormflows.

Surficial coarse-grained sands and gravels on the surface of Wildwood Creek at California Street appear to have limited thickness and are underlain by a fine-grained matrix that significantly limits infiltration. Development of a recharge facility and additional investigations are not recommended at this site.

3.1.6. Wilson Creek Basins

A synopsis of the infiltration testing completed at the Wilson Creek Basins is shown on **Figure 7**. As shown on Figure 1, the site is located in the upgradient portion of the Basin in the center of the Gateway Subbasin. The Chicken Hill Fault is located north of the site, but

based on local groundwater levels, does not appear to represent a subsurface barrier to groundwater flow. Based on the lithologic log of exploratory boring EX-1 located on the berm 450 feet to the southwest, the site is underlain by coarse-grained deposits; however, shallow fine-grained (clay) deposits create perched conditions beneath the basins during recharge and limit surface infiltration rates. Such conditions were observed both during pilot-scale infiltration test by the USGS in 1970 and during field-scale testing. Depth to water in PZ-1 (constructed in EX-1) was 272 feet-bgs in 2014.

Results of infiltration testing confirm that the site is suitable for recharge. The average infiltration rate from constant-head testing is 7.4 feet/day (based on relatively stabilized rates observed after 11 days of testing), which is verified by measured infiltration rates from the falling-head test (5.5 to 7.4 feet/day). The "high" infiltration rate (based on an infiltrating area of the basin bottom only) matches the final infiltration rate achieved by the USGS in 1970 of about 9 feet/day. The USGS-reported rate and rates from field-scale testing are considered representative of a "clean" basin.

A full-scale basin initial infiltration rate is predicted at 3.7 feet/day, and a full-scale long-term infiltration rate is predicted at 1.8 feet/day.

If site recharge goals are expected to exceed the operational capacity of the basins based on predicted long-term rates, the removal of the upper approximately 3 feet of sediment in each of the basins prior to resumption of active recharge is recommended. Pilot-scale testing is not recommended at this site.

3.1.7. City of Yucaipa at California Street (EX-5)

A synopsis of the infiltration testing completed at the Wildwood Creek at California Street is shown on **Figure 8**. The site in the eastern portion of the Calimesa Subbasin with no nearby geologic faults. Based on the lithologic log of exploratory boring EX-5, located about 100 feet to the southeast, the site is underlain by generally permeable sand and gravel deposits. Only a few minor clay layers were observed in the vadose zone. Depth to water in EX-5 was 342 feet-bgs in 2014.

Results of infiltration testing indicate that the site is highly suitable for recharge. The average infiltration rate from constant-head testing is 16.0 feet/day (based on stabilized rates observed after 4 days of testing), which is verified by measured infiltration rates from the falling-head test (14.5 to 16.8 feet/day).

A full-scale basin initial infiltration rate is predicted at 8.0 feet/day, and a full-scale long-term infiltration rate is predicted at 4.0 feet/day.

Pilot-scale infiltration testing is recommended, assuming a full-scale recharge basin would include the majority of the land parcel. No new monitoring wells are needed. However, monitoring of water levels in the nested USGS Equestrian well, located just east of California Street and north of Avenue G, is recommended during pilot testing.

3.1.8. Wilson Creek III (EX-3)

A synopsis of the infiltration testing completed at the Wilson Creek III is shown on **Figure 9**. The site in the eastern portion of the Gateway Subbasin. Based on the lithologic log of exploratory boring EX-3 located about 900 feet to the east, the site is underlain by permeable sand and gravel deposits. Only a few minor silt layers were observed in the vadose zone. Depth to water in EX-3 was 202 feet-bgs in 2014.

Results of infiltration testing indicate that the site is highly suitable for recharge. The average infiltration rate from constant-head testing is 52 feet/day (based on relatively stabilized rates observed after 10 days of testing). It is possible that rates may be overestimated due to the proximity of the test basin to a large-diameter conveyance pipe along the east side of 2nd St, set in a gravel-filled trench. Because the basin drained within a couple of hours, an infiltration rate from the falling-head test could not be calculated.

A full-scale basin initial infiltration rate is predicted at 26.0 feet/day, and a full-scale long-term infiltration rate is predicted at 13.0 feet/day.

Pilot-scale infiltration testing involving installation of monitoring wells north and south of the Chicken Hill Fault is recommended, if the size of a potential full-scale recharge project is significantly larger than the test basin. Monitoring of water levels in the nearby YVWD production well located south of the test site may preclude the need for a monitoring well south of the Chicken Hill Fault if the well is not actively pumped during pilot testing.

3.1.9. Oak Glen Creek Basins (Excavated) (EX-2)

A synopsis of the infiltration testing completed at the Oak Glen Creek Basins (excavated) is shown on **Figure 10**. The site is favorably located upgradient of major production wells in the Gateway and Wilson Creek subbasins. Water levels indicate that recharging at this location will likely benefit aquifers on both sides of the Chicken Hill Fault. Based on the lithologic log of exploratory boring EX-2 located about 200 feet to the east, the site is underlain by coarse-grained deposits that allow for uninhibited vertical migration of recharge water to the underlying water table, which is at 302 ft-bgs in 2014).

Results of infiltration testing indicate that the site is highly suitable for recharge. The average infiltration rate from constant-head testing is 21.0 feet/day (based on stabilized rates observed after one day of testing), which is verified by measured infiltration rates from the falling-head test (19.7 feet/day). An apparent decline in infiltration rate was observed from Day 9 through Day 11 of testing. This is believed to be related to a pressure drop in the fire hydrant, which resulted in pond water levels gradually dropping over this period as well.

A full-scale basin initial infiltration rate is predicted at 10.5 feet/day, and a full-scale long-term infiltration rate is predicted at 5.2 feet/day. This rate assumes historically accumulated silt/clay in the upper 3 feet of the basin is removed, and a basin maintenance plan is established.

If site recharge goals are expected to exceed the operational capacity of the basins, we recommend the removal of the upper 3 feet of sediment in each of the basins prior to future active recharge. Pilot-scale testing is not critical at this site.

3.1.10. Wildwood Creek Basins (EX-4)

A synopsis of the infiltration testing completed at the Wildwood Creek Basins is shown on **Figure 11**. The site is located in the Oak Glen Creek Subbasin upgradient of the South Mesa barrier and aquifers in the Calimesa Subbasin relied upon for groundwater production. The site is underlain by highly permeable deposits that should allow for uninhibited vertical migration of recharge water to the underlying water table. Available vadose zone storage may be limited by the existing depth to water (104 feet-bgs in MW-3 [constructed in EX-4] in 2014) located about 140 feet to the east. The degree to which recharge water can flow across the South Mesa Barrier into the Calimesa Subbasin is a critical knowledge gap that requires further investigation and/or evaluation.

Results of infiltration testing indicate that the site is highly suitable for recharge. The average infiltration rate from constant-head testing is 39.0 feet/day (based on stabilized rates observed after 9 days of testing), which is generally verified by measured infiltration rates from the falling-head test (28.3 to 31.2 feet/day). Lower rates from the falling-head test are likely due to less driving head from declining water levels.

A full-scale basin initial infiltration rate is predicted at 19.5 feet/day, and a full-scale long-term infiltration rate is predicted at 9.8 feet/day.

Pilot-scale infiltration testing is recommended to identify potential site vadose zone storage capacity constraints due to associated recharge mounding, which may be exacerbated by the South Mesa Barrier. Installation of a monitoring well west of the South Mesa Barrier and monitoring of water levels in the new monitoring well and MW-3 during pilot testing is recommended to better understand the subsurface flow dynamics across the South Mesa Barrier.

3.1.11. Oak Glen Creek Basins (Bermed) (EX-2)

A synopsis of the infiltration testing completed at the Oak Glen Creek Basins (bermed) is shown on **Figure 12**. This site is unique, in that native material was used to create shallow berms to test the infiltration through undisturbed sediment at the ground surface. The site is favorably located upgradient of major production wells in the Gateway and Wilson Creek subbasins. Water levels indicate that recharging at this location will likely benefit aquifers on both sides of the Chicken Hill Fault. Based on the lithologic log of exploratory boring EX-2 located about 200 feet to the east, the site is underlain by coarse-grained deposits that allow for uninhibited vertical migration of recharge water to the underlying water table, which is at 302 ft-bgs in 2014).

Results of infiltration testing, combined with the results from the excavated test basin (see section 3.1.9), indicate that while the site is highly suitable for recharge, accumulated

sediments to about 3 feet in depth have a significant negative impact on infiltration rates. The average infiltration rate from constant-head testing is 5.6 feet/day (based on stabilized rates observed after one day of testing), which is verified by measured infiltration rates from the falling-head test (5.2 to 6.6 feet/day).

For the bermed test, full-scale initial and long-term infiltration rates of 2.8 feet/day are predicted, as the existing basin is currently clogged. The estimated long-term infiltration rate is similar to the infiltration rate of 3.2 feet/day measured for the middle basin during pilot-scale testing of the Oak Glen Creek Basins in 2017-2018 (City of Yucaipa et al., 2018).

If site recharge goals are expected to exceed the operational capacity of the Oak Glen Creek Basins, the removal of the upper 3 feet of sediment in each of the Oak Glen Creek basins prior to future active recharge is recommended. Pilot-scale testing is not critical at this site.

3.1.12. Oak Glen Creek at Western Heights (EX-9)

A synopsis of the infiltration testing completed at the Oak Glen Creek Basins at Western Heights is shown on **Figure 13**. The site in the center of the Western Heights Subbasin. Based on the lithologic log of exploratory boring EX-9 located along the northern channel bank about 550 feet to the northwest, the site is generally underlain by permeable sand and gravel deposits. Fine-grained deposits were identified in EX-9 from 15 to 25 feet-bgs (approximately 0 to 10 feet below the channel bottom); however, fine-grained material observed during excavation of the test basin indicated significant fine-grained sediment load from natural stormflows. Depth to water in EX-9 was measured at 347 feet-bgs in 2014.

Results of infiltration testing indicate that the site is not suitable for recharge. The average infiltration rate from constant-head testing is 1.4 feet/day (based on stabilized rates observed almost immediately after the start of testing), which is verified by measured infiltration rates from two falling-head tests (1.5 to 1.6 feet/day).

Full-scale basin initial and long-term infiltration rates are predicted to be less than 0.7 and 0.4 feet/day, respectively. Low infiltration rates appear to be associated with fine-grained geologic deposits and associated with sediment loads from stormflows. Development of a recharge facility and any additional investigations are not recommended at this site.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. CONCLUSIONS

Based on the results of infiltration testing completed at eleven investigation sites in the Yucaipa Basin, the following general conclusions can be made:

- Short-term infiltration testing using temporary field-scale basins provides a reliable and cost-effective means for confirming vadose zone infiltration capacity, a critical component to assessing site recharge feasibility.

- Infiltration test results provide a technical basis for predicting "initial" infiltration rates for a full-scale recharge basin, the size for which is known at existing storm detention/recharge facilities (e.g., Wilson Creek Basins, Oak Glen Creek Basins, and Wildwood Creek Basins) and unknown for other sites.

- Initial full-scale infiltration rates presented herein do not account for potential hydraulic boundary conditions that can inhibit radial flow of recharge water and increase recharge mounding beneath a full-scale recharge basin. The primary boundary condition concern identified for some investigation sites is the presence of a nearby geologic fault or barrier. Additional focused field investigations, including pilot-scale infiltration testing with groundwater monitoring, are needed to address these effects.

- Infiltration test results also provide a technical basis for predicting "long-term" infiltration rates for a full-scale basin, needed to support future evaluation and design of recharge facilities to optimize groundwater water level, storage, safe yield, and water quality benefits in the Yucaipa Basin. Long-term full-scale infiltration rates presented herein consider the effects of basin clogging which is dependent on currently unknown variables, including the site-specific recharge goals, anticipated active spreading period, and approach and frequency of basin maintenance.

Combined with existing available hydrogeologic information, infiltration test results indicate the following regarding site recharge feasibility, organized below by subbasin:

Western Heights Subbasin

The Tennessee Street Basins and Chapman Heights Basins appear to provide adequate infiltration capacity (predicted long-term rates of 2.7 and 2.5 feet/day, respectively). Both sites are favorably located upgradient of aquifers relied upon for groundwater production and beyond the extent of regionally extensive clay layers in the Western Heights Subbasin. Whether the migration of recharge water across the Western Heights Fault into the Western Heights Subbasin will be inhibited represents a critical knowledge gap that requires further investigation and/or evaluation.

Very low infiltration rates associated with fine-grained vadose zone sediments were measured at the Oak Glen Creek at Western Heights and Dunlap Channel sites (predicted long-term rates of 0.4 and 0.03 feet/day). A further complication and challenge of operating an in-channel recharge facility is the need for potentially frequent basin maintenance to remove debris associated with storm events that may further reduce surface infiltration rates.

Calimesa/Oak Glen Subbasins

The City of Yucaipa at California Street site appears to provide the best combination of infiltration capacity (predicted long-term rate of 4.0 feet/day) and location from a hydrogeologic perspective. The site is favorably located upgradient of key production wells in the Calimesa Subbasin and is underlain by coarse-grained deposits that should allow for uninhibited vertical migration of recharge water to the underlying water table (342 ft-bgs in 2014). The site is also located a significant distance from geologic faults that form most of the boundaries of the Calimesa Subbasin.

The Wildwood Creek Basins provides a high infiltration capacity (predicted long-term rate of 9.8 feet/day). The site is located in the Oak Glen Creek Subbasin upgradient of aquifers in the Calimesa Subbasin relied upon for groundwater production. The site is underlain by highly permeable deposits that should allow for uninhibited vertical migration of recharge water to the underlying water table. Available vadose zone storage may be limited by the existing depth to water of approximately 100 feet-bgs. The degree to which recharge water can flow across the South Mesa Barrier into the Calimesa Subbasin is a critical knowledge gap that requires further investigation and/or evaluation.

The 10th Street at Avenue E site appears to provide a good infiltration capacity (predicted long-term rate of 3.2 feet/day). Clay sediments found in nearby exploratory borehole EX-7 (south of Avenue E outside of the channel) down to 25 feet-bgs were not encountered during test basin excavation. Despite having good infiltration capacity, the site is poorly located adjacent to and east of the Chicken Hill Fault in the Calimesa Subbasin. The potential value of this site for recharge is contingent on potential benefits this site can provide to the Western Heights Subbasin. Water level differences of approximately 300 feet across the Chicken Hill Fault indicate that the hydraulic connection between the site and Western Heights Subbasin is expected to be poor. However, further investigation and/or evaluation is needed to confirm this interpretation.

Low infiltration rates associated with shallow fine-grained sediments were measured at the Wildwood Creek at California Street site (predicted long-term rate of 0.9 feet/day). Similar to the challenges identified for the two channel sites in the Western Heights Subbasin, operating an in-channel recharge facility could potentially frequent basin maintenance to remove debris associated with storm events.

Gateway/Wilson Creek Subbasins

Of the two existing storm detention/recharge basins in this area, the Oak Glen Creek Basins appears to provide the best infiltration capacity on a per-acre basis. The predicted long-term rate for the middle basin tested is 5.2 feet/day. This rate assumes historically accumulated silt/clay in the upper 3 feet of the basin is removed, and a basin maintenance plan is established. From a hydrogeologic perspective, the site is favorably located upgradient of major production wells in the Gateway and Wilson Creek subbasins. Water levels indicate that recharging at this location should benefit aquifers on both sides of the Chicken Hill Fault. The site is underlain by coarse-grained deposits that should allow for uninhibited vertical migration of recharge water to the underlying water table, which was at 302 ft-bgs in 2014.

The Wilson Creek Basins provides a reasonable infiltration capacity (predicted long-term rate of 1.8 feet/day, assuming historically accumulated silt/clay in the upper 2-3 feet of the basin is removed). From a hydrogeologic perspective, the site is favorably located upgradient of major production wells in the Gateway Subbasin. Recharging at this location has historically benefited areas on both sides of the Chicken Hill Fault. The site is primarily underlain by coarse-grained deposits; however, shallow fine-grained (clay) deposits create perched conditions beneath the basins during recharge and limit surface infiltration rates. Such conditions were observed both during pilot-scale infiltration test by the USGS in 1970 and during field-scale testing. Accordingly, for this site, the long-term infiltration rate of 1.8 feet/day accounts not only for long-term clogging, but also for predicted mounding (given the results are similar to the 1970 pilot test, which identified the shallow perching condition).

The Wilson Creek III site provides an exceptionally high infiltration capacity (predicted long-term rate of 13.0 feet/day). While the site is underlain by highly permeable sand and gravel deposits that should allow for uninhibited vertical migration of recharge water to the underlying water table, measured infiltration rates may be slightly overestimated due to the presence of a gravel-filled trench next to the site. The site is located in the Gateway Subbasin upgradient of aquifers relied upon for groundwater production. Available vadose zone storage is sufficient based on a 2014 measured depth to water of 202 feet-bgs. Recharging at this location would likely yield benefits both south and north of the Chicken Hill Fault. Confirmation of the infiltration rate for a full-scale basin requires further investigation.

4.2. RECOMMENDATIONS

Key findings from this study are based on integration of infiltration testing results with available site-specific and basin-wide hydrogeologic information. We recommend that Valley District and its partners use the long-term infiltration rates presented in this report to quantify potential groundwater level/storage benefits from recharge and establish site-specific recharge goals that maximize basin yield while meeting subbasin and basin sustainability criteria as part of the GSP development process. We envision these tasks will

be an iterative process utilizing the Yucaipa Basin groundwater flow model developed by the USGS.

Depending on the modeling results and sustainability criteria established, we recommend performing pilot-scale infiltration testing at preferred investigation sites to fill critical knowledge gaps and support implementation of a basin recharge program. Pilot-scale infiltration tests will require excavation of a recharge basin commensurate in size with the full-scale recharge basin, conveyance and metering of test water sufficient to fill and maintain a constant-head, and accurate measurement of pond water levels. Recommended actions for each investigation site are summarized below followed by site-specific details.

Table 4

Recommended Future Investigation/Testing Activities

Test Site	Adjacent Exploratory Boring	Estimated Long-Term Infiltration Rate (ft/d)	Recommended Action		
			Pilot Testing[1]	New Monitoring Well(s)	Basin Cleaning[2]
Tennessee Street Basins		2.7	Yes	Yes	
Dunlap Channel		0.0	No	No	
Chapman Heights Basin		2.5	Yes	Yes	
10th Street and Avenue E	EX-7	3.2	Yes	Yes	
Wildwood Creek at California Street	EX-5	0.9	No	No	
Wilson Creek Basins	EX-1	1.8	No	No	Yes
City of Yucaipa at California Street	EX-5	4.0	Yes	No	
Wilson Creek III	EX-3	13.0	Yes	Yes	
Oak Glen Creek Basins	EX-2	5.2	No	No	Yes
Wildwood Creek Basins	EX-4	9.8	Yes	Yes	
Oak Glen Creek at Western Heights	EX-9	0.35	No	No	

Notes:
1 - Recommended pilot testing assumes recharge will help to achieve basin/subbasin sustainability goals.
2 - Basin cleaning is recommended at the Wilson Creek Basins and Oak Glen Creek Basins if site recharge goals are expected to exceed the current operational capacity of the basins.

Western Heights Subbasin

Tennessee Street Basins / Chapman Heights Basins: Depending on the size of the full-scale basin, pilot-scale infiltration testing is recommended to identify potential site vadose zone storage capacity constraints due to recharge mounding and benefits to the Western Heights Subbasin. Installation of monitoring wells north and south of the Western Heights Fault is recommended to confirm groundwater levels beneath the sites and to better understand the hydraulic connection to the Western Heights Subbasin.

Calimesa/Oak Glen Subbasins

City of Yucaipa at California Street: Pilot-scale infiltration testing is recommended to confirm initial full-scale infiltration rates and identify potential site vadose zone storage capacity constraints due to recharge mounding. Installation of one monitoring well adjacent to the pilot basin is recommended to confirm arrival of recharge water at the water table (which is relatively deep at 342 feet-bgs) and monitor future groundwater level changes.

Wildwood Creek Basins: Pilot-scale infiltration testing is recommended to identify potential site vadose zone storage capacity constraints due to associated recharge mounding, which may be exacerbated by the South Mesa Barrier. Installation of a monitoring well west of the South Mesa Barrier and monitoring of water levels during pilot testing is recommended to better understand the subsurface flow dynamics across the South Mesa Barrier.

10th Street and Avenue E: Water level differences of approximately 300 feet across the Chicken Hill Fault indicate that the hydraulic connection between this site and the Western Heights Subbasin is likely to be poor. However, further investigation is needed to confirm this interpretation. If there is interest in developing a recharge facility at this site, pilot-scale infiltration testing is recommended with installation of a monitoring well east and west of the Chicken Hill Fault.

Gateway/Wilson Creek Subbasins

Oak Glen Creek Basins: If site recharge goals are expected to exceed the operational capacity of the basins, we recommend the removal of the upper 3 feet of sediment in each of the basins prior to future active recharge. Pilot-scale testing is not critical at this site.

Wilson Creek Basins: If site recharge goals are expected to exceed the operational capacity of the basins, we recommend the removal of the approximately upper 3 feet of sediment in each of the basins prior to future active recharge. Pilot-scale testing is not recommended at this site.

Wilson Creek III: Depending on the size of the full-scale basin, pilot-scale infiltration testing is recommended to confirm full-scale initial infiltration rates and to identify potential site vadose zone storage capacity constraints due to recharge mounding. Installation of a monitoring well adjacent to the site is recommended to confirm the arrival and mounding effect of recharge water during pilot testing and to track future groundwater level changes.

5. REFERENCES

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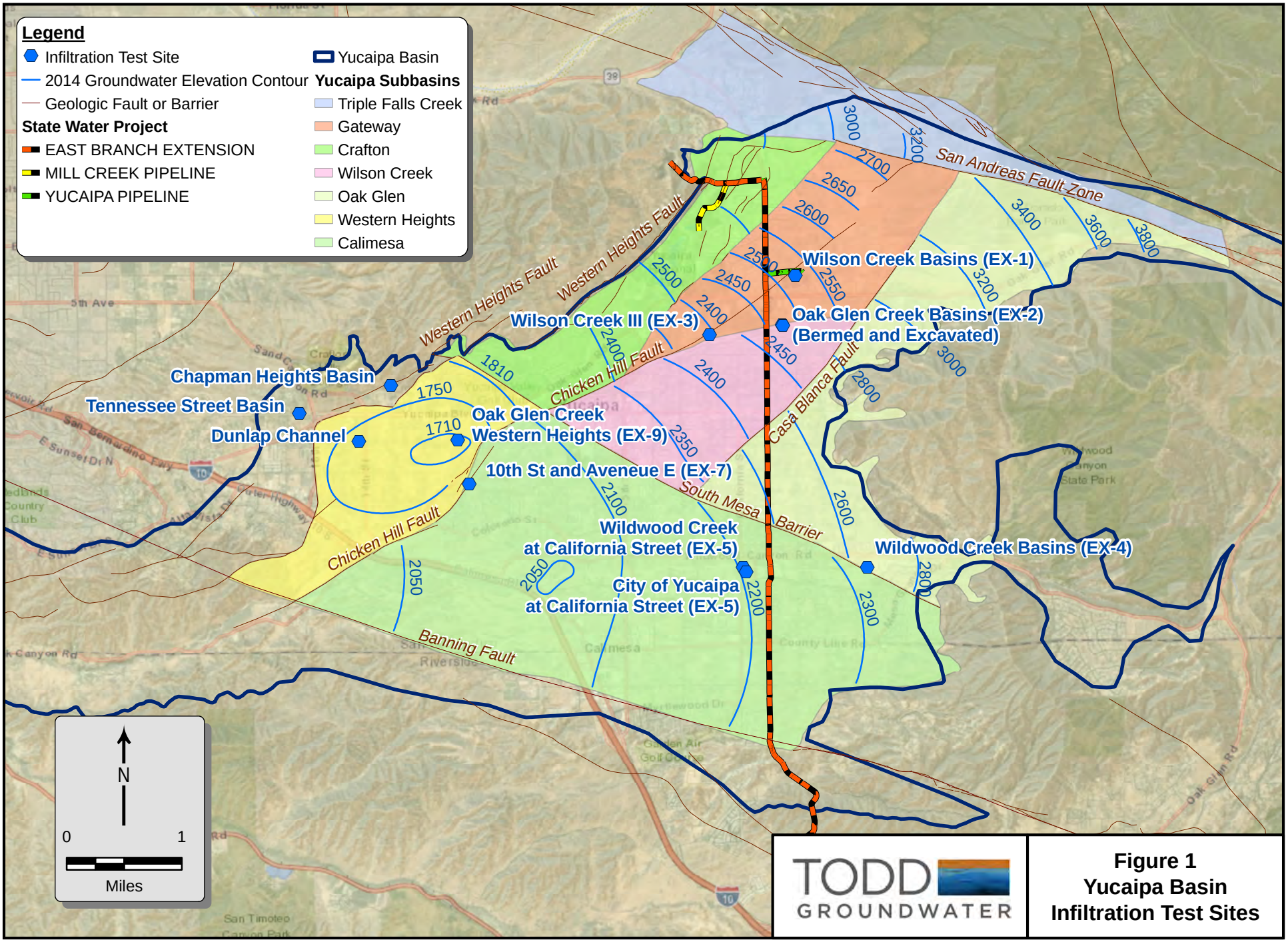
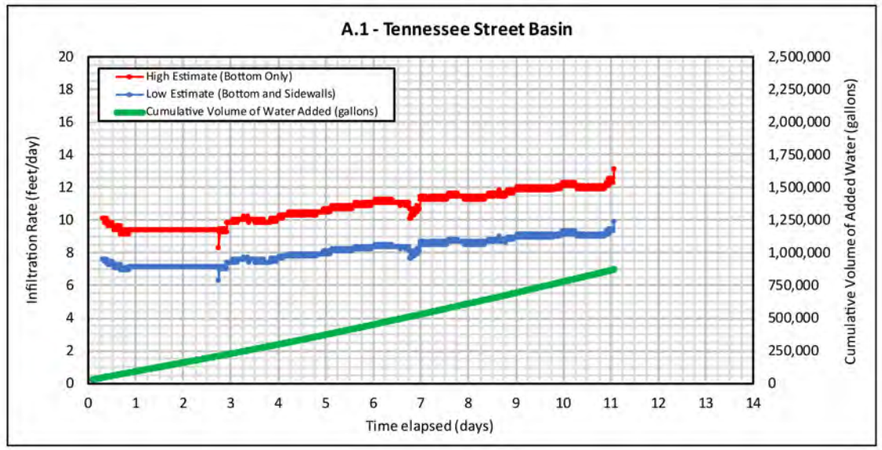
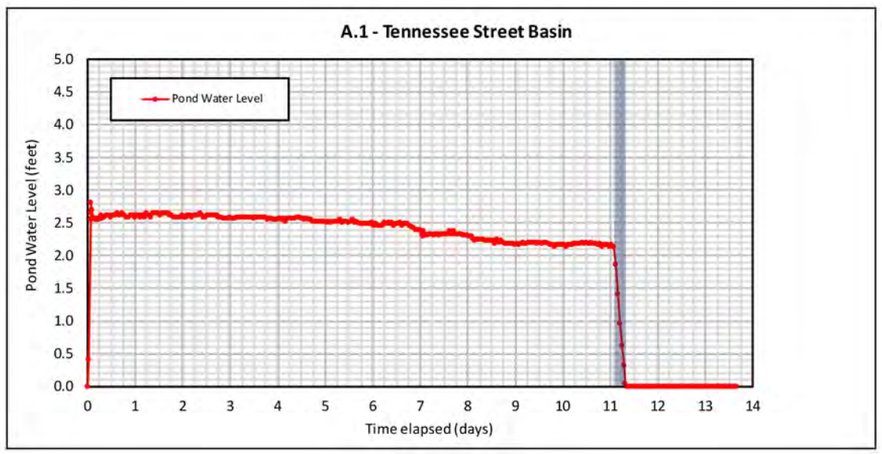

Legend
Infiltration Test Site
2014 Groundwater Elevation Contour
Geologic Fault or Barrier
State Water Project
EAST BRANCH EXTENSION
MILL CREEK PIPELINE
YUCAIPA PIPELINE
Yucaipa Basin
Yucaipa Subbasins
Triple Falls Creek
Gateway
Crafton
Wilson Creek
Oak Glen
Western Heights
Calimesa
San Andreas Fault Zone
Western Heights Fault
Chicken Hill Fault
Casa Blanca Fault
South Mesa Barrier
Banning Fault
Wilson Creek Basins (EX-1)
Wilson Creek III (EX-3)
Oak Glen Creek Basins (EX-2)
(Bermed and Excavated)
Chapman Heights Basin
Tennessee Street Basin
Dunlap Channel
Oak Glen Creek
Western Heights (EX-9)
10th St and Aveneue E (EX-7)
Wildwood Creek
at California Street (EX-5)
City of Yucaipa
at California Street (EX-5)
Wildwood Creek Basins (EX-4)
3000
3200
2700
2650
2600
2500
2550
2450
2400
3400
3600
3800
1810
1750
1710
2350
2100
2050
2200
2300
2800
2600
N
0
1
Miles
TODD GROUNDWATER
Figure 1
Yucaipa Basin
Infiltration Test Sites

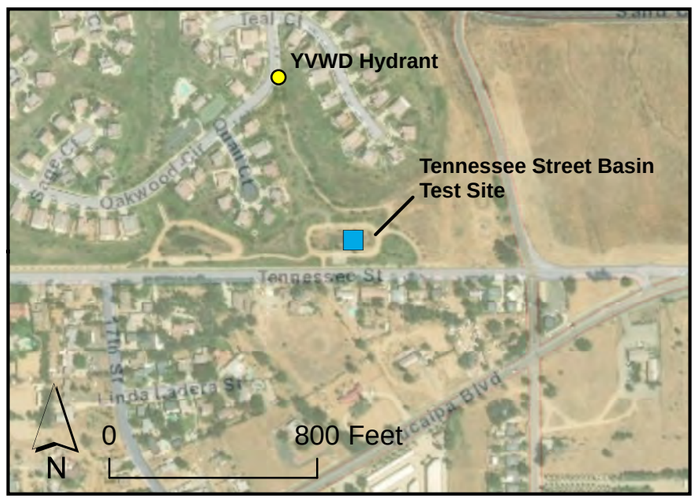
Infiltration Test Results





A. YVWD hydrant setup at Oakwood Circle
B. 4" fire hose above test site
C. Setting up flow control skid in excavation prior to filling; two float valves on 2" discharge lines and high and low water level alarm sensors
D. Initial fill of test basin (Day 1)
E. Consistent silt with fine to medium sand (0-5 feet)

Test Start		Jul-09-2018
Test End		Jul-23-2018
Basin Dimensions (L x W) (ft)		32 x 30
Average Water Height (ft)		2.5
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		871,782
Total Water Added (acre-feet)		2.7
Infiltration Rate (Constant-Head)	**High (ft/d)**	12.3
	Low (ft/d)	9.2
	Average (ft/d)	10.8
Infiltration Rate (Falling-Head)	**High (ft/d)**	11.1
	Low (ft/d)	9.5
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		5.4
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		2.7



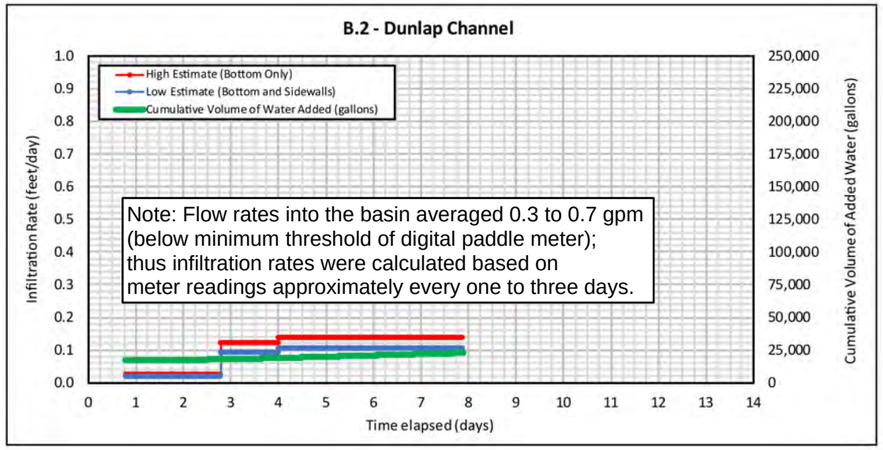
Conclusions:
- Results of infiltration testing indicate that the site is suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 5.4 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 2.7 feet/day. While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.

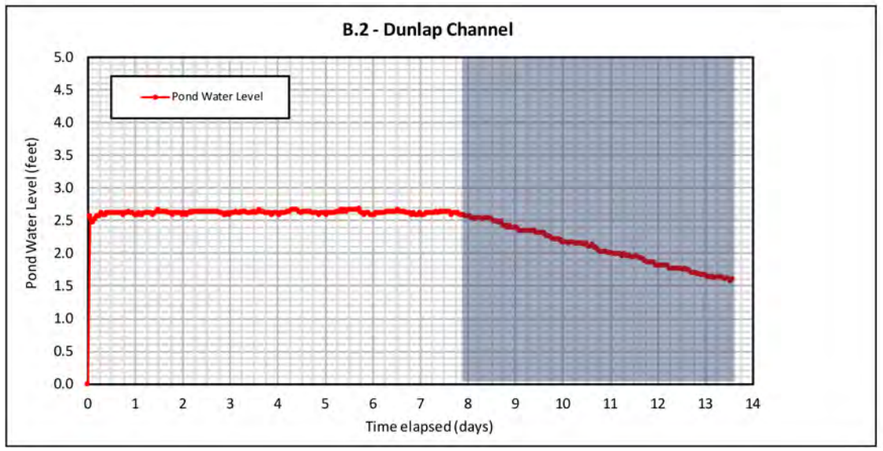
Recommendations:
- Depending on size of a full-scale recharge project, pilot scale infiltration test is recommended to identify potential site vadose zone storage capacity constraints due to recharge mounding.
- Pilot testing combined with installation of monitoring wells north and south of the Western Heights Fault is recommended to confirm groundwater storage benefits from recharge at this location.

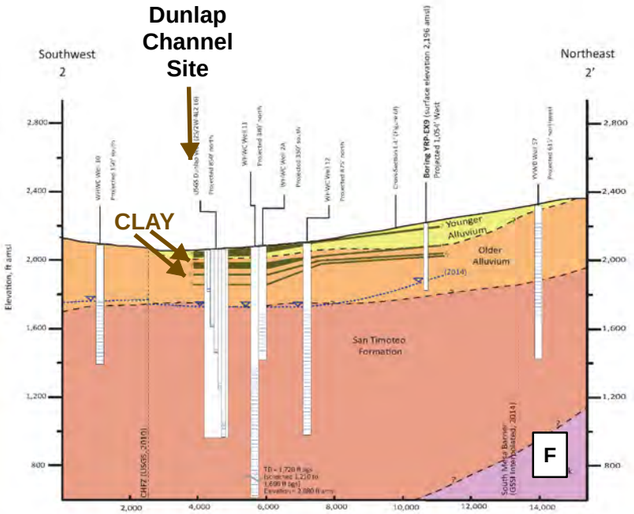
TODD GROUNDWATER

Figure 2
Tennessee Street Basin

Infiltration Test Results

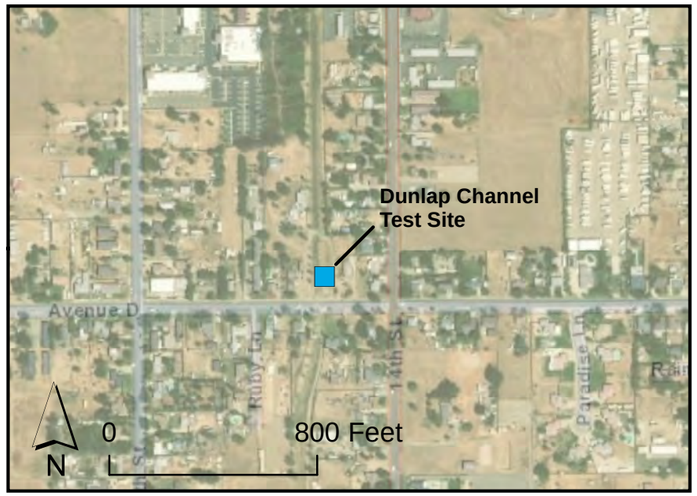






A. WHWC hydrant setup on Avenue D
B. Excavation of test infiltration basin
C. Native clay sediment deposited on base of flow control skid at end of testing (Day 13)
D. Testing in progress (Day 1)
E. End of falling-head test (Day 13)
F. Geologic cross section 2-2' (Figure 5b; Geoscience, Dec 2014) showing significant clay lenses in vadose zone beneath Dunlap Channel test basin site

Test Start		Jul-16-2018
Test End		Jul-30-2018
Basin Dimensions (L x W) (ft)		33 x 30
Average Water Height (ft)		2.5
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		22,895
Total Water Added (acre-feet)		0.1
Infiltration Rate (Constant-Head)	**High (ft/d)**	0.14
	Low (ft/d)	0.1
	Average (ft/d)	0.1
Infiltration Rate (Falling-Head)	**High (ft/d)**	0.19
	Low (ft/d)	0.18
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		0.1
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		0.0



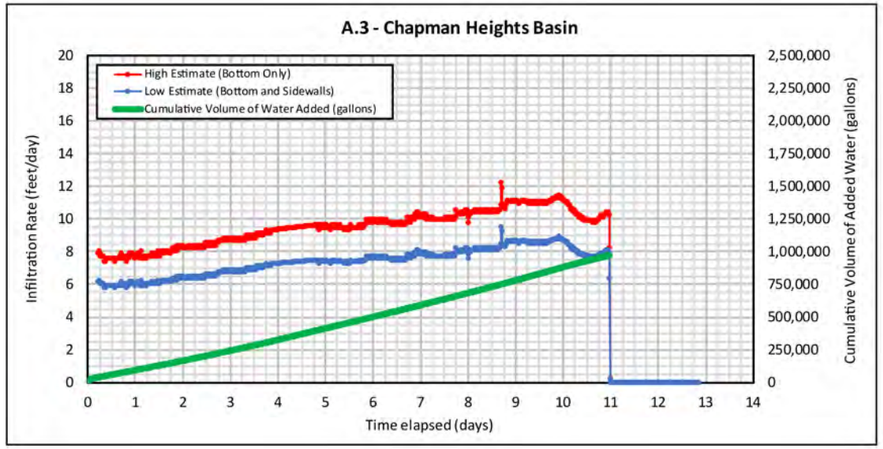
Conclusions:
- Results of infiltration testing indicate that the site is not suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 0.1 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at <0.1 feet/day.

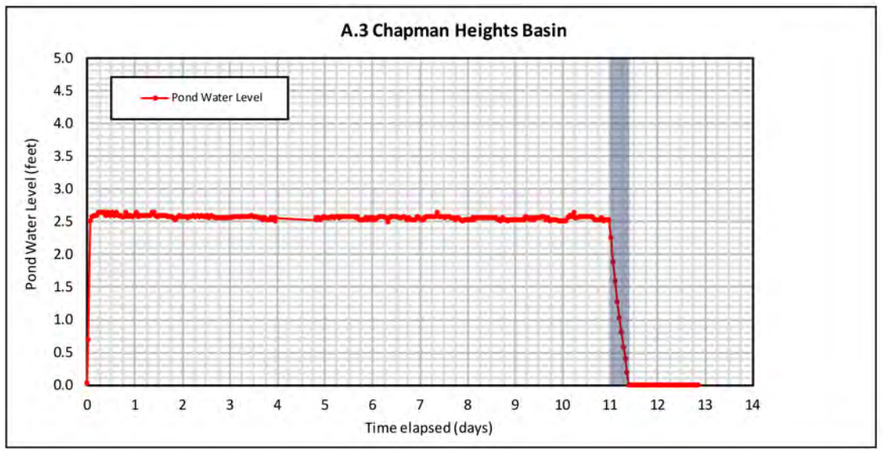
Recommendations:
- Regional geologic cross sections and interpretations indicate vadose zone sediments are comprised of significant fine-grained clay layers in this area of the Western Heights Subarea, corresponding with the very low infiltration rates observed during testing.
- No additional actions are recommended at this site.

TODD GROUNDWATER

Figure 3
Dunlap Channel

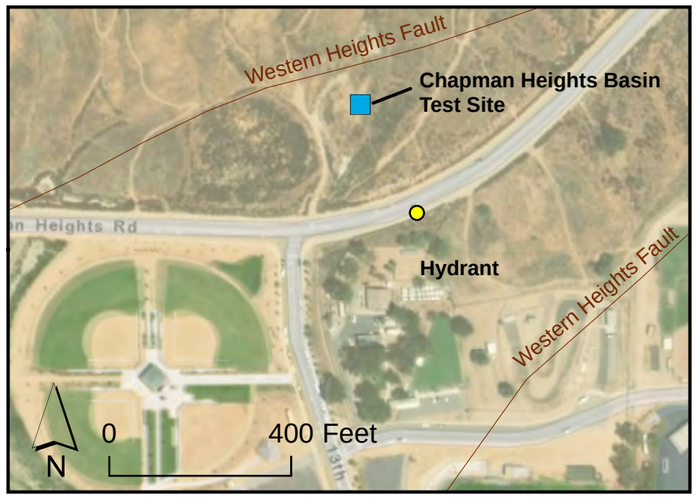
Infiltration Test Results





A. YVWD hydrant setup on Chapman Heights Road
B. 4" fire hose elbow south of Chapman Heights Rd
C. 4" fire hose in culvert north of Chapman Heights Rd
D. Testing in progress (Day 1)
E. Testing in progress (Day 1)
F. Test in progress (from western bank) (Day 7)

Test Start		Jul-23-2018
Test End		Aug-06-2018
Basin Dimensions (L x W) (ft)		37 x 33
Average Water Height (ft)		2.5
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		974,084
Total Water Added (acre-feet)		3.0
Infiltration Rate (Constant-Head)	**High (ft/d)**	11.5
	Low (ft/d)	8.8
	Average (ft/d)	10.2
Infiltration Rate (Falling-Head)	**High (ft/d)**	9.5
	Low (ft/d)	7.25
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		5.1
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		2.5



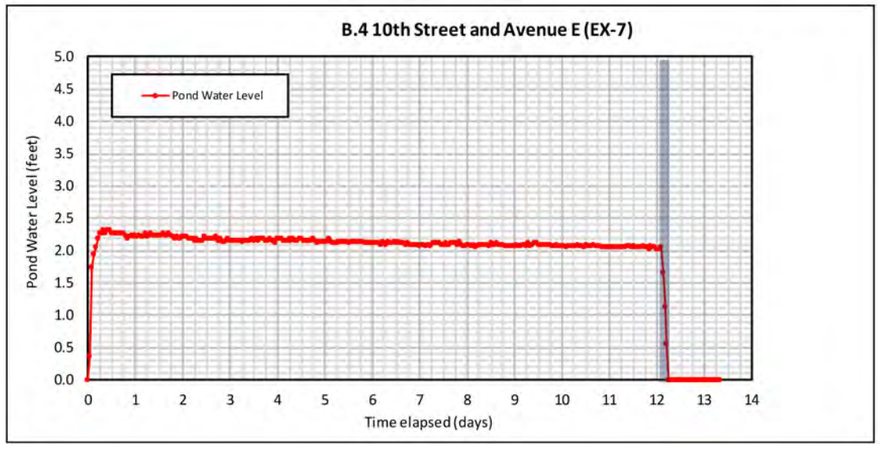
Conclusions:
- Results of infiltration testing indicate that the site is suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 5.1 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 2.5 feet/day. While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.

Recommendations:
- Depending on size of a full-scale recharge project, pilot scale infiltration test is recommended to identify potential site vadose zone storage capacity constraints due to recharge mounding.
- Pilot testing combined with installation of monitoring wells north and south of the Western Heights Fault is recommended to confirm groundwater storage benefits from managed aquifer recharge at this location.

TODD GROUNDWATER

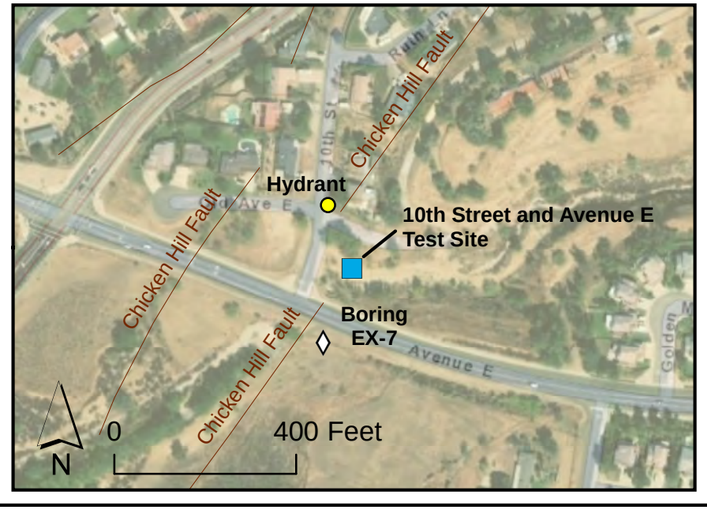
Figure 4
Chapman Heights Basin

Infiltration Test Results



Test Start		Jul-30-2018
Test End		Aug-13-2018
Basin Dimensions (L x W) (ft)		39 x 36
Average Water Height (ft)		2.1
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		1,451,335
Total Water Added (acre-feet)		4.5
Infiltration Rate (Constant-Head)	**High (ft/d)**	13.44
	Low (ft/d)	12.04
	Average (ft/d)	12.7
Infiltration Rate (Falling-Head)	**High (ft/d)**	11.54
	Low (ft/d)	9.75
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		6.4
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		3.2

A. Initial excavation of test infiltration basin
B. Setting up flow control skid
C. Temporary fencing and 4" fire hose from YVWD hydrant on 10th Street
D. Initial test basin filling (Day 1)
E. Testing in progress (Day 2)
Note abandoned pipes unearthed during excacation in background
F. Test in progress view from north (Day 2)



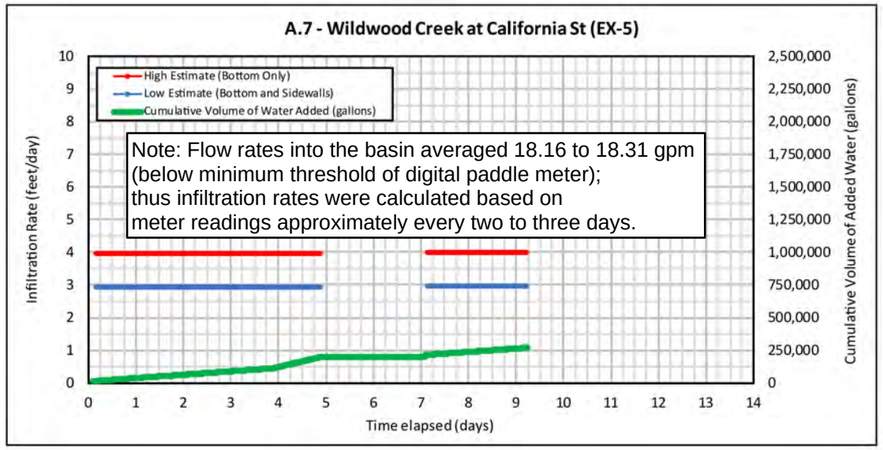
Conclusions:
- Results of infiltration testing indicate that the site is suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 6.4 feet/day.
- Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 3.2 feet/day.
- Relatively high infiltration rates are representative of the generally permeable vadose zone sediments (sand, gravel) encountered from 25 to 200 feet in adjacent exploratory boring EX-7 (located oustide of the channel south of Avenue E)
- Fine-grained silt/clay deposits encountered in the upper 25 feet of EX-7, were not encountered during excavation. It is possible that upper clay deposits are only located outside of the drainage channel.
- Depth to water in EX-7 was 115 ft-bgs in 2014, similar to water levels east of the fault, indicating that the Chicken Hill Fault is a partial barrier to subsurface flow at this location.
- Due to its downgradient location in the Calimesa Basin, The value of this site for recharge is contingent on potential benefits this site can provide to the Western Heights Subbasin.
- Water level differences of approximately 300 feet across the Chicken Hill Fault indicate the that the hydraulic connection between the site and Western Heights Subbasin is expected to be poor. However, further investigation and/or evaluation is needed to confirm this interpretation.

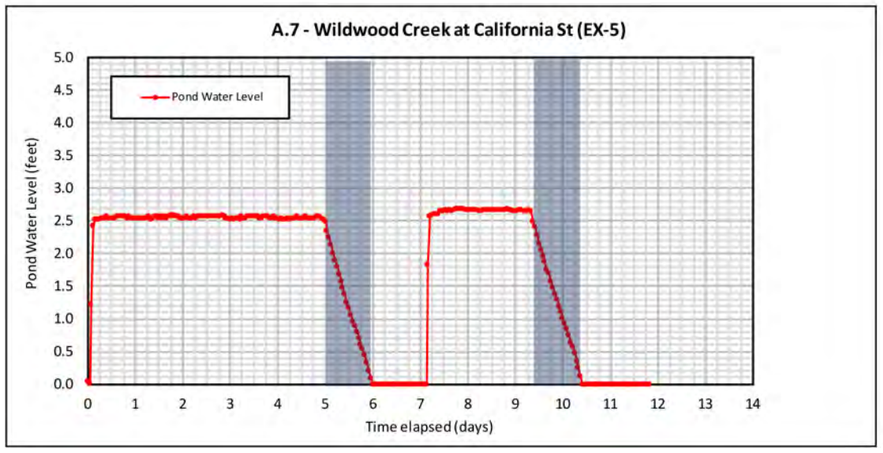
Recommendations:
- Pilot scale infiltration test with monitoring wells west/northwest of the Western Heights Fault would be needed to identify potential site vadose zone storage capacity constraints due to recharge mounding and to confirm if recharge can benefit the Western Heights Subbasin.

TODD GROUNDWATER

Figure 5
10th Street and Avenue E

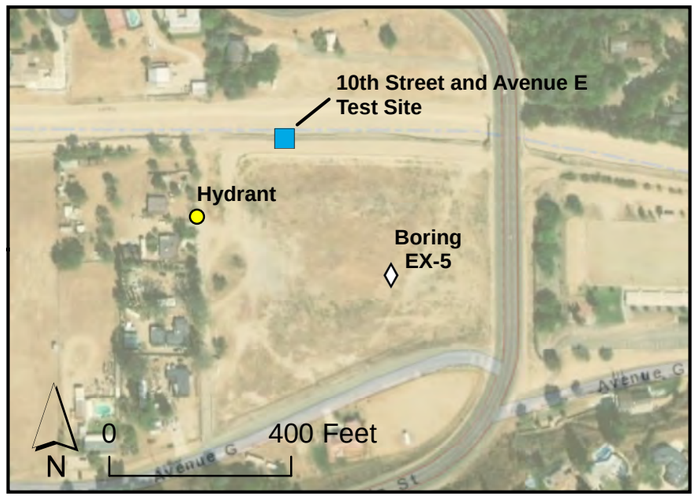
Infiltration Test Results





A. Initial excavation of test infiltration basin
B. Flow control skid and temporary fencing
C. Post-infiltration potholing to evaluate subsurface moisture conditions
D. Dry soil conditions below shallow silt layer occuring at 10-12 feet below the channel
E. Test in progress (Day 1)

Test Start		Aug-06-2018
Test End		Aug-20-2018
Basin Dimensions (L x W) (ft)		41 x 21
Average Water Height (ft)		2.5
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		270,060
Total Water Added (acre-feet)		0.8
Infiltration Rate (Constant-Head)	High (ft/d)	4
	Low (ft/d)	2.94
	Average (ft/d)	3.5
Infiltration Rate (Falling-Head)	High (ft/d)	3.07
	Low (ft/d)	2.4
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		1.7
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		0.9



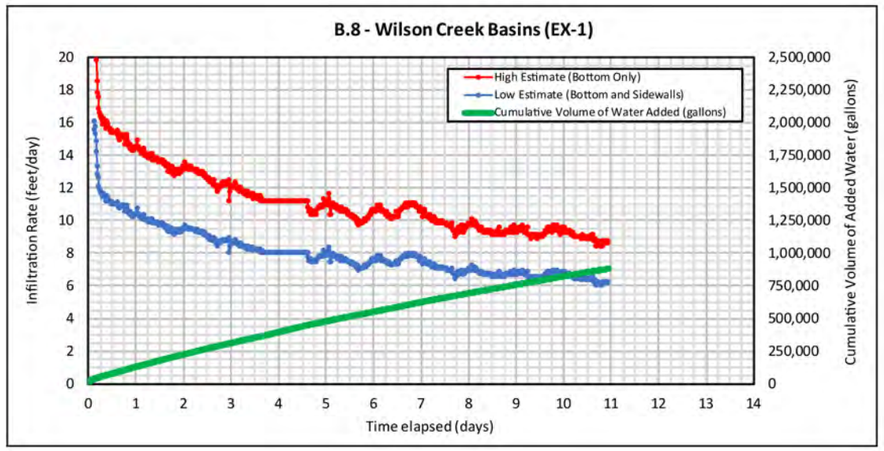
Conclusions:
- Results of infiltration testing indicate that the site (within the channel) is not suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 1.7 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 0.9 feet/day.
- Low infiltration rates appear to be due to low-permeability clayey silt layer, the top of which occurs at 10-12 feet depth. Dry soil conditions were observed below the clayey silt layer at end of testing.
- No fine-grained deposits were identified in EX-5 above 94 feet-bgs; fine-grained material appears to be associated with sediment load from natural stormflows.

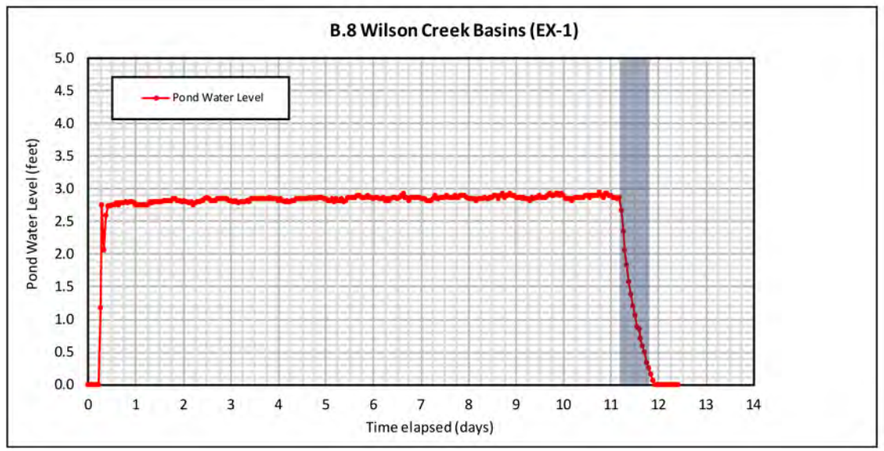
Recommendations:
- Near-surface coarse-grained sediments found in Wildwood Creek at California Street, appear to have limited thickness and are underlain by a fine-grained matrix associated with natural stormflows, which limit infiltration significantly.
- No additional actions are recommended at this site.

TODD GROUNDWATER

Figure 6
Wildwood Creek at California Street

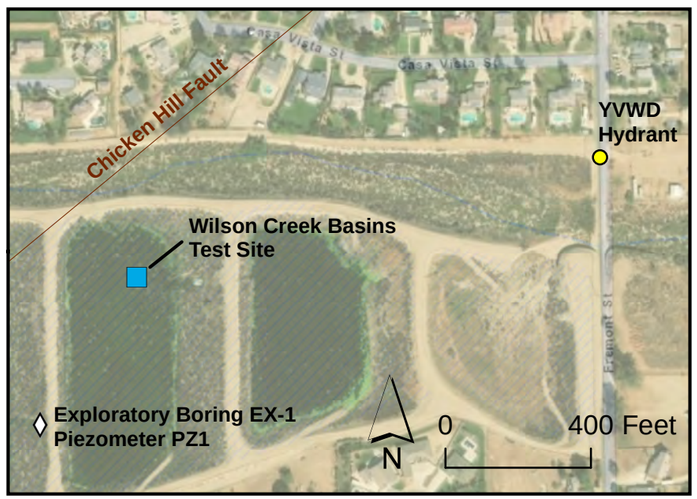
Infiltration Test Results





A. Initial excavation of test infiltration basin
B. 4" fire hose through intra-basin culvert
C. Clay on basin surface from historical SWP recharge operations; SWP water during test release from turnout
D. Fine-grained silt/clay 0-2.5 feet; silt/sand/gravel 2.5-5 feet)
E. Test in progress (Day 11)
F. Dry basin after falling-head test (Day 14)

Test Start		Aug-13-2018
Test End		Aug-27-2018
Basin Dimensions (L x W) (ft)		32 x 29
Average Water Height (ft)		3.0
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		882,120
Total Water Added (acre-feet)		2.7
Infiltration Rate (Constant-Head)	High (ft/d)	8.71
	Low (ft/d)	6.05
	Average (ft/d)	7.4
Infiltration Rate (Falling-Head)	High (ft/d)	7.39
	Low (ft/d)	5.51
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		3.7
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		1.8



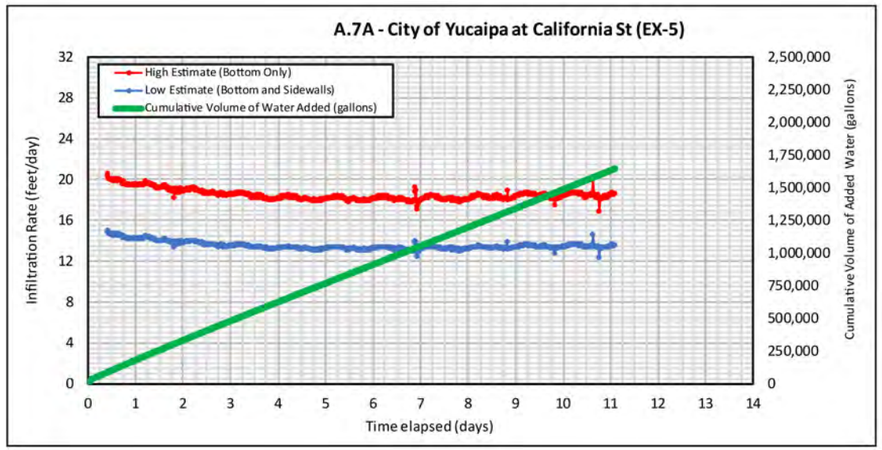
Conclusions:
- Results of infiltration testing confirm that the site is suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 3.7 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 1.8 feet/day.
- While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.
- Declining infiltration rates during the test are associated with shallow recharge mounding identified by the USGS (Mooreland, 1970)

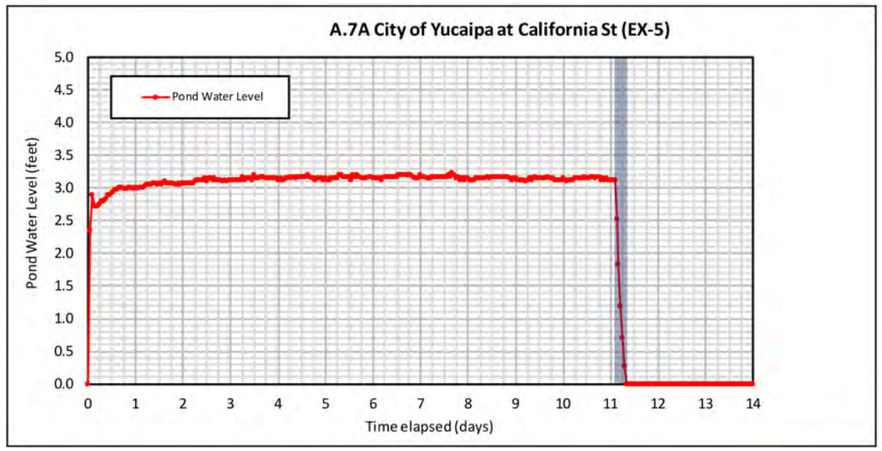
Recommendations:
- If site recharge goals are expected to exceed the operational capacity of the basins, the removal of the approximately upper 3 feet of sediment in each of the basins is recommended prior to future active recharge. Pilot-scale testing is not recommended at this site.

TODD GROUNDWATER

Figure 7
Wilson Creek Basins

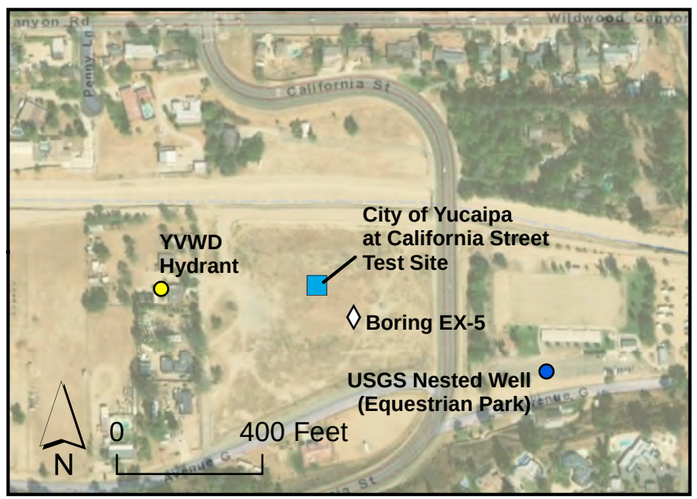
Infiltration Test Results





A. SMWC fire hydrant setup
B. 4" fire hose and traffic barricades
C. Post-excavation / flow control skid setup
D. Test in progress (Day 1)
E. Test in progress (Day 7)

Test Start		Aug-20-2018
Test End		Sep-03-2018
Basin Dimensions (L x W) (ft)		33 x 32
Average Water Height (ft)		3.0
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		1,646,180
Total Water Added (acre-feet)		5.1
Infiltration Rate (Constant-Head)	High (ft/d)	18.47
	Low (ft/d)	13.58
	Average (ft/d)	16.0
Infiltration Rate (Falling-Head)	High (ft/d)	16.82
	Low (ft/d)	14.5
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		8.0
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		4.0



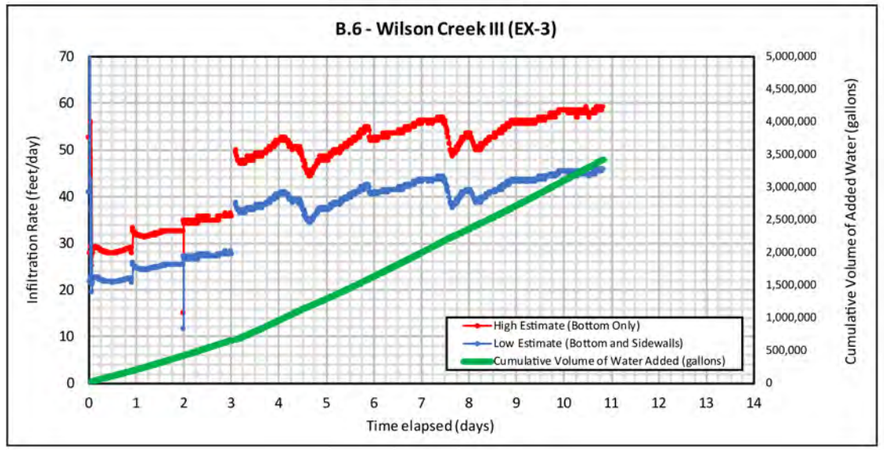
Conclusions:
- Results of infiltration testing confirm/indicate that the site is favorable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 8.0 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 4.0 feet/day.
- While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.
- High infiltration rates are representative of almost exclusively coarse-grained deposits (sand/gravel) identified in EX-5.

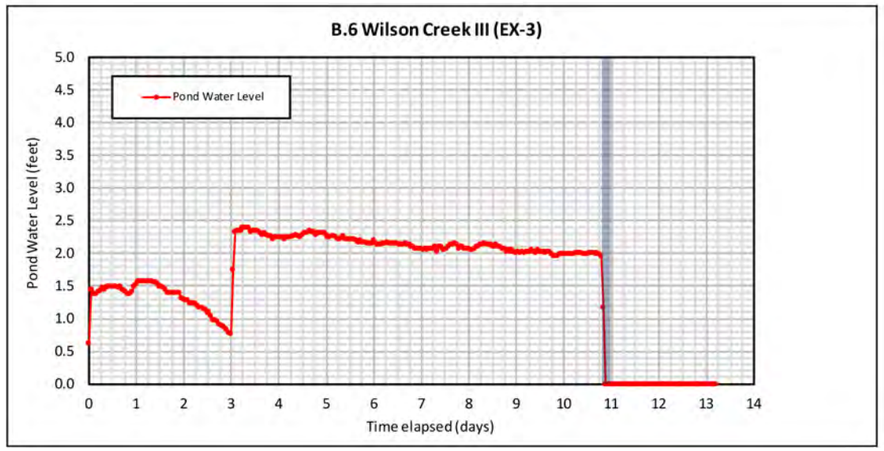
Recommendations:
- Pilot recharge testing is recommended to confirm full-scale basin infiltration rates and identify potential site vadose zone storage capacity constraints due to recharge mounding.

TODD GROUNDWATER

Figure 8
City of Yucaipa at California Street

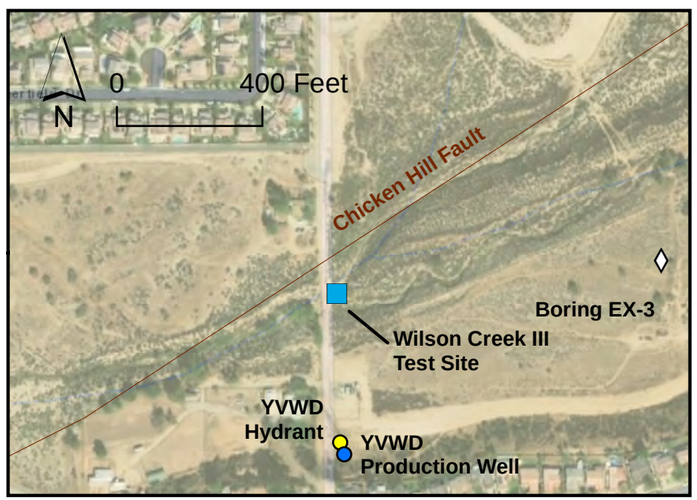
Infiltration Test Results





A. YVWD fire hydrant setup
B. 4" fire hose along east side of 2nd St
C. Post-excavation / fencing
D. Test in progress (Day 1)
E. Test in progress (Day 4)

Test Start		Aug-27-2018
Test End		Sep-10-2018
Basin Dimensions (L x W) (ft)		45 x 20
Average Water Height (ft)		2.0
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		3,426,110
Total Water Added (acre-feet)		10.5
Infiltration Rate (Constant-Head)	**High (ft/d)**	59.18
	Low (ft/d)	44.8
	Average (ft/d)	52.0
Infiltration Rate (Falling-Head)	**High (ft/d)**	N/A; too fast
	Low (ft/d)	
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		26.0
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		13.0



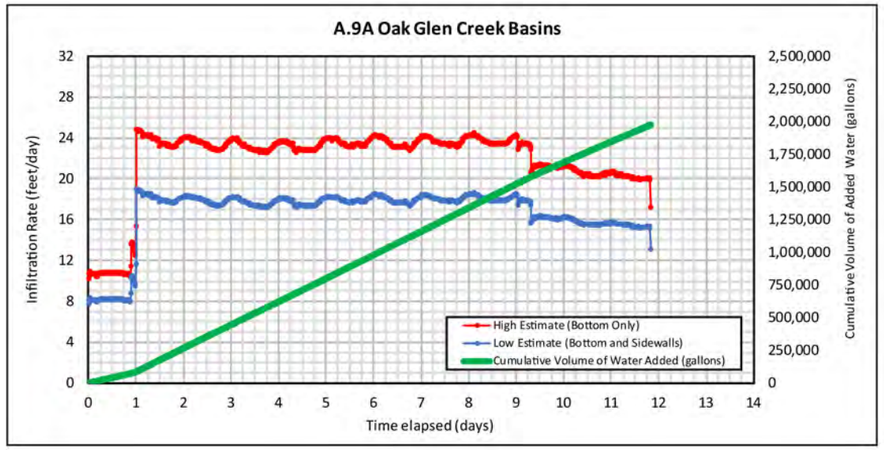
Conclusions:
- Results of infiltration testing confirm/indicate that the site is favorable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 26.0 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 13.0 feet/day.
- While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.
- High infiltration rates are representative of almost exclusively coarse-grained deposits (sand/gravel) identified during excavating and in EX-3.
- High rates may also be partly attributable to the proximity of the test basin to a large-diameter conveyance pipe along the east side of 2nd St, presumably set in a gravel-filled trench.

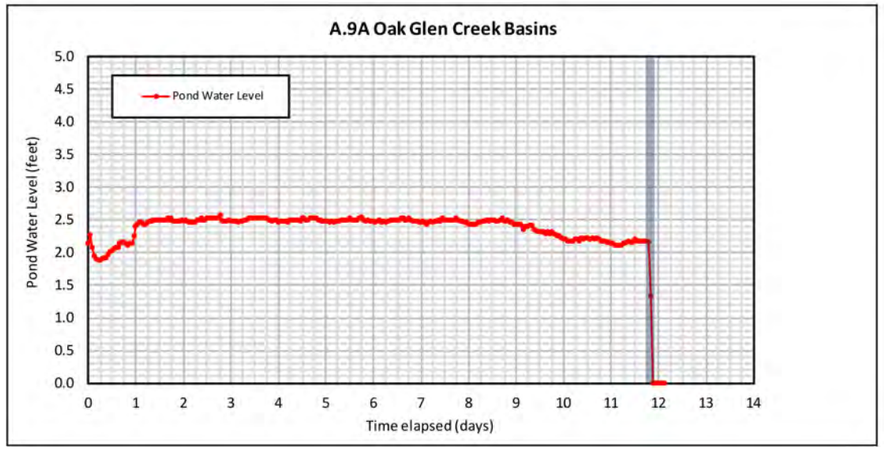
Recommendations:
- Depending on the size of the full-scale basin, pilot-scale infiltration testing is recommended to confirm full-scale initial infiltration rates and to identify potential site vadose zone storage capacity constraints due to recharge mounding. Installation of a monitoring well adjacent to the site is recommended to confirm the arrival and mounding effect of recharge water during pilot testing and to track future groundwater level changes.

TODD GROUNDWATER

Figure 9
Wilson Creek III

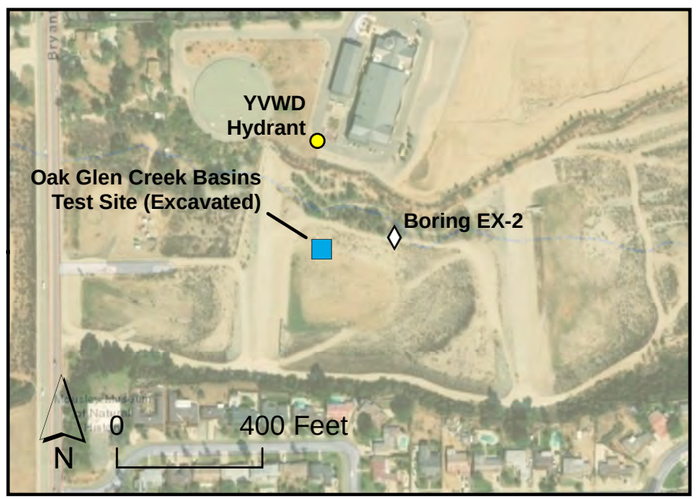
Infiltration Test Results





A. 4" fire hose / YVWD fire hydrant in background
B. Post-excavation / fencing setup (Day 1)
C. Test in progress (Day 3)
D. Test in progress (Day 4)
E. Post-testing - hard silt/clay layer shown in upper 3 feet

Test Start		Sep-03-2018
Test End		Sep-17-2018
Basin Dimensions (L x W) (ft)		32 x 32
Average Water Height (ft)		2.5
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		1,974,600
Total Water Added (acre-feet)		6.1
Infiltration Rate (Constant-Head)	High (ft/d)	24.06
	Low (ft/d)	17.86
	Average (ft/d)	21.0
Infiltration Rate (Falling-Head)	High (ft/d)	19.7
	Low (ft/d)	19.7
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		10.5
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		5.2



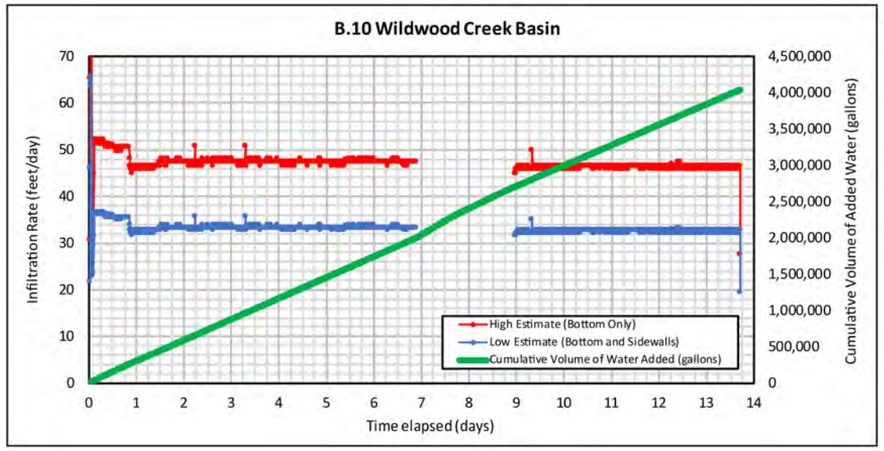
Conclusions:
- Results of infiltration testing confirm/indicate that the site is favorable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 10.5 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 5.2 feet/day.
- While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.
- High infiltration rates are representative of almost exclusively coarse-grained deposits (sand/gravel/cobbles) identified during excavating and in EX-2.
- Infiltration test results for excavated and bermed test basins within Oak Glen Creek Basin highlight the importance removing the upper approximate 3 feet of fine silt/clay that has accumulated in the basin.

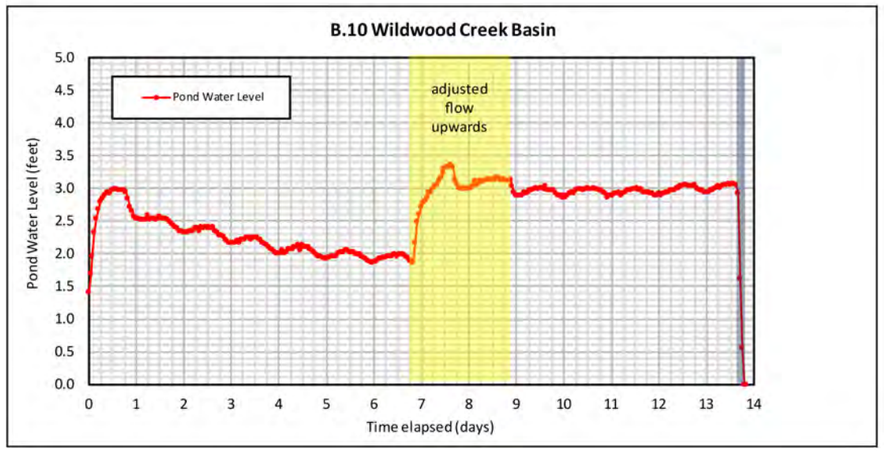
Recommendations:
- If site recharge goals are expected to exceed the operational capacity of the Oak Glen Creek Basins, the removal of the upper 3 feet of sediment in each of the Oak Glen Creek basins prior to future active recharge is recommended. Pilot-scale testing is not critical at this site.

TODD GROUNDWATER

Figure 10
Oak Glen Creek Basins (Excavated)

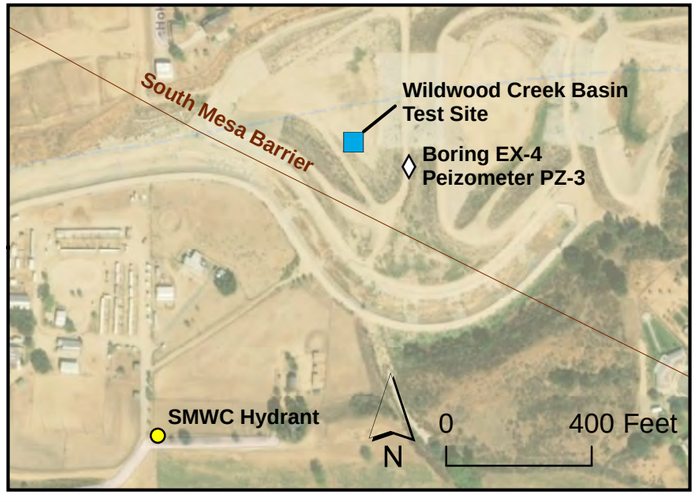
Infiltration Test Results





A. Traffic control and buried hose from SMWC hydrant
B. Testing in progress (Day 1)
C. EX-4 monitoring well (151' deep) located ~100' east of test basin
D. Flow control skid at end of test (Day 14)
E. Test in progress view from east (Day 7)

Test Start		Sep-10-2018
Test End		Sep-24-2018
Basin Dimensions (L x W) (ft)		29 x 28
Average Water Height (ft)		3.0
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		4,040,929
Total Water Added (acre-feet)		12.4
Infiltration Rate (Constant-Head)	High (ft/d)	45.8
	Low (ft/d)	32.2
	Average (ft/d)	39.0
Infiltration Rate (Falling-Head)	High (ft/d)	31.2
	Low (ft/d)	28.3
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		19.5
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		9.8



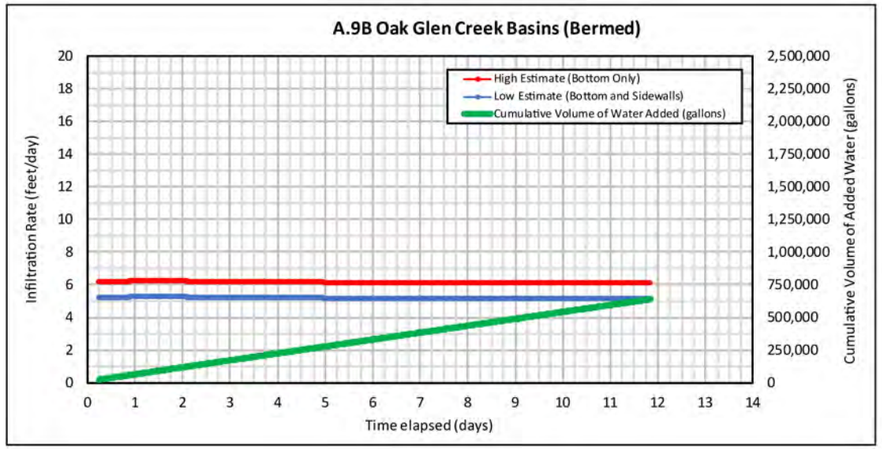
Conclusions:
- Results of infiltration testing indicate that the site is suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 19.5 feet/day.
- Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 9.8 feet/day.
- Relatively high infiltration rates are representative of the permeable vadose zone sediments (sand, gravel) encountered in adjacent exploratory boring EX-4
- No significant fine-grained silt/clay deposits were encountered in EX-4, which was drilled to 151 feet-bgs. Depth to water in MW-3 was 103 ft-bgs after 6 days of testing and rose to within 99 ft-bgs at the end of testing (after 14 days of infiltration).
- While long-term estimates consider expected clogging of the basin bottom from SWP water, actual long-term rates will be dependent on the specific site recharge goal and implementation of a basin maintenance plan.

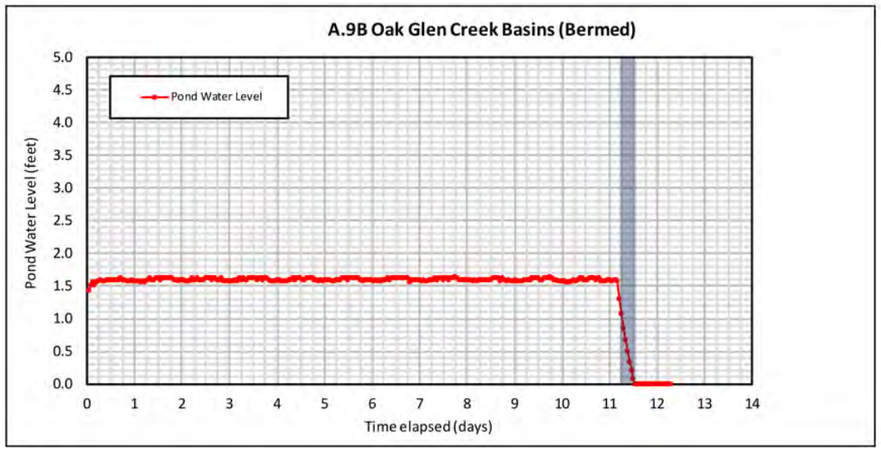
Recommendations:
- Pilot scale infiltration test is recommended to identify potential site vadose zone storage capacity constraints due to recharge mounding and the influence of the South Mesa Barrier.
- Prior to pilot testing, installation of monitoring well west of the South Mesa Barrier is recommended to confirm groundwater storage benefits from managed aquifer recharge at this location.

TODD GROUNDWATER

Figure 11
Wildwood Creek Basin

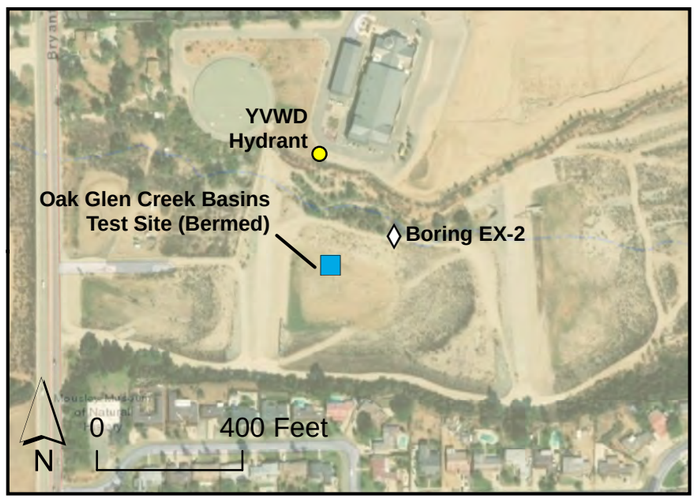
Infiltration Test Results





A. 4" fire hose / YVWD fire hydrant in background
B. Bermed (background) and Excavated Basin (foreground)
C. Fine silt/clay on ground surface
D. Post-excavtion and plastic sheeting bermed basin
E. Testing in progress (Day 1)
F. Leaked recharge water east of test basin (Day 6)

Test Start		Sep-17-2018
Test End		Oct-01-2018
Basin Dimensions (L x W) (ft)		34 x 34
Average Water Height (ft)		1.6
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		639,130
Total Water Added (acre-feet)		2.0
Infiltration Rate (Constant-Head)	High (ft/d)	6.12
	Low (ft/d)	5.15
	Average (ft/d)	5.6
Infiltration Rate (Falling-Head)	High (ft/d)	6.58
	Low (ft/d)	5.17
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		2.8
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		***2.8



Conclusions:
- Results of infiltration testing of the bermed basin at Oak Glen Creek indicates that while the site is favorable for recharge, fine grained sediment in the upper approximately 3 feet of soil has decreased the recharge capacity of the basin significantly.
- Clean full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates of the excavated test basin) are estimated at 10.5 feet/day.
- Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 5.2 feet/day. Long-term rates assume a consistent basin maintenance and cleaning program.
- An estimated full-scale long-term infiltration rate of 2.8 feet/day is predicted, which is similar to infiltration rates (3.2 feet/day) measured during pilot testing in 2018.
(City of Yucaipa, Oak Glen Creek Recharge Report, 2018)

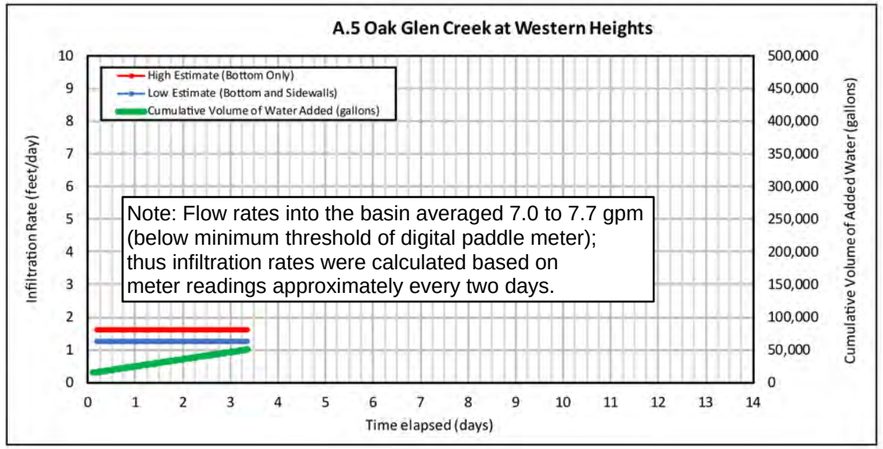
Recommendations:
- Infiltration test results for excavated and bermed test basins within Oak Glen Creek Basin highlight the effect that the upper 3 feet of accumulated fine silt/clay has on basin infiltration capacity.
- If site recharge goals are expected to exceed the operational capacity of the Oak Glen Creek Basins, the removal of the upper 3 feet of sediment in each of the Oak Glen Creek basins prior to future active recharge is recommended. Pilot-scale testing is not critical at this site.

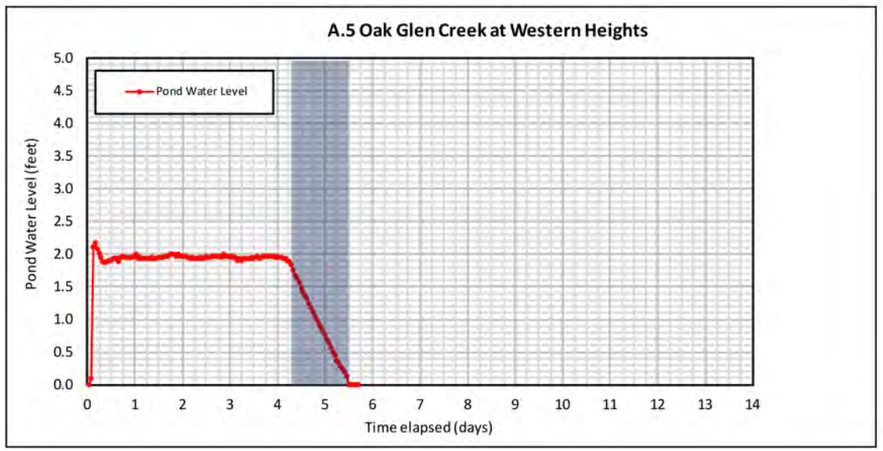
*** Initial and long-term infiltration rates are the same, because the basin is already significantly clogged from lack of maintenance

TODD GROUNDWATER

Figure 12
Oak Glen Creek Basins (Bermed)

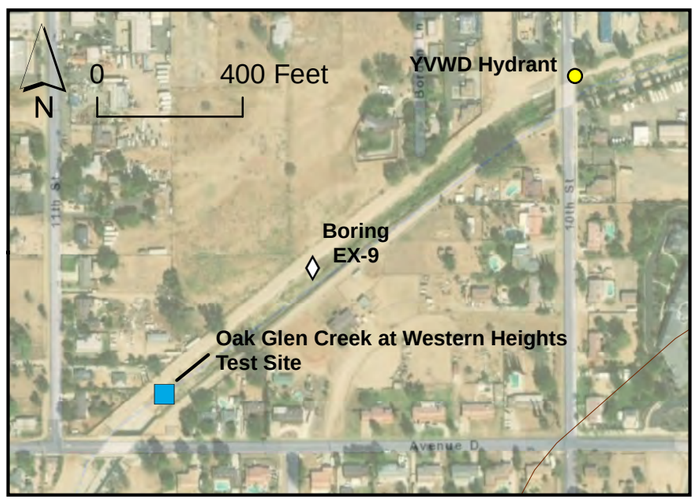
Infiltration Test Results





Test Start		Sep-24-2018
Test End		Oct-01-2018
Basin Dimensions (L x W) (ft)		46 x 20
Average Water Height (ft)		2.0
Infiltrating Area Basin Bottom (ft^2)		960
Infiltrating Area Basin Bottom + Walls (ft^2)		1,270
Total Water Added (gallons)		50,632
Total Water Added (acre-feet)		0.2
Infiltration Rate (Constant-Head)	**High (ft/d)**	1.59
	Low (ft/d)	1.24
	Average (ft/d)	1.4
Infiltration Rate (Falling-Head)	**High (ft/d)**	1.64
	Low (ft/d)	1.45
Full-Scale Basin Est. Initial Infiltration Rate (ft/d)		0.7
Full-Scale Basin Est. Long-Term Infiltration Rate (ft/d)		0.4

A. YVWD hydrant at 10th Street and 4" fire hose
B. 4" fire hose along northern channel bank west of 10th Street
C. Excavated basin, fencing, and soil stockpile
D. Initial test basin filling (Day 1)
E. Falling head test in progress view from south (Day 2)



Conclusions:
- Results of infiltration testing indicate that the site (within the channel) is not suitable for recharge.
- Full-scale basin initial infiltration rates (based on 50% of measured field-scale testing infiltration rates) are estimated at 0.7 feet/day. Long-term infiltration rates (based on 50% of full-scale basin initial infiltration rates) are estimated at 0.4 feet/day.
- Low infiltration rates appear to be due to low-permeability clayey silt sediments comprising the channel sidewalls and bottom.
- Fine-grained deposits were identified in EX-9 from 15 to 25 feet-bgs (approximately 0 to 10 feet below the channel bottom); however, fine-grained material also appears to be associated with sediment load from natural stormflows.

Recommendations:
- Surficial sediments found Oak Glen Creek at this location are comprised of predominatly fine-grained sediments that may be naturally occurring and also associated with natural stormflows, which significantly inhibit infiltration.
- No additional actions are recommended at this site.

TODD GROUNDWATER

Figure 13
Oak Glen Creek at Western Heights

Appendix A

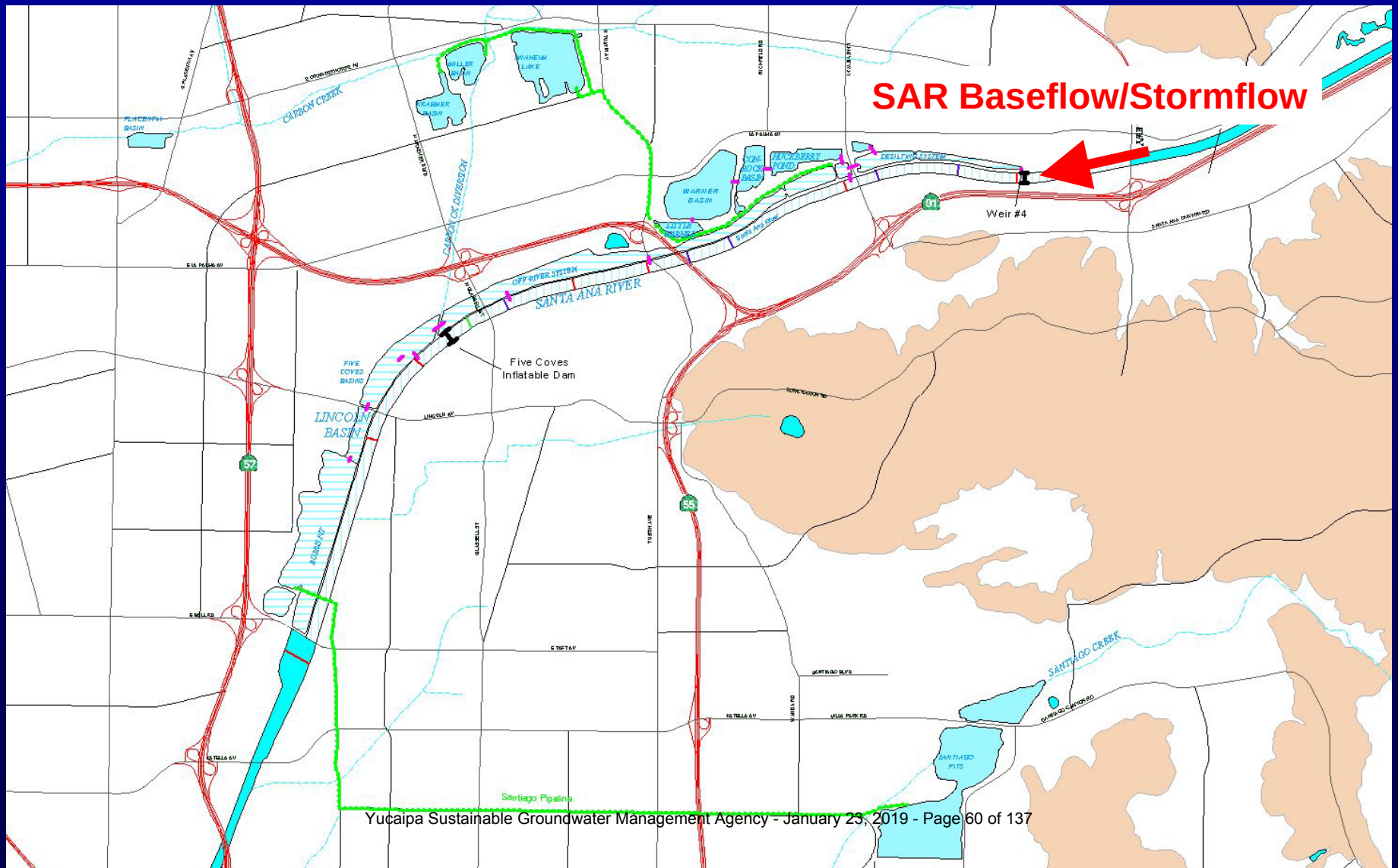
Phipps, D.W., Lyon, S., and Hutchinson, A. (2007) Development of a Percolation Model to Guide Future Optimization of Surface Water Recharge Basins. Presentation at 6th International Symposium of Managed Aquifer Recharge (ISMAR). October 30, 2007.

Development of a Percolation Model to Guide Future Optimization of Surface Water Recharge Basins

ISMAR 6
October 30, 2007

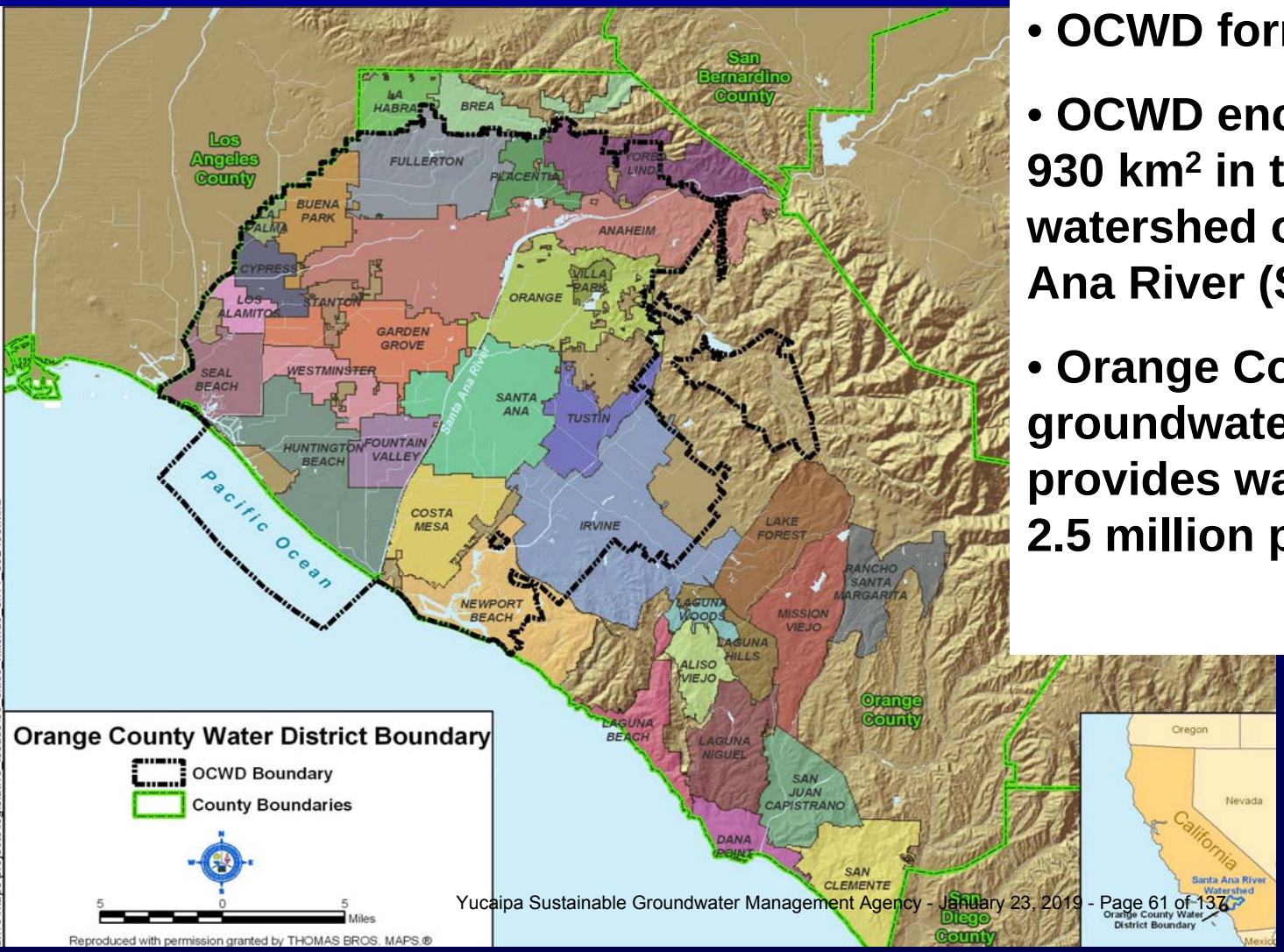
Donald W. Phipps, Jr.
Stephen Lyon
Adam Hutchinson

OCWD's 1,100 acres of MAR facilities receive imported and SAR water.



OCWD Background

- OCWD formed in 1933
- OCWD encompasses 930 km^2 in the lower watershed of the Santa Ana River (SAR)
- Orange County groundwater basin provides water for over 2.5 million people

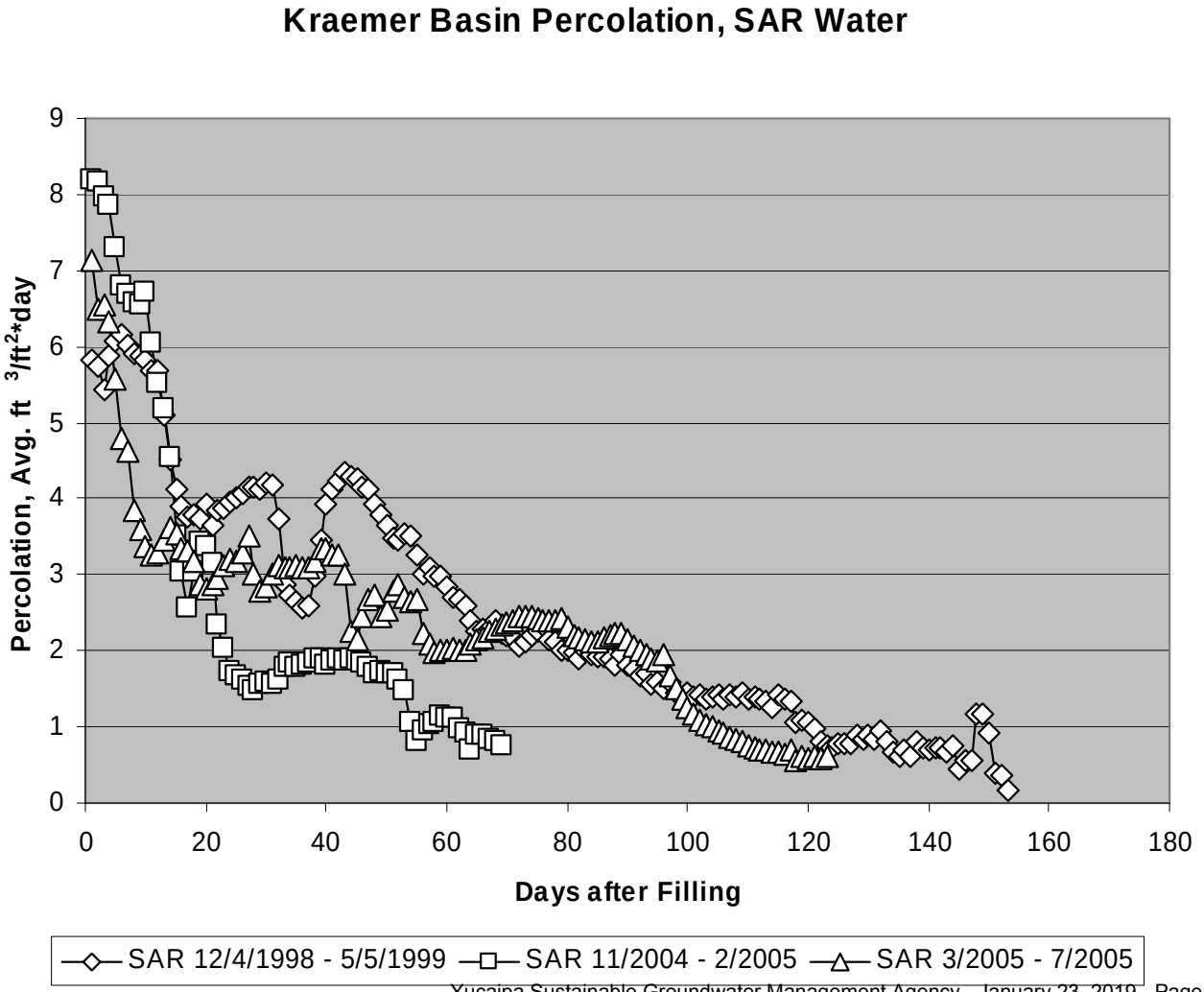


Primary Replenishment Source

- **250,000 AFY – Santa Ana River (52% of supply)**
- **500 cfs recharge rate and 51,000 AF of storage**
- ***1,600 acres of recharge basins***

Problem: Suspended Solids Deposited on Basin Bottoms During Percolation Form a Fouling Layer

Fouling Layer Accumulation Leads to Percolation Rate Decay



- Percolation decline observed in Kraemer Basin during percolation of Santa Ana River (SAR) water

From Percolation Studies at OCWD (1987-1990)…

- Percolation reduction appeared primarily a function of fine suspended solids accumulation
- Accumulation at or very close to the sediment/water interface responsible for loss of percolation
- Percolation loss appears to follow a log decay relationship

Objective: To Model OCWD Recharge Basin Percolation Kinetics

A Basin Percolation Kinetic model will:

- Provide an insight regarding mechanisms responsible for observed percolation rate decay kinetics.
- Assist in predicting recharge basin water production.
- Define parameters that may be manipulated to improve recharge basin percolation performance.

Model Hypotheses

Percolation decay:

- Is caused by accumulation of fine material deposited by percolation water flux at the sediment/water interface
- Is related to accumulation of foulant material by a log decay function

Hypothesized Relationship Between Foulant Accumulation and Percolation

$$Q = Q_o * e^{-rL}$$

Where:

Q = **Observed percolation rate at L (ft^3/ft^2 per day)**

Q_o = **Initial percolation rate @ L=0 (ft^3/ft^2 per day)**

r = **Sediment/Foulant Interaction Coefficient (ft^2/mg)**

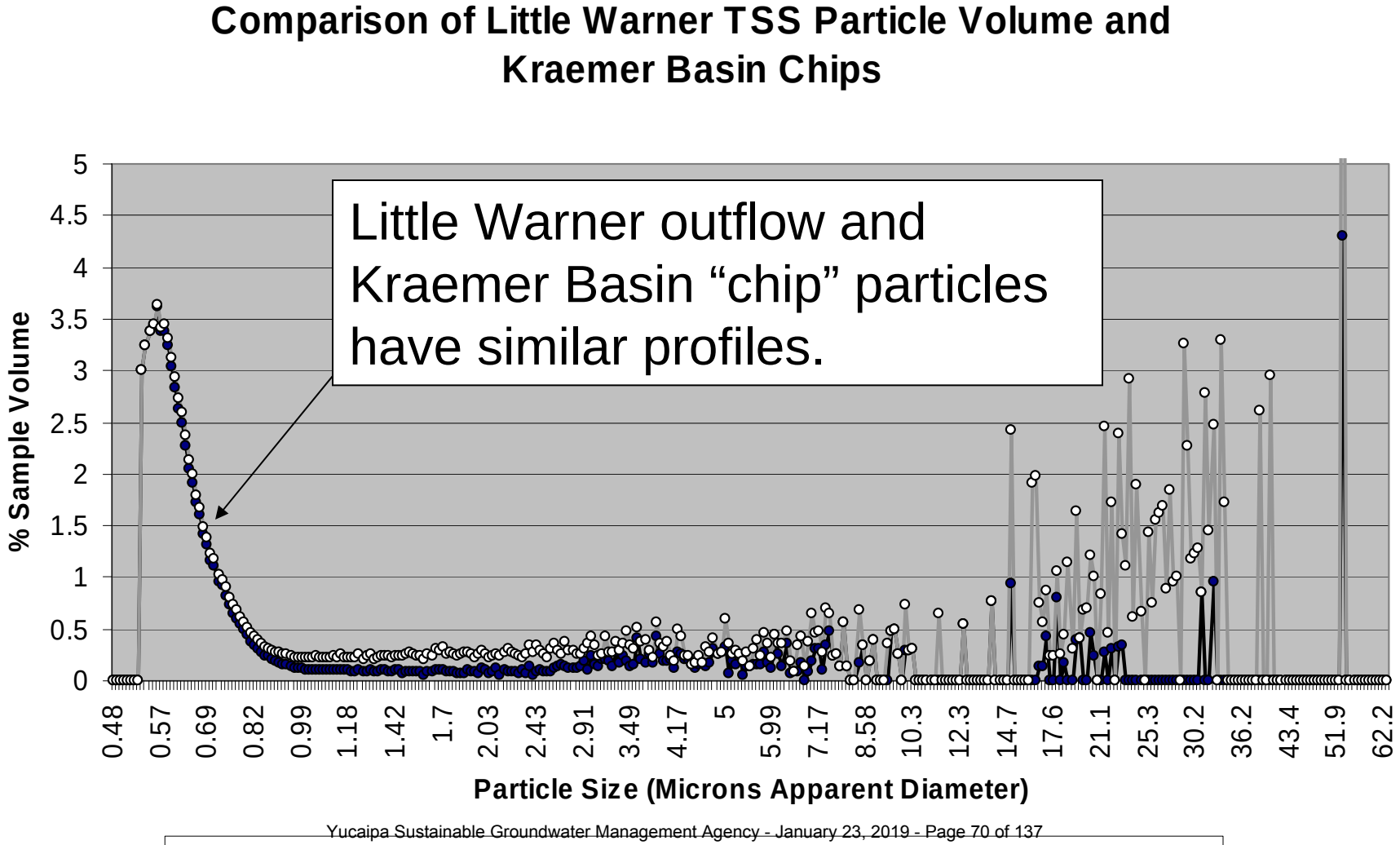
L = **Total mass of solids on the bottom (mg/ft^2)**

- **Advantage –** ***terms in model all defined by measurable field parameters***

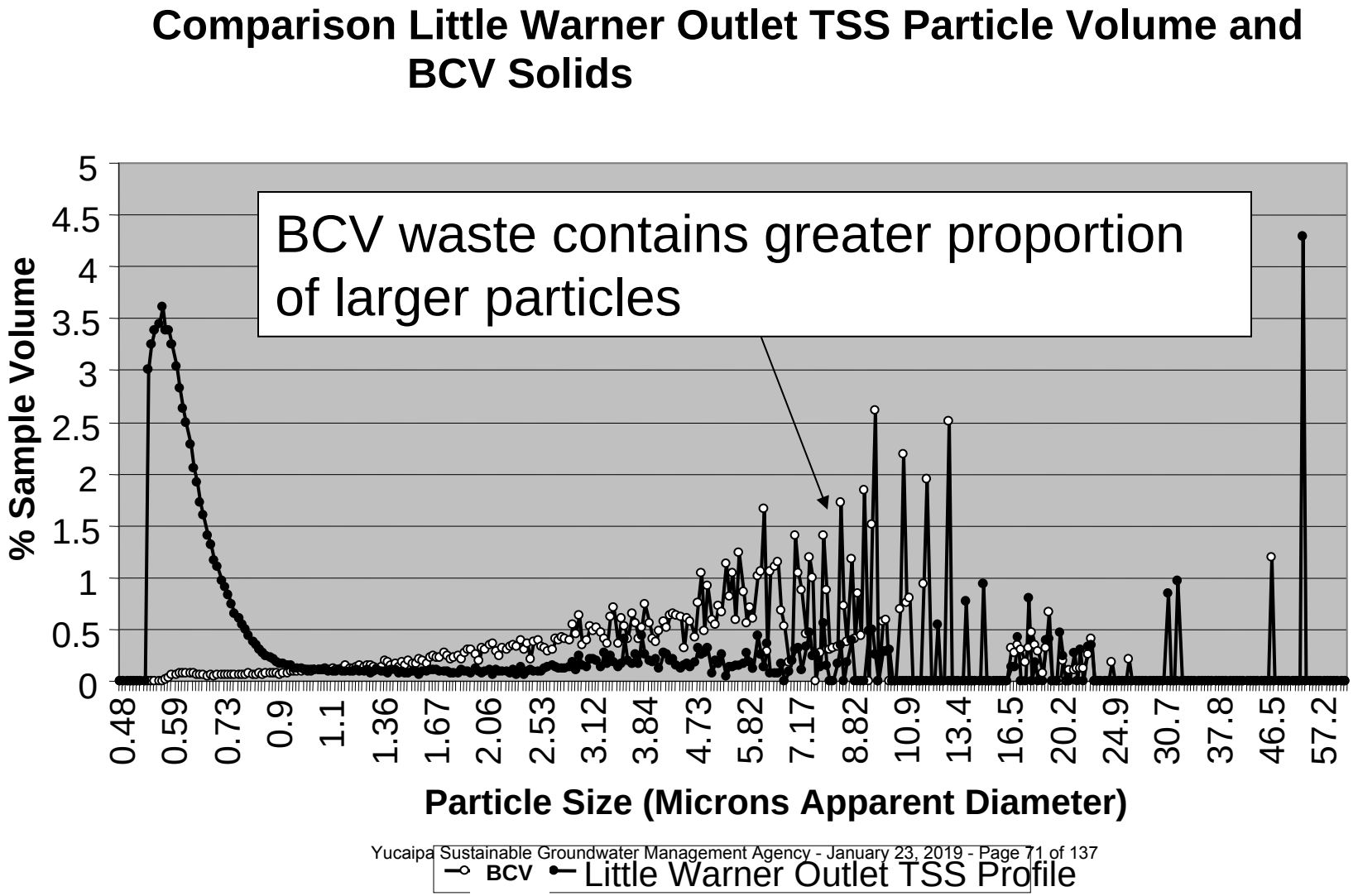
TSS for Laboratory Tests Obtained from "Chips" of Accumulated Fines

- Clay chips collected from the bottom of Kraemer Basin were mixed with bank-filtered SAR water to create TSS concentrations ranging from 20 to 400 mg/L. Other material was obtained from OCWD Basin Cleaning Vehicle (BCV) effluent.

Foulant Particle Size Distribution Comparison



Little Warner TSS vs. BCV Effluent Material



Model Hypothesis Tested Using 3” PVC Columns

Laboratory Test System:

Kraemer Basin sediment loaded onto 3” clear PVC columns operated at constant head pressure with SAR water containing a defined TSS load

Laboratory Test Column Schematic

Determination of r Value for Laboratory Columns

Obtain flow (ml/min) at intervals from 3" columns percolating well-derived SAR water containing KB chip fines at a desired TSS load (mg/L)

↓

Determine instantaneous percolation rate (ft^3/ft^2*day) using flow data and column geometry

↓

Determine total water percolated (ft^3) and solids deposited in column (mg/ft^2) as a function of time by calculating the total water percolated at each time point and multiplying by solids load (mg/ft^2)

→

Plot total solids deposited, mg/ft^2 (L) vs. observed column percolation (ft^3/ft^2*day, Q)

↓

Use nonlinear regression techniques to fit data to a log decay relationship:

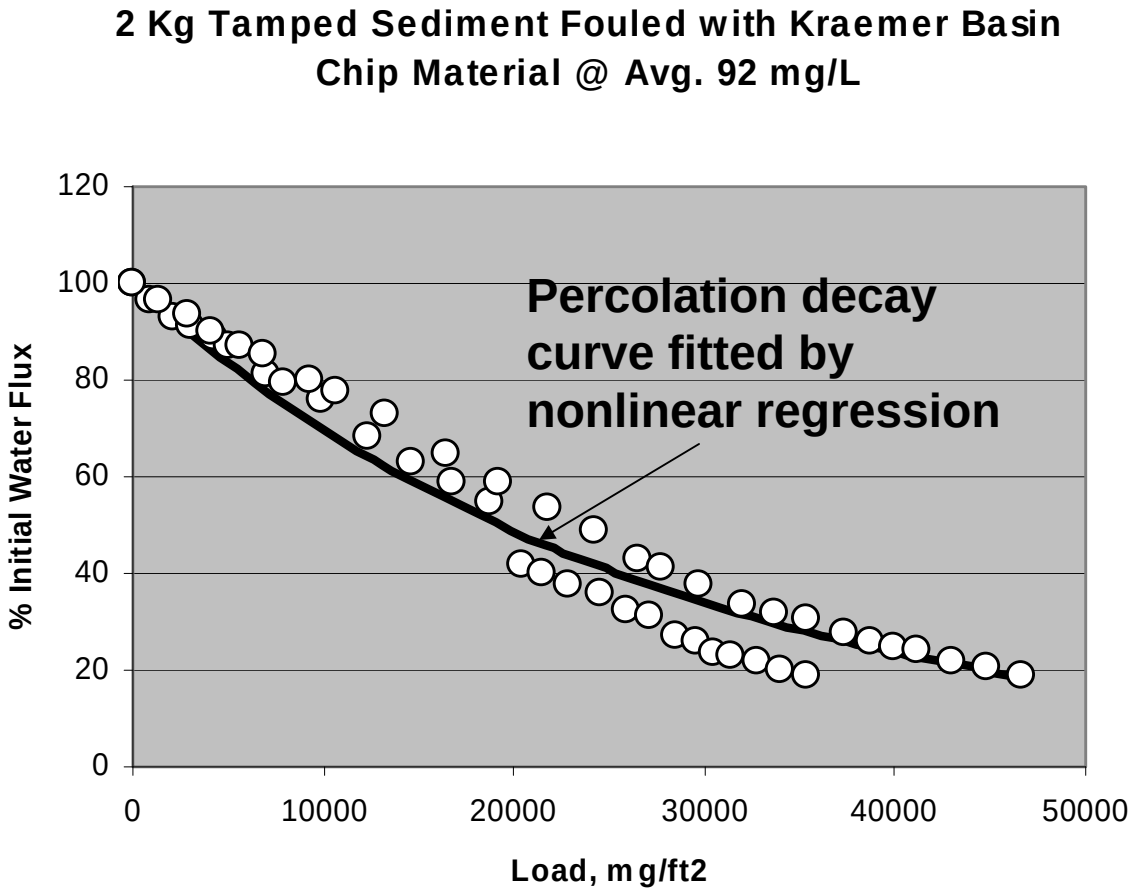
$Q = Q_o*(e^{(-r*\text{solids loaded, mg/ft2})})$

Determine averaged value for r from replicated columns

↓

To predict percolation kinetics, use laboratory-derived value for r and integrate L over 0.1 day increments (using given TSS values) to express percolation vs. time

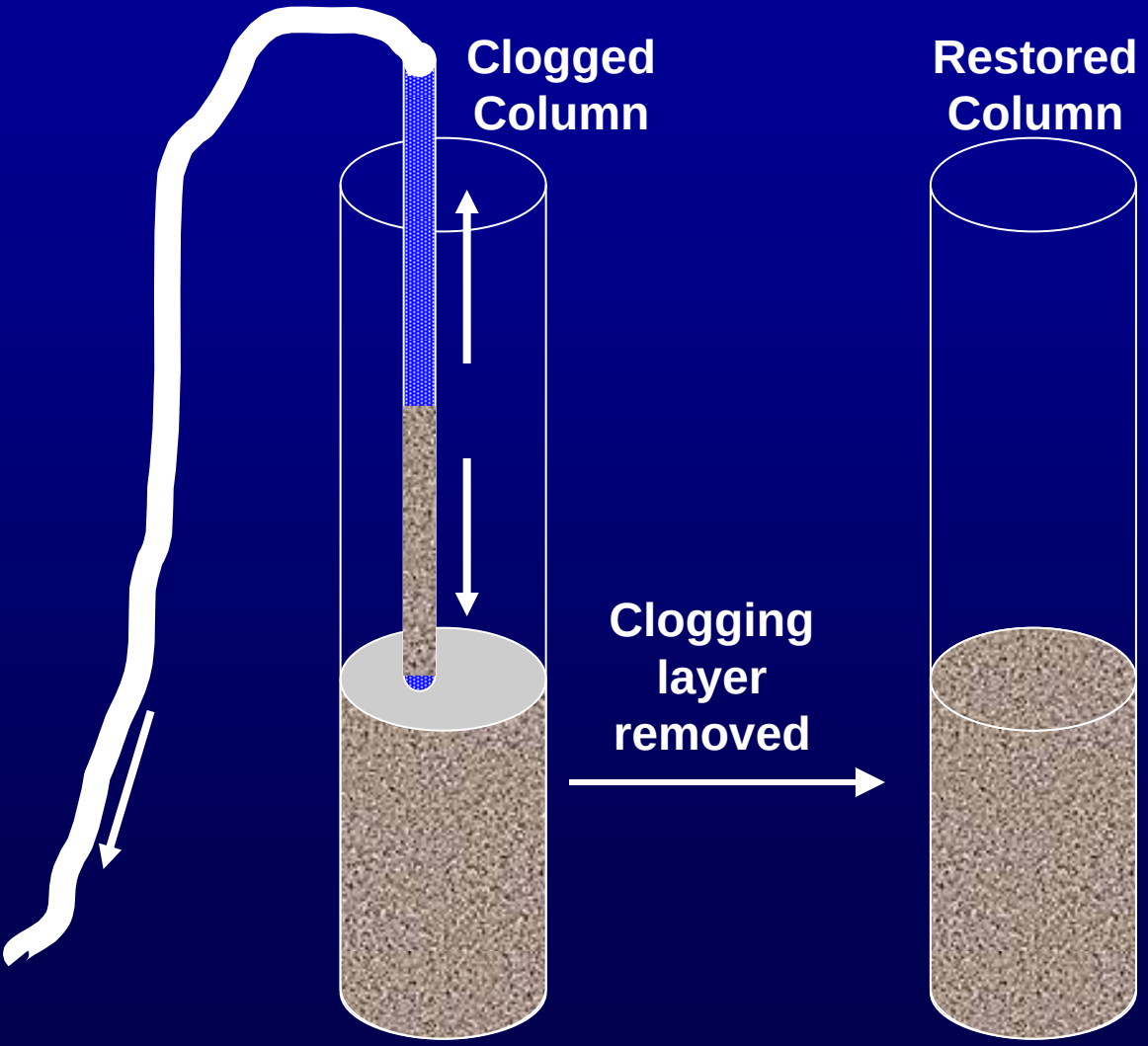
Model Fitted to Test Column Data



The model was fitted to test column data by manipulating the sediment/foulant interaction coefficient (r) with method of Marquardt nonlinear regression.

In most cases, the model explained <90% of the data variability.

Fouled Column Q Restored by Removing Top Layer of Sediment



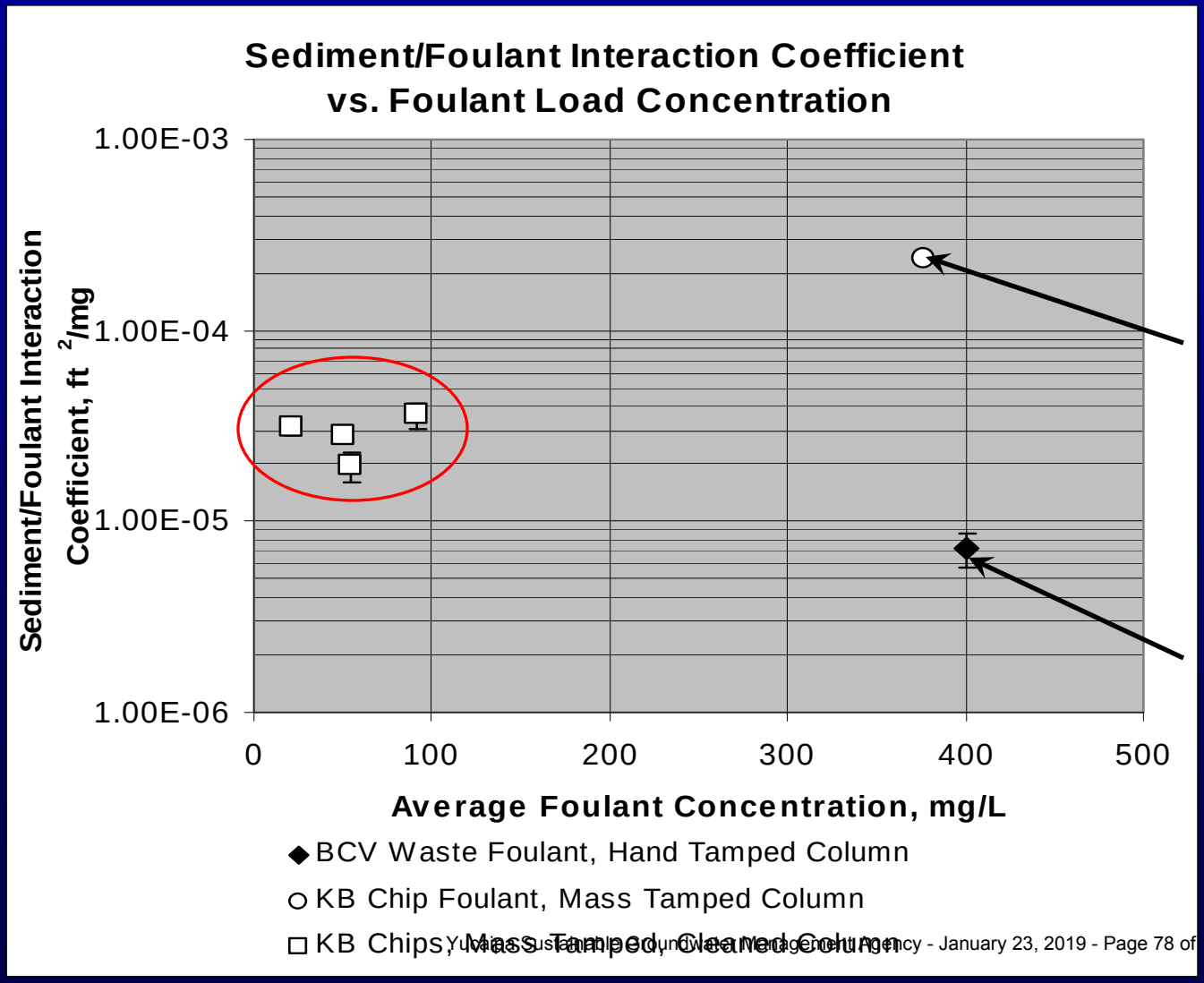
Restoration of percolation by aspiration of accumulated fines from upper 1cm of column *consistent with hypothesis that percolation reduction caused by foulant accumulation at the soil/water interface*

Multiple Column Tests were Performed at Different Foulant Loading Rates

- Columns loaded at various TSS concentrations ranging from 21 to 377 mg/L

- SAR baseflow: Avg. 23 mg/L
- SAR stormflow: Avg. 400 mg/L

Sediment/foulant interaction coefficient (r) is nearly constant for TSS <100 mg/L.

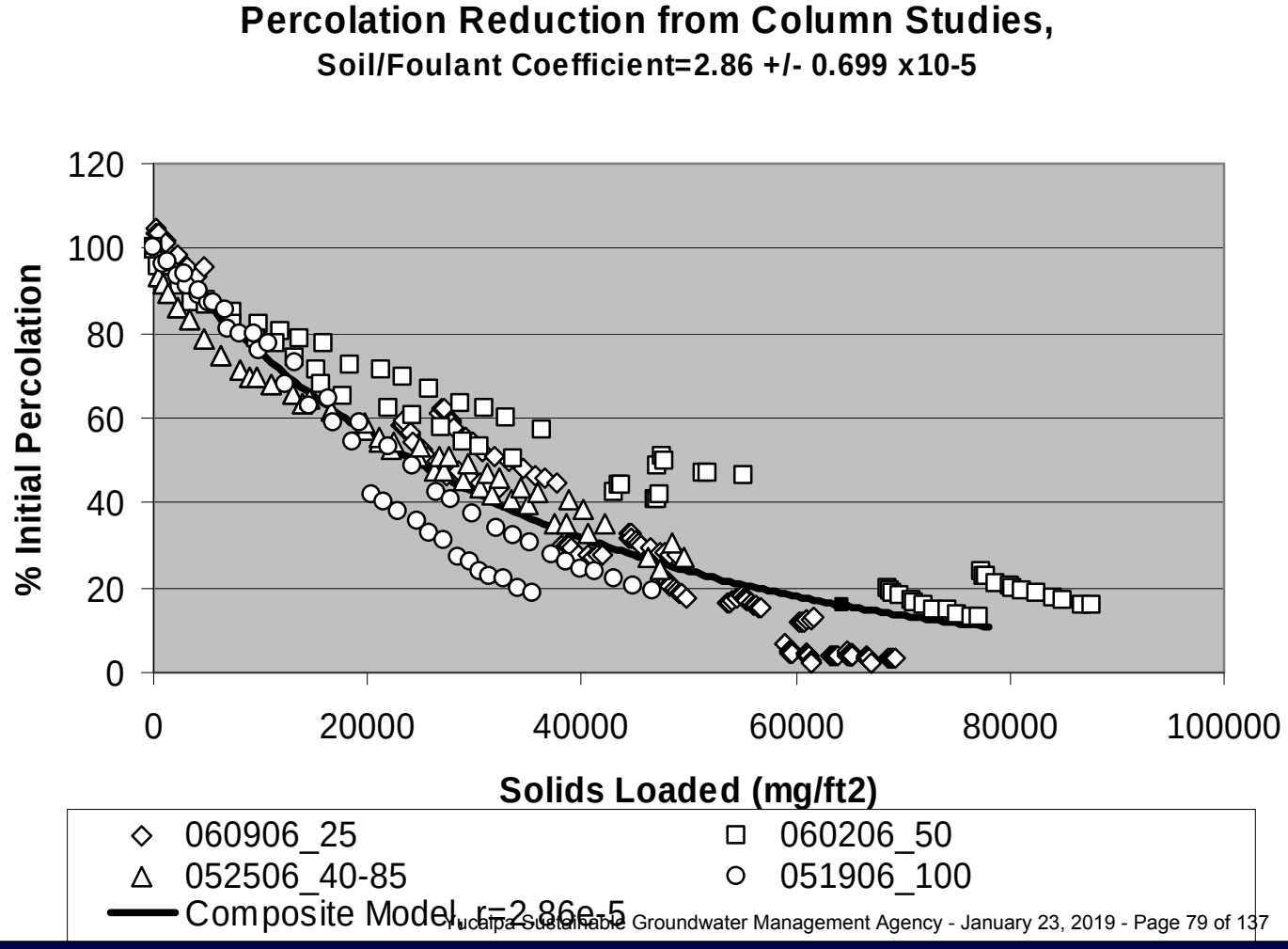


Kraemer Basin (KB) foulant material r values vary only slightly below 100 mg/L load.

At greater loading rates, KB fines foul more (greater r). Greater compaction possible?

r depends on foulant: BCV waste, with a greater average particle size than KB material exhibits lower r (fouls less)

Deriving Sediment/Foulant Interaction Coefficient (r) From Statistically Similar Column Data



Nonlinear regression of combined data from column experiments where foulant loading was <100 mg/L allowed calculation of an aggregate r value for Kraemer Basin Chip material:

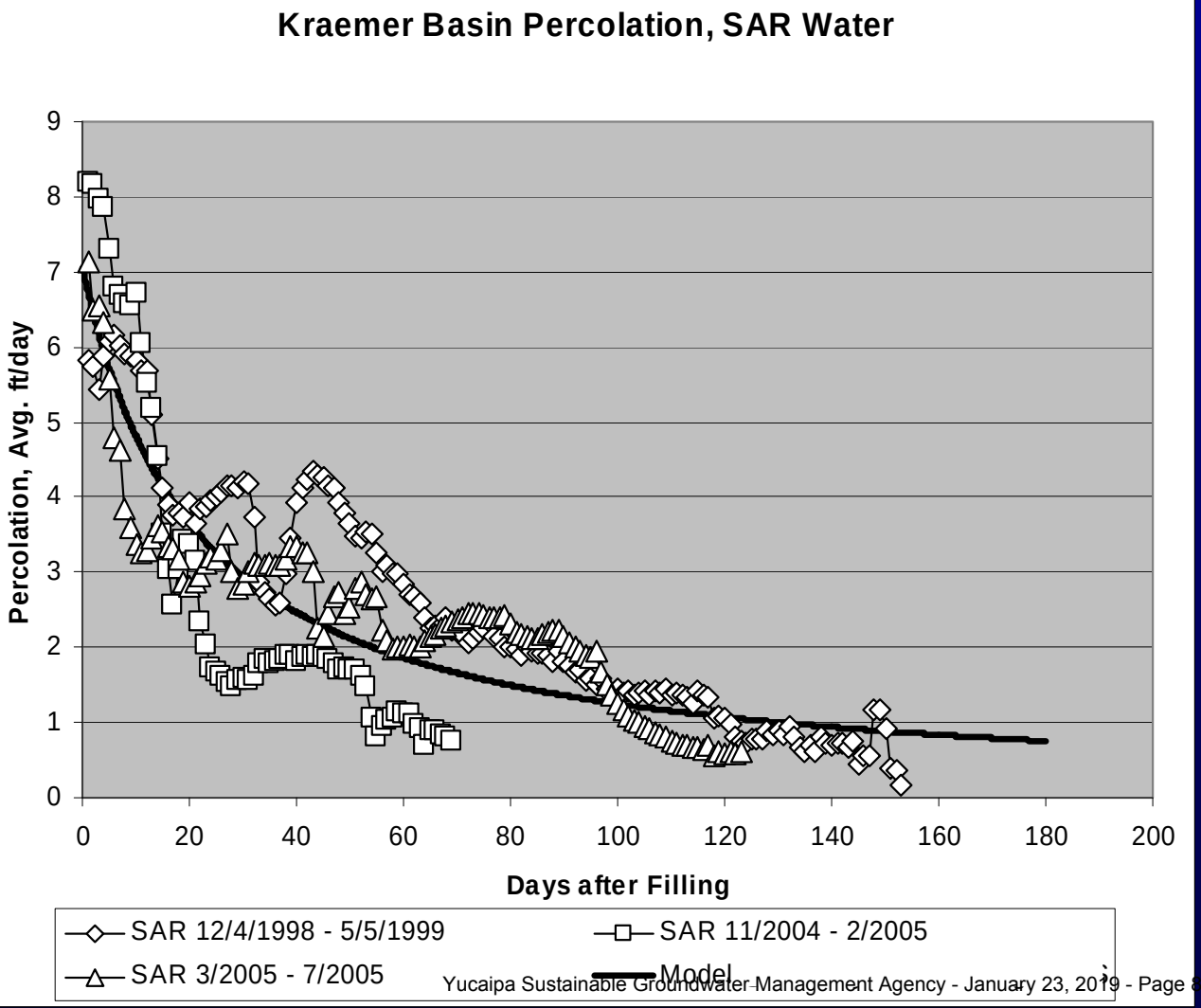
$r = 2.86 \pm 0.7 \times 10^{-5}$ ft²/mg

(2.66×10^{-6} m²/mg)

Some Factors That May Affect the Sediment/Foulant Interaction Coefficient (r):

- Foulant particle size distribution
- Soil particle size distribution
- Foulant geochemical composition
- Presence of materials increasing foulant adhesion (e.g., biopolymers)
- Deposition rate (slow vs rapid)

Describing SAR Water Percolation Decay Kinetics in Kraemer Basin Using Laboratory Column-Derived Value of r.



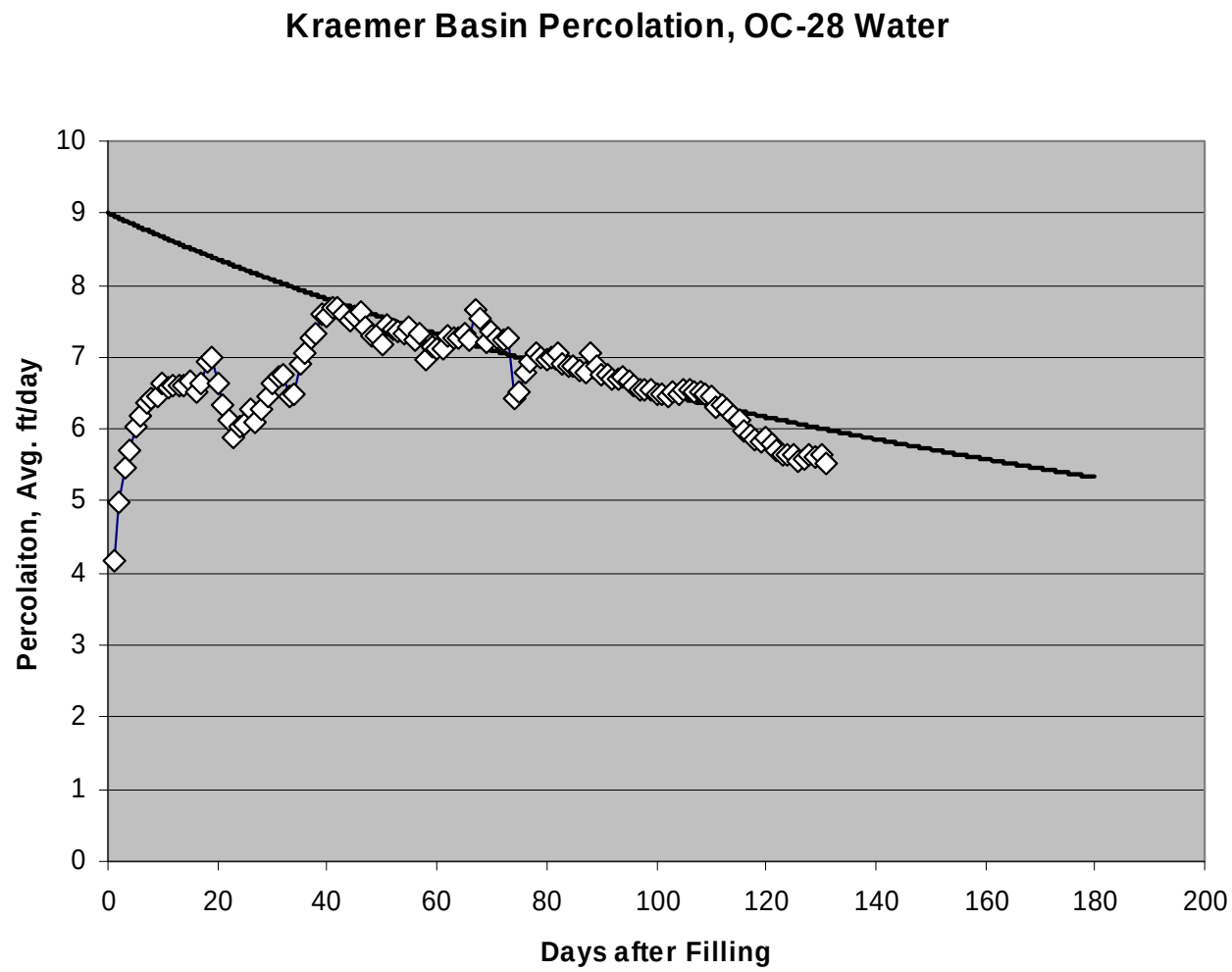
Model:

Q_o=7.05 ft^3/ft^2*day ($2.03 m^3/m^2*day$)

$r=2.86x10^{-5}$ ft^2/mg ($2.66x10^{-6}$ m^2/mg)

[Foulant] estimated at 8.20 mg/L average

Model Fitted to percolation decay in Kraemer Basin with OC-28 Water



Model:

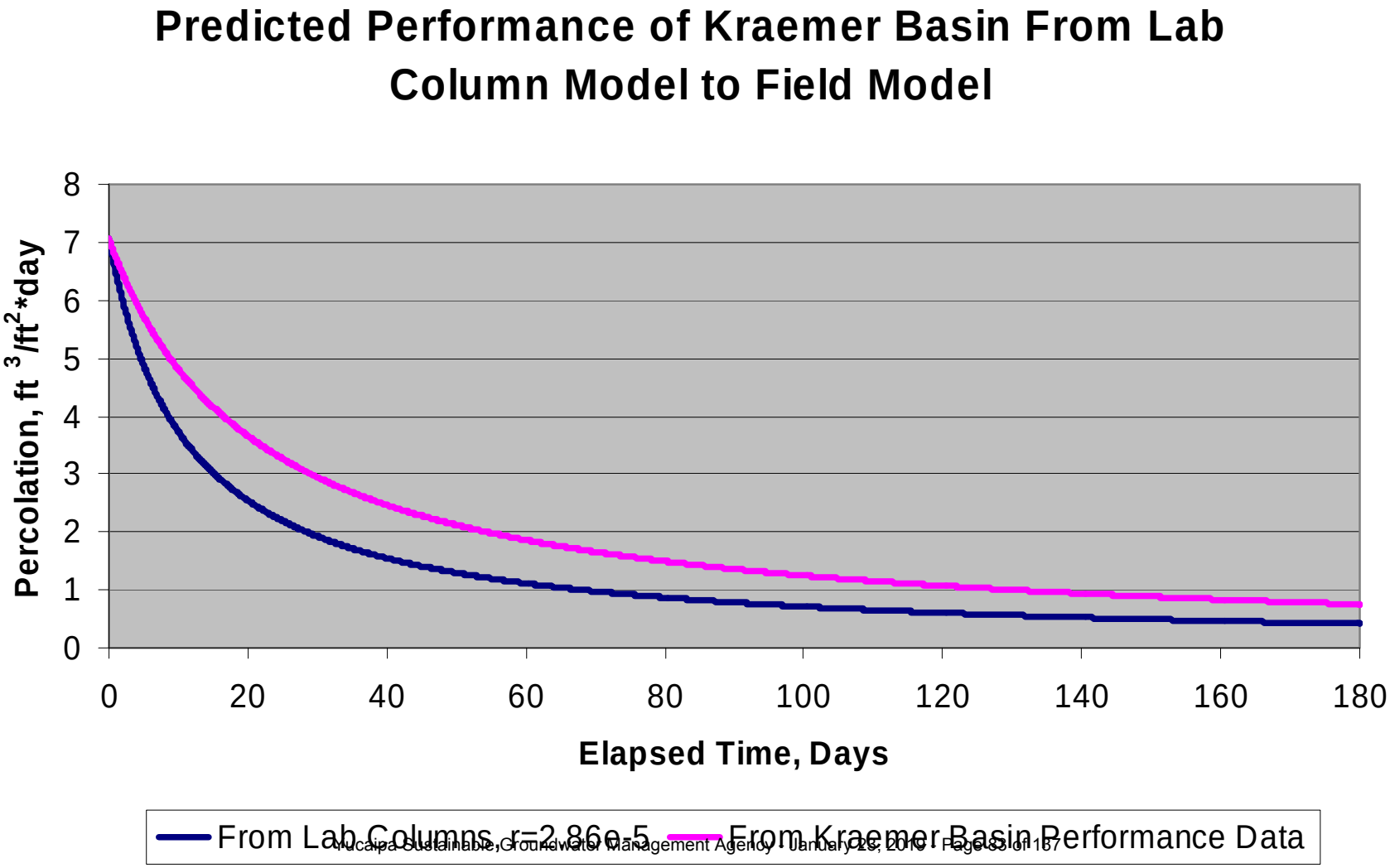
Q_o=9 ft^3/ft^2*day
(2.03 m^3/m^2*day)

$r=2.86x10^{-5}$ ft^2/mg
($2.66x10^{-6}$ m^2/mg

Estimated [Foulant] = 0.6 mg/L

In this case, the model described well performance of the basin and predicted the low value of TSS consistent with OC 28 water

Basin Performance Prediction Made Using Lab Column Model Compares Well With Field Model

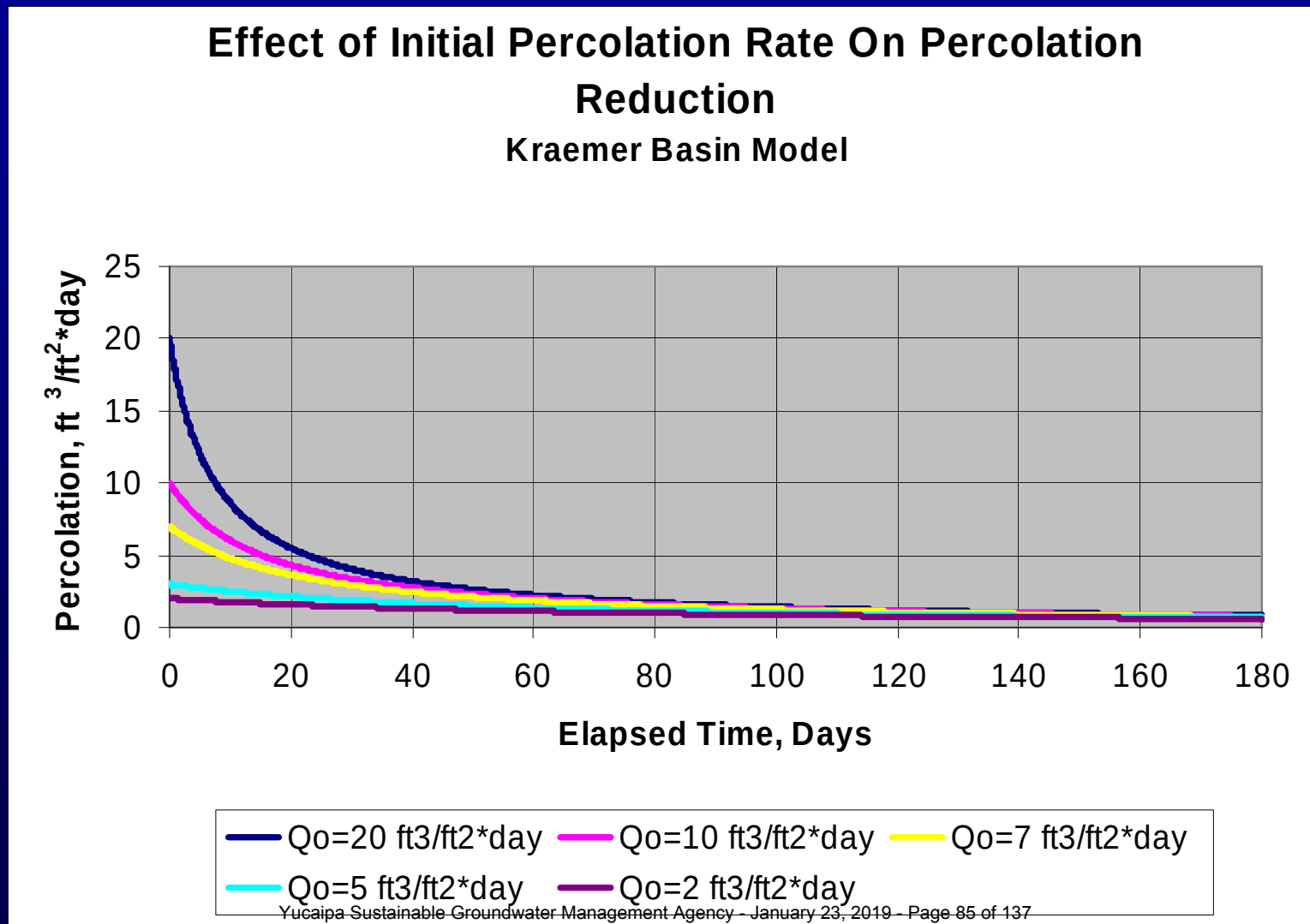


Percolation Decay Model Development Conclusions

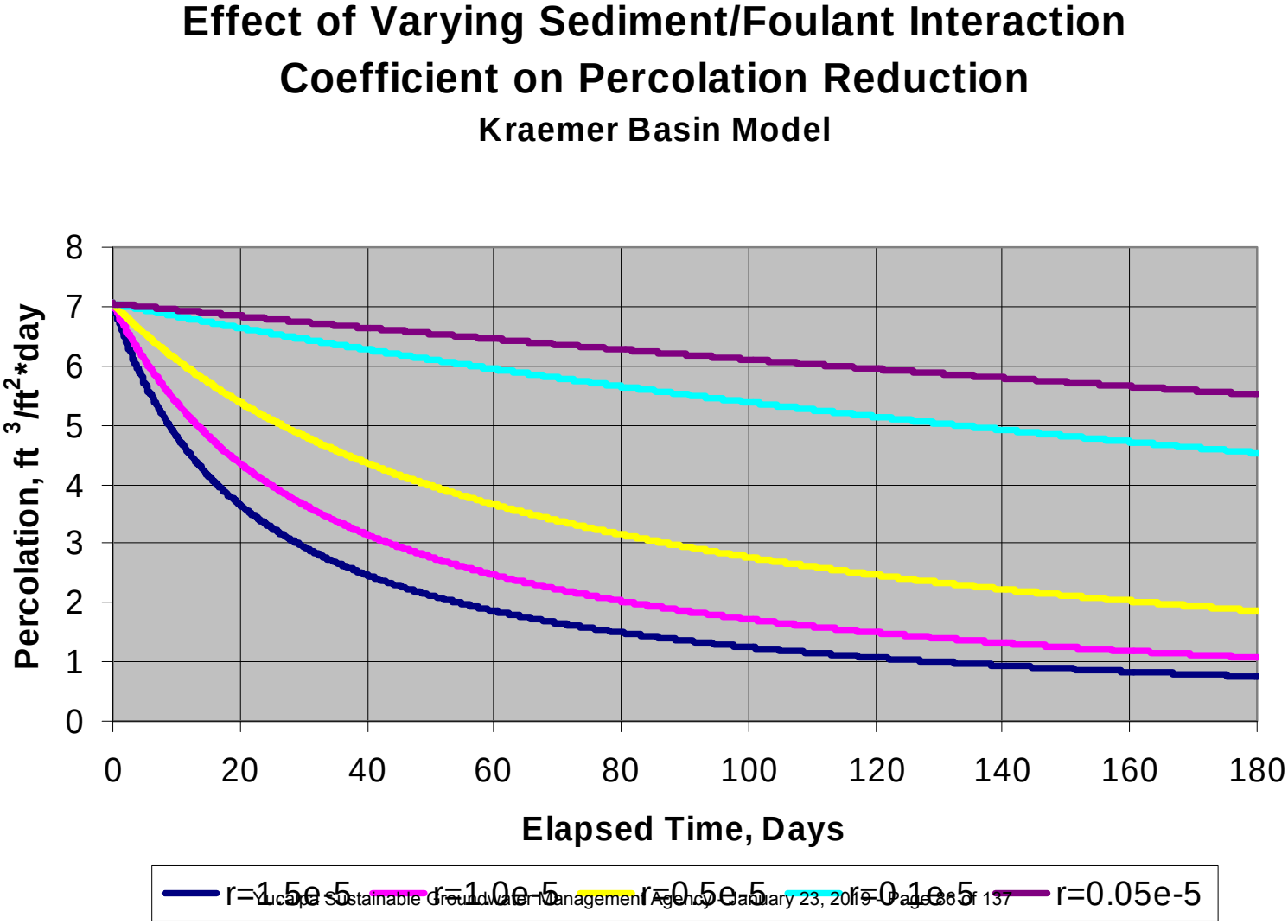
- Column and field data support the hypothesis that a simple log decay function based on total solids deposition and a single sediment/foulant interaction coefficient could explain >90% of observed percolation decay.

- The sediment/foulant interaction coefficient was not affected by increasing concentrations of TSS up to 100 mg/L, making possible prediction of months of field kinetics with hours to days using a laboratory column model (i.e., can compress study times).

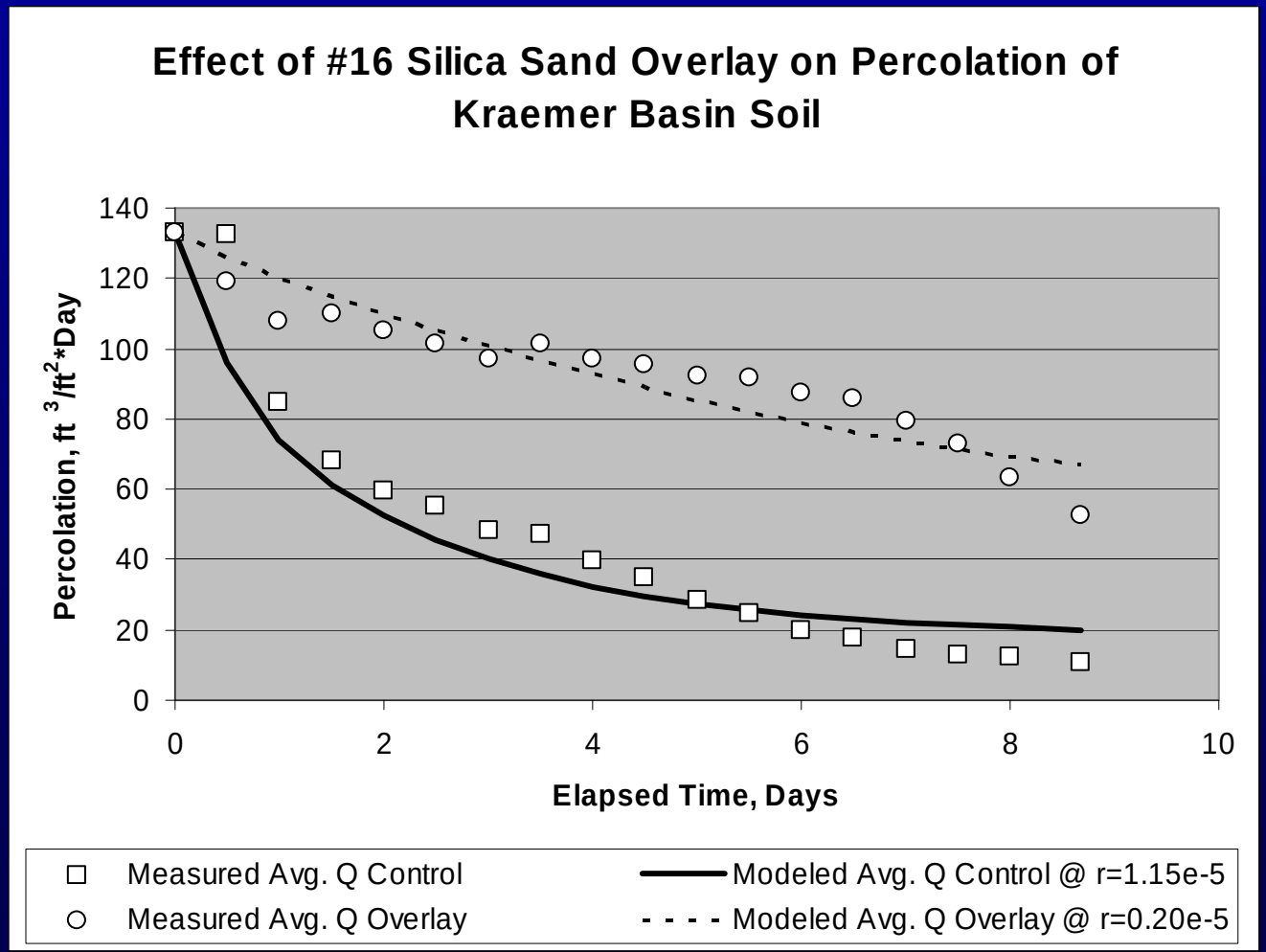
Predicting Effects of Varying the Q_o



Varying the Sediment/Foulant Interaction Coefficient (r)



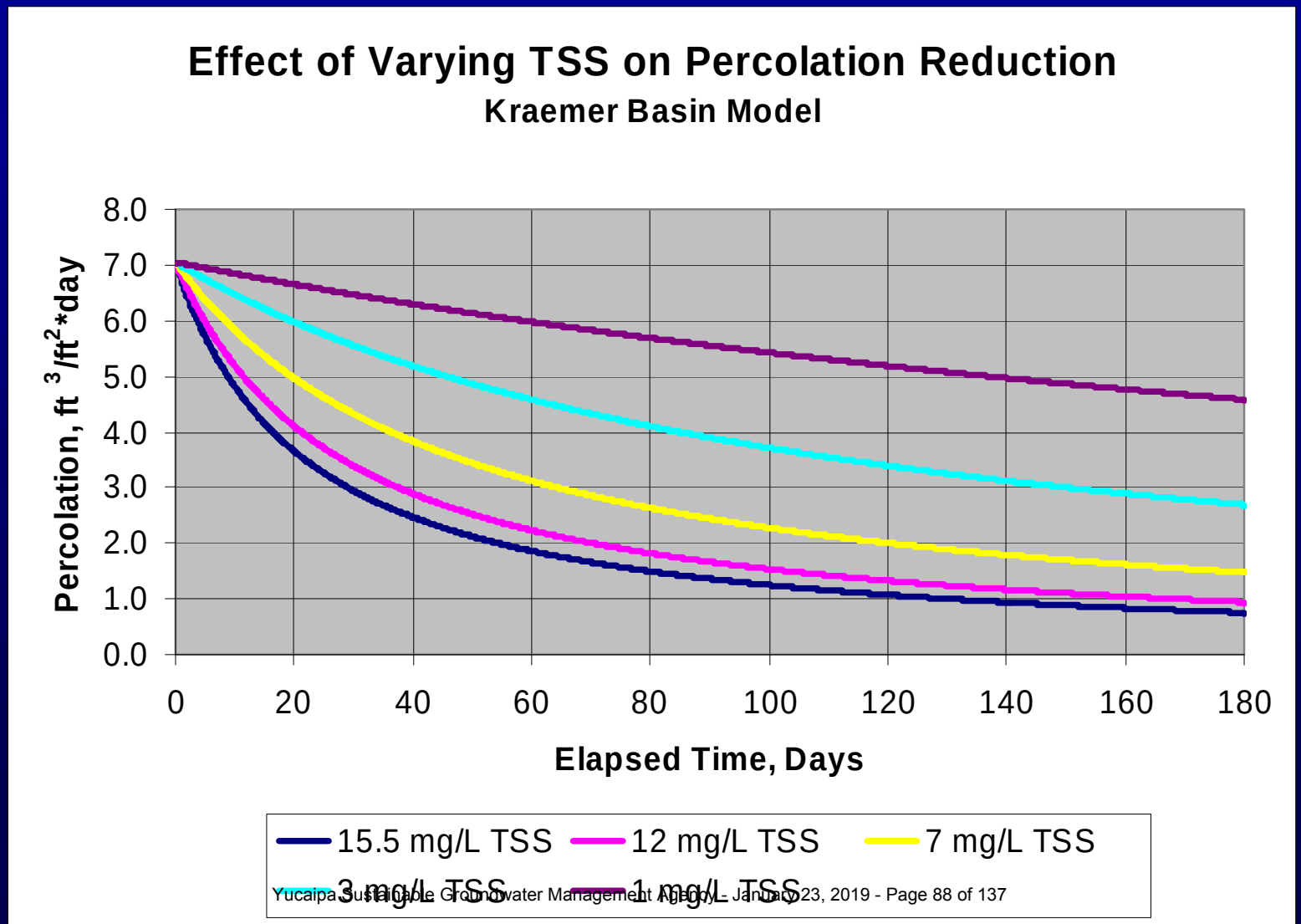
Increasing Average Sediment Particle Size Reduces r (Reduces Percolation Decay).



By increasing the sediment mean soil particle size, the sediment/foulant interaction coefficient (r) is reduced and water production is improved.

Data from a 1988 1" soil column study; TSS presumed to be ~15 mg/L for modeling purposes.

Predicting Effects of Varying the Foulant Loading (TSS)

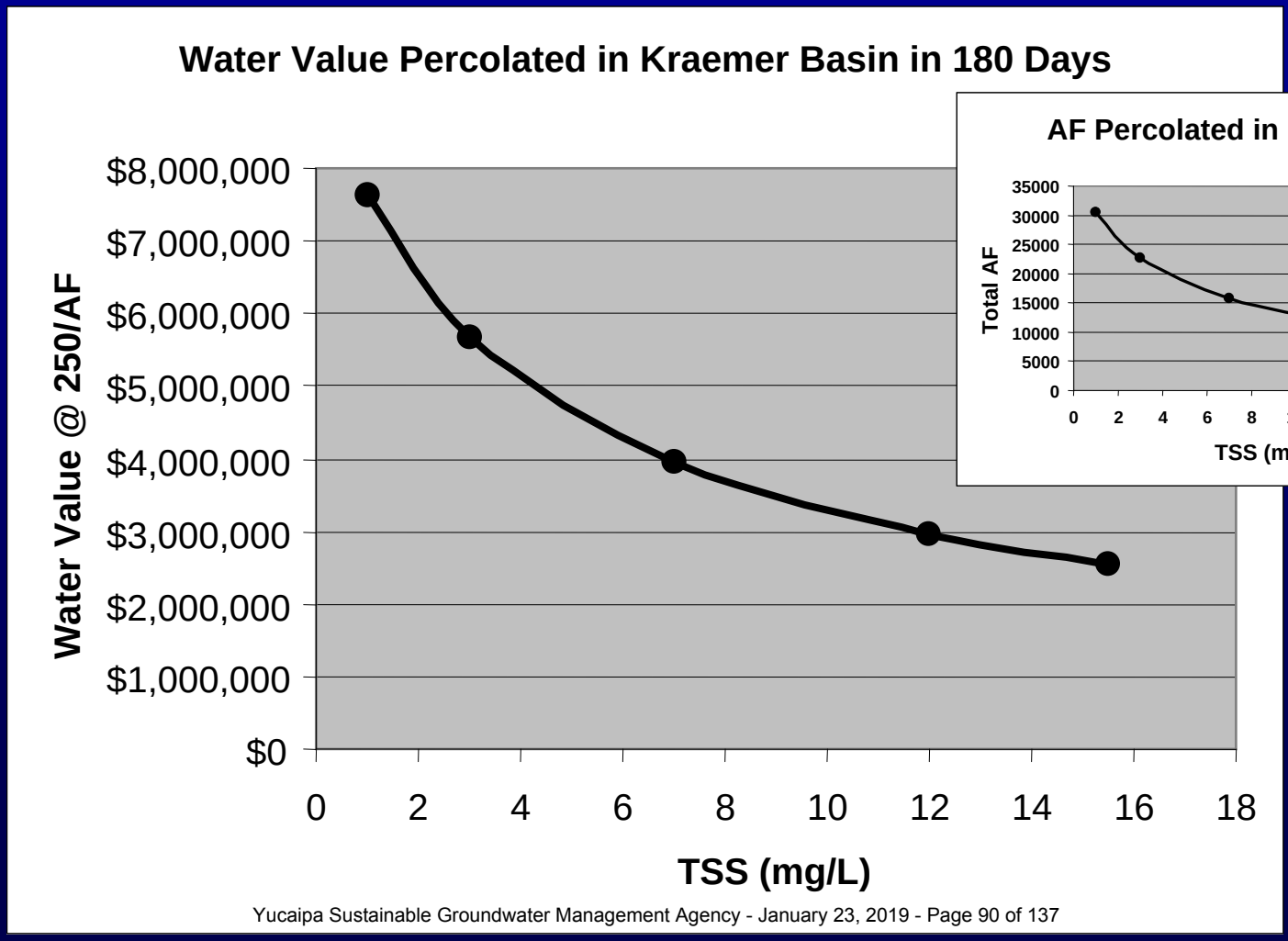


Percolation Model Predictions

- Most benefit in reducing decay obtained by:
  - Reducing soil/foulant interaction coefficient (coarsening surface soil)
  - Reducing foulant load (desilting)

- Increasing initial percolation rate provides least benefit.

Percolation Model Application: *Predicting Effects of Desilting Kraemer Basin*



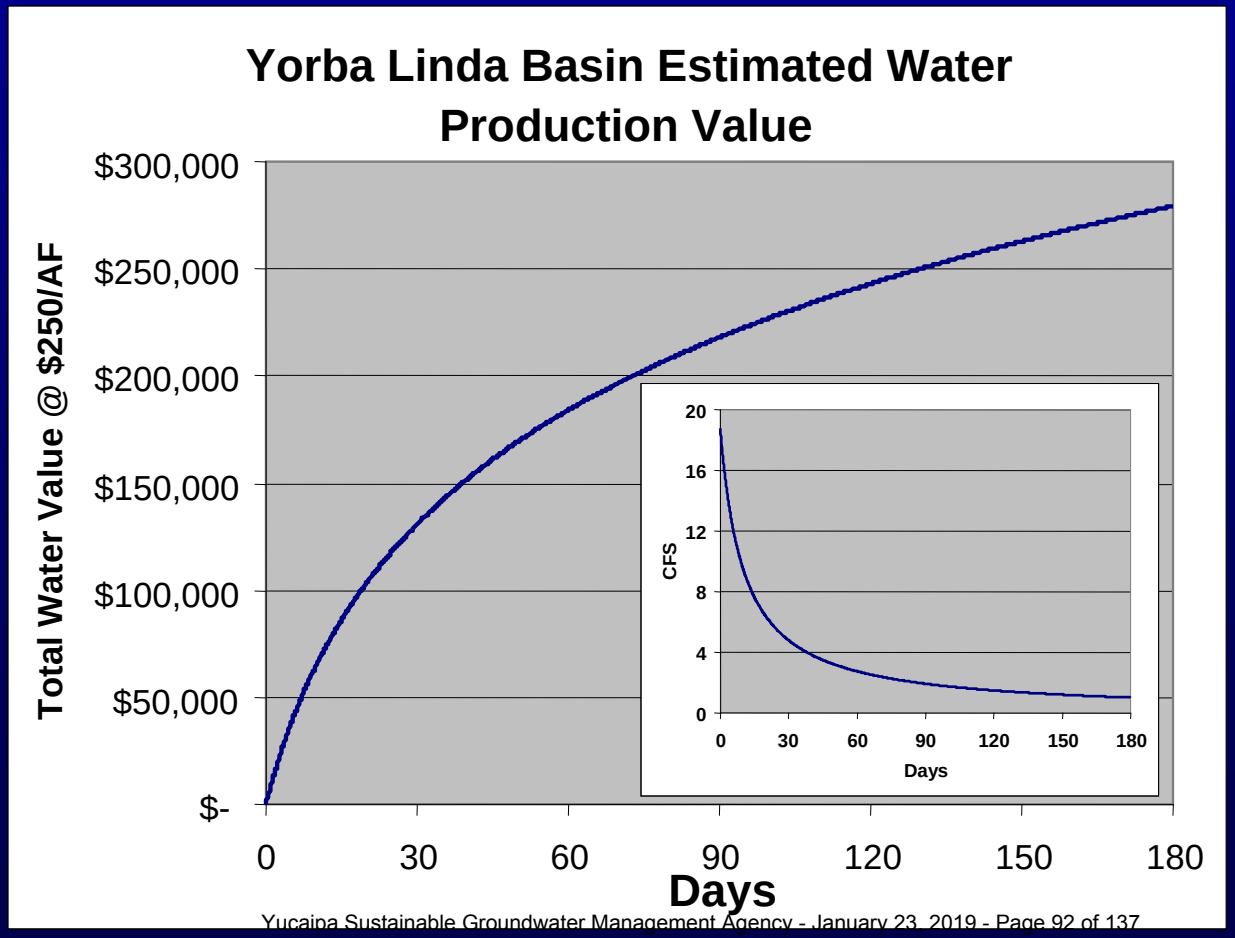
Percolation Model Application: *Predicting Percolation Performance of a New Basin*

Example: Yorba Linda Basin

Model Input Parameters:

- Basin wetted area = 6.2 acres
- Average Initial Percolation Rate (Q_o) = 6 ft^3/ft^2*day
- Average Foulant Loading (TSS) = 20 mg/L
- Sediment/foulant interaction coefficient (r) = $2.86x10^{-5}$ ft^2/mg
- Time (*t*) period = 180 days
- Time increment (*dt*) = 0.1 days
- Value of water = $250/AF

Percolation Model Application: *Predicting Percolation Performance of a New Basin*



Predicted Basin 180 Day Production:

1,117 acre-feet

Value = $279,376

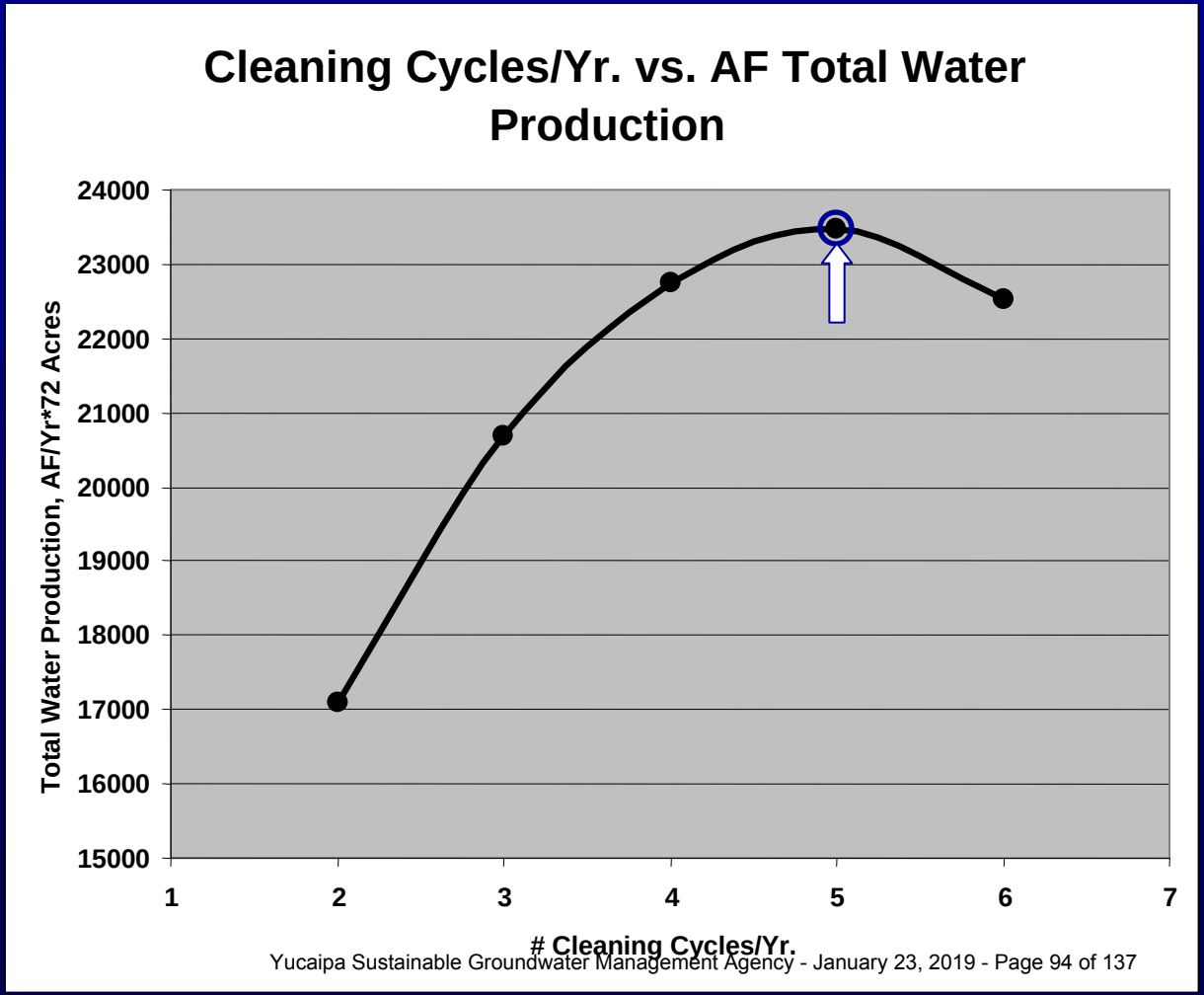
Percolation Model Application: *Predicting Optimum Cleaning Frequency*

Example: Anaheim Lake

Model Input Parameters:

- Basin wetted area = 72 acres
- Average initial percolation rate (Q_o) = 3.3 ft^3/ft^2*day
- Average foulant loading (TSS) = 25 mg/L
- Sediment/foulant interaction coefficient (r) = $2.86x10^{-5}$ ft^2/mg
- Time (*t*) period = Variable, up to 180 days
- Time increment (*dt*) = 0.1 days
- Value of water = $250/AF
- Cost to clean basin $69,812

Percolation Model Application: *Predicting Optimum Cleaning Frequency*

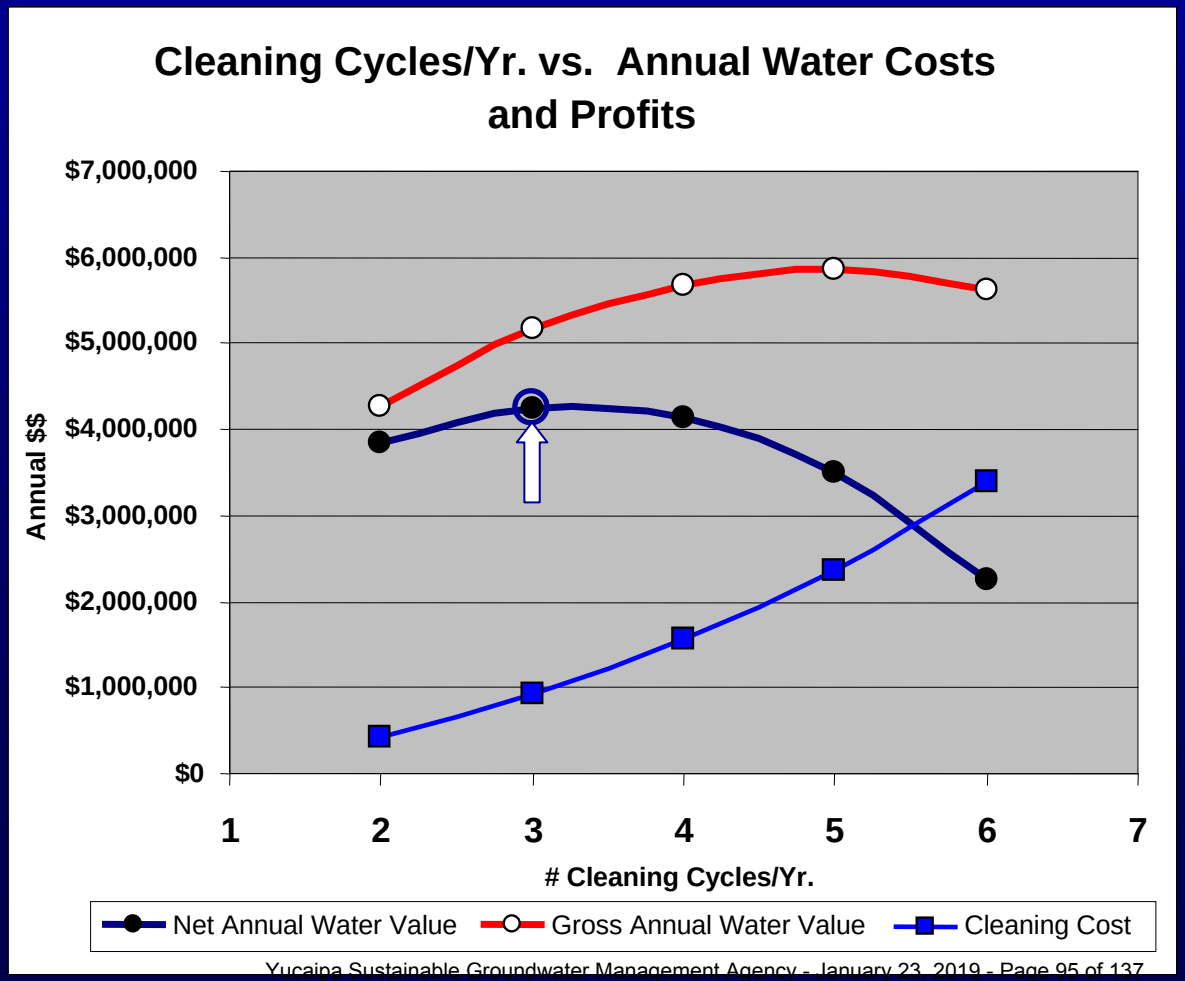


Prediction:

Five (5) cleanings per year would result in maximum annual water production

however…..

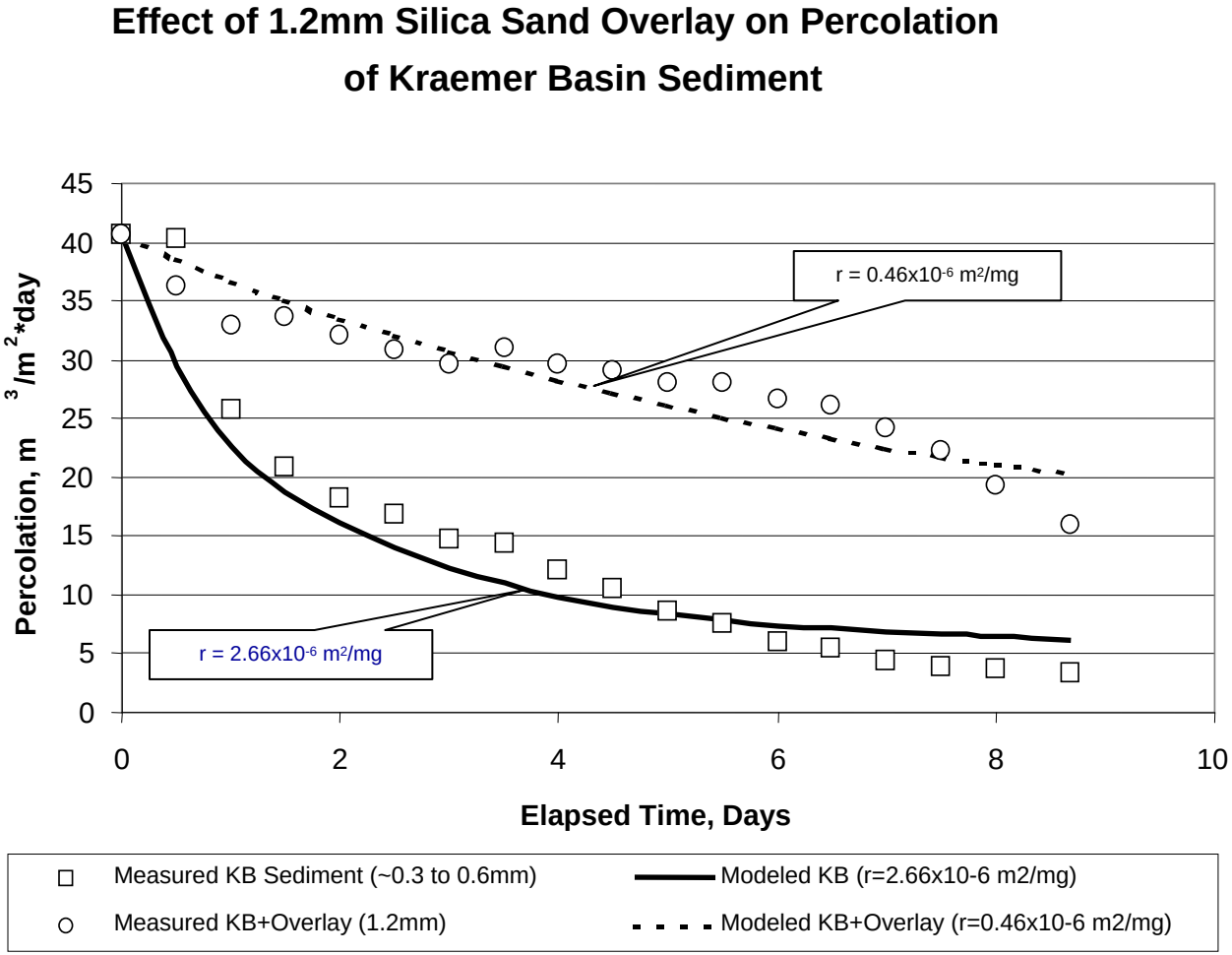
Percolation Model Application: *Predicting Optimum Cleaning Frequency*



Prediction:

…Three (3) cleanings per year would result in maximum annual net water revenue generation

Percolation Model Application: *Optimizing Basin Soil Structure for BCV Operations*

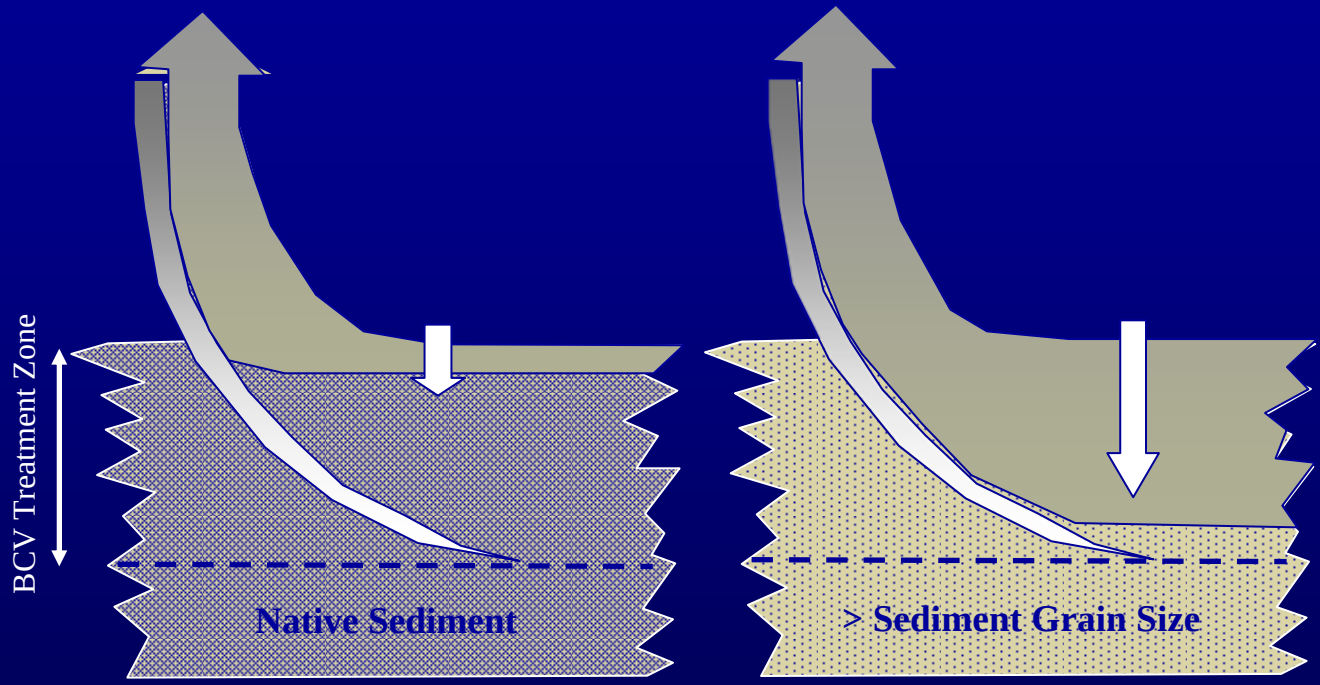


Model Prediction:

Increasing mean sediment particle size at the sediment/water interface reduces the sediment/foulant interaction coefficient (r).

As a result, ***water production is improved over time…***

Percolation Model Application: *Optimizing Basin Soil Structure for BCV Operations*



Foulant deposit shallow, dense, less water permeates over time.

BCV treats much "clean" sediment below foulant layer

Foulant deposit deeper, less dense, more water permeates over time.

BCV now treats mostly fouled sediment

…providing sediment particle size is adjusted to keep foulant deposition within the zone cleaned by the BCV, greater sustainable percolation rates may be obtained.

Modeling relationship between r and foulant penetration will help optimization of BCV operations.

Future Research

Define the nature of foulant contributing to L from:

- laboratory experiments to determine effect of foulant particle size on fouling kinetics
- field measurements of foulant size distribution obtained from operating recharge basins
  - composition and source of the foulant material

Future Research (Cont'd)

- Determine influence of basin sediment structure on the sediment/foulant interaction coefficient (r), specifically:
  - Effects of changing average particle size
  - Relationship between r and penetration of foulant materials

Future Research (Cont'd)

Explore using model to:

- develop methods of real-time prediction of basin performance
- assess potential impact of desilting methodologies on percolation
- optimize basin sediment structure at the sediment/water interface to maximize water production during percolation

- **End of Presentation**

DUDEK

MAIN OFFICE
605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760.942.5147 T 800.450.1818 F 760.632.0164

MONTHLY PROGRESS REPORT
Yucaipa Basin Groundwater Sustainability Plan

NOVEMBER 2018

Task	Task Title	Description of Work Completed this Month	Budget	Budget Used This Month	Budget Remaining	% Complete by Budget	% Complete by Date
1	USGS Groundwater Model	Obtained USGS model files from Geoscience; began inspecting files and extracting information.	$ 81,720	$ 1,710	$ 80,010	2.1%	5.0%
2	Current and Historical Groundwater Conditions	Obtained info from Geoscience on YVWD well construction, water levels, water quality.	$ 49,440	$ 2,160	$ 47,280	4.4%	4.3%
3	Plan Area Including Land Use	Draft figure of land use defined in 2012 within basin boundary.	$ 26,640	$ 60	$ 26,580	0.2%	11.0%
12.1	*Prepare Admin Draft GSP*	Began preparing the draft annotated outline for the GSP.	$ 53,120	$ 120	$ 53,000	0.2%	0.0%
15	Develop and Implement Coordinated Outreach Plan	Z. Carlson participated in kick-off meeting and reviewed preliminary draft of	$ 26,900	$ 219	$ 26,681	0.8%	8.1%
17	GSA Meetings	S. Stuart & J. Weinberger prep for and attend kick-off meeting.	$ 29,760	$ 3,120	$ 26,640	10.5%	1.7%
19	Project Management	Correspondence with T. Kellett at SBVMWD re project management; draft PM forms.	$ 96,000	$ 3,480	$ 92,520	3.6%	3.2%
	Total		**$ 814,500**	**$ 10,869**	**$ 803,631**	1.3%	

The summary table above reflects services provided by Dudek from October 27 to November 30, 2018, which includes costs billed to each task, a percent complete by budget and by date. Labor hours billed by Dudek staff and other expenses, if charged, for this billing period will be presented in Dudek invoice #20187881 dated December 12, 2018.

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY
EDMUND G. BROWN JR., *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

December 6, 2018

Mr. Douglas D. Headrick
General Manager
San Bernardino Valley Municipal
Water District
380 East Vanderbilt Way
San Bernardino, California 92408

2017 Proposition 1 Sustainable Groundwater Planning (SGWP) Grant; Agreement #4600012677

Dear Mr. Headrick:

Enclosed is an original executed copy of Agreement #4600012677.

If you have any questions, please contact Michael Weil, Project Manager at (818)549-2328 or via email at Michael.Weil@water.ca.gov.

Sincerely,

Lana Quidgeon Graber
Associate Government Program Analyst
Financial Assistance Branch
Division of Integrated Regional Water Management

Enclosures

GRANT AGREEMENT BETWEEN THE STATE OF CALIFORNIA
(DEPARTMENT OF WATER RESOURCES) AND
SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT
AGREEMENT NUMBER 4600012677
2017 PROPOSITION 1 SUSTAINABLE GROUNDWATER PLANNING (SGWP) GRANT

THIS GRANT AGREEMENT is entered into by and between the Department of Water Resources of the State of California, herein referred to as the "State" or "DWR" and the San Bernardino Municipal Water District, a public agency in the State of California, duly organized, existing, and acting pursuant to the laws thereof, herein referred to as the "Grantee," which parties do hereby agree as follows:

1) PURPOSE. The State shall provide funding from the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) to assist the Grantee in financing the planning and/or selected project activities (Project) that will improve sustainable groundwater management, pursuant to Water Code Section 79700 et seq. The provision of State funds pursuant to this Agreement shall not be construed or interpreted to mean that the Groundwater Sustainability Plan (GSP), or any components of the GSP, implemented in accordance with the Work Plan as set forth in Exhibit A, will be: adopted by the applicable Groundwater Sustainability Agency (GSA); obtain the necessary desirable results of Sustainable Management Criteria; or, meet all of the evaluation and assessment criteria when submitted to the Department of Water Resources as required by the Sustainable Groundwater Management Act and implementing regulations.

2) TERM OF GRANT AGREEMENT. The term of this Grant Agreement begins on the date this Grant Agreement is executed by the State, through final payment plus three (3) years unless otherwise terminated or amended as provided in this Grant Agreement. However, all work shall be completed in accordance with the Schedule as set forth in Exhibit C.

3) GRANT AMOUNT. The maximum amount payable by the State under this Grant Agreement shall not exceed $815,100.

4) GRANTEE COST SHARE. The Grantee is required to provide a Local Cost Share (non-State funds) of not less than 50 percent of the Total Project Cost. The cost share requirement for projects benefiting a Severely Disadvantaged Community (SDAC), Disadvantaged Community (DAC), or an Economically Distressed Areas (EDA) may be waived or reduced. The Grantee agrees to provide a Local Cost Share (non-State funds) for the amount as documented in Exhibit B (Budget). Local Cost Share may include Eligible Project Costs directly related to Exhibit A incurred after January 1, 2015.

5) BASIC CONDITIONS. The State shall have no obligation to disburse money for a project under this Grant Agreement until the Grantee has satisfied the following conditions (if applicable):

    1. Prior to execution of this Grant Agreement, selected applicants (Groundwater Sustainability Agency) for GSP Development projects must submit evidence of a notification to the public and DWR prior to initiating development of a GSP in compliance with California Code of Regulations, title 23, Section 350 et seq. (GSP Regulations) and Water Code Section 10727.8.
    2. The Grantee must demonstrate compliance with all relevant eligibility criteria as set forth on pages 7 and 8 of the 2015 Grant Program Guidelines for the SGWP Grant Program.
    3. For the term of this Grant Agreement, the Grantee submits timely reports and all other deliverables as required by Paragraph 16, "Submission of Reports" and Exhibit A.

6) DISBURSEMENT OF FUNDS. The State will disburse to the Grantee the amount approved, subject to the availability of funds through normal State processes. Notwithstanding any other provision of this Grant Agreement, no disbursement shall be required at any time or in any manner which is in violation of, or in conflict with, federal or state laws, rules, or regulations, or which may require any rebates to the federal government, or any loss of tax-free status on state bonds, pursuant to any federal statute or regulation. Any and all money disbursed to the Grantee under this Grant Agreement shall be deposited in a non-interest bearing account and shall be used solely to pay Eligible Project Costs.

7) ELIGIBLE PROJECT COST. The Grantee shall apply State funds received only to eligible Project Costs in accordance with applicable provisions of the law and Exhibit B. Eligible Project Costs include the reasonable costs of studies, engineering, design, land and easement acquisition, legal fees, preparation of environmental documentation, environmental mitigations, monitoring, project construction, and/or any other scope of work efforts as described in Exhibit A. Reimbursable administrative expenses are the necessary costs incidental but directly related to the Project included in this Agreement. Work performed on the Project after July 1, 2017, but before April 30, 2022, shall be eligible for reimbursement.

   Costs that are not eligible for reimbursement with State funds cannot be counted as Cost Share. Costs that are not eligible for reimbursement include, but are not limited to, the following items:

   1. Costs, other than those noted above, incurred prior to the award date of this Grant.
   2. Costs for preparing and filing a grant application belonging to another solicitation.
   3. Operation and maintenance costs, including post construction performance and monitoring costs.
   4. Purchase of equipment that is not an integral part of a project.
   5. Establishing a reserve fund.
   6. Purchase of water supply.
   7. Monitoring and assessment costs for efforts required after project construction is complete.
   8. Replacement of existing funding sources for ongoing programs.
   9. Support of existing agency requirements and mandates (e.g., punitive regulatory agency requirement).
   10. Purchase of land in excess of the minimum required acreage necessary to operate as an integral part of a project, as set forth and detailed by engineering and feasibility studies, or land purchased prior to the execution date of this Grant Agreement.
   11. Overhead and indirect costs: "Indirect Costs" means those costs that are incurred for a common or joint purpose benefiting more than one cost objective and are not readily assignable to the funded project (i.e., costs that are not directly related to the funded project). Examples of Indirect Costs include, but are not limited to: central service costs; general administration of the Grantee; non-project-specific accounting and personnel services performed within the Grantee's organization; depreciation or use allowances on buildings and equipment; the costs of operating and maintaining non-project-specific facilities; tuition and conference fees; and, generic overhead or markup. This prohibition applies to the Grantee and any subcontract or sub-agreement for work on the Project that will be reimbursed pursuant to this Agreement.

8) METHOD OF PAYMENT FOR REIMBURSEMENT. After the disbursement requirements in Paragraph 5 "Basic Conditions" are met, the State will disburse the whole or portions of State funding to the Grantee, following receipt from the Grantee via U.S. mail or Express mail delivery of a "wet signature" invoice for costs incurred, including Cost Share, and timely Progress Reports as required by Paragraph 16, "Submission of Reports." Payment will be made no more frequently than monthly, in arrears, upon receipt of an invoice bearing the Grant Agreement number. The State will notify the Grantee, in a timely manner, whenever, upon review of an Invoice, the State determines that any portion or portions of the costs claimed are not eligible costs or is not supported by documentation or receipts acceptable to the State. The Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to the State to cure such deficiency(ies). If the Grantee fails to submit adequate documentation curing the deficiency(ies), the State will adjust the pending invoice by the amount of ineligible or unapproved costs.

   Invoices submitted by the Grantee shall include the following information:

   1. Costs incurred for work performed in implementing the project during the period identified in the particular invoice.

2. Costs incurred for any interests in real property (land or easements) that have been necessarily acquired for a project during the period identified in the particular invoice for the implementation of a project.
3. Invoices shall be submitted on forms provided by the State and shall meet the following format requirements:
   a. Invoices must contain the date of the invoice, the time period covered by the invoice, and the total amount due.
   b. Invoices must be itemized based on the categories (i.e., tasks) specified in the Exhibit B. The amount claimed for salaries/wages/consultant fees must include a calculation formula (i.e., hours or days worked times the hourly or daily rate = the total amount claimed).
   c. One set of sufficient evidence (i.e., receipts, copies of checks, time sheets) must be provided for all costs included in the invoice.
   d. Each invoice shall clearly delineate those costs claimed for reimbursement from the State's funding amount, as depicted in Paragraph 3, "Grant Amount" and those costs that represent the Grantee's costs, as applicable, in Paragraph 4, "Grantee Cost Share."
   e. Original signature and date (in ink) of the Grantee's Project Representative. Submit the original "wet signature" copy of the invoice form to the address listed in Paragraph 22, "Project Representative."

All invoices submitted shall be accurate and signed under penalty of perjury. Any and all costs submitted pursuant to this Agreement shall only be for the tasks set forth herein. The Grantee shall not submit any invoice containing costs that are ineligible or have been reimbursed from other funding sources unless required and specifically noted as such (i.e., match costs). Any eligible costs for which the Grantee is seeking reimbursement shall not be reimbursed from any other source. Double or multiple billing for time, services, or any other eligible cost is illegal and constitutes fraud. Any suspected occurrences of fraud, forgery, embezzlement, theft, or any other misuse of public funds may result in suspension of disbursements of grant funds and/or termination of this Agreement requiring the repayment of all funds disbursed hereunder plus interest. Additionally, the State may request an audit pursuant to Exhibit D and refer the matter to the Attorney General's Office or the appropriate district attorney's office for criminal prosecution or the imposition of civil liability. (Civ. Code, §§ 1572-1573; Pen. Code, §§ 470, 489-490.)

9) ADVANCED PAYMENT. Water Code Section 10551 authorizes advance payment by the State for projects included and implemented in an applicable integrated regional water management plan, and when the project proponent is a nonprofit organization; a DAC; or the project benefits a DAC. If the project is awarded less than $1,000,000 in grant funds, the project proponent may receive an advanced payment of up to 50% of the grant award; the remaining 50% of the grant award will be reimbursed in arrears. Within ninety (90) calendar days of execution of the Grant Agreement, the Grantee may provide the State an Advanced Payment Request. Advanced Payment Requests received ninety-one (91) calendar days after execution of this Agreement, or later, will not be eligible to receive advance payment. The Advanced Payment Request must contain the following:

   1. Documentation demonstrating that each Local Project Sponsor (if different from the Grantee, as listed in Exhibit I) was notified about their eligibility to receive an advanced payment and a response from the Local Project Sponsor stating whether it wishes to receive the advanced payment or not.
   2. If the Local Project Sponsor is requesting the advanced payment, the request must include:
      a. A funding plan which shows how the advanced funds will be expended within 18 months of this Grant Agreement's execution (i.e., for what, how much, and when).
      b. A discussion of the Local Project Sponsor's financial capacity to complete the project once the advance funds have been expended, and include an "Audited Financial Statement Summary Form" specific to the DAC.

3. If a Local Project Sponsor is requesting advanced payment, the Grantee shall also submit a single Advance Payment Form Invoice, containing the request for each qualified project, to the State Project Manager with "wet signature" and date of the Grantee's Project Representative, as indicated in Paragraph 22, "Project Representative." The Grantee shall be responsible for the timely distribution of the advanced funds to the respective Local Project Sponsor(s). Within sixty (60) calendar days of receiving the Advanced Payment Form Invoice and subject to the availability of funds, the State will authorize payment of the advanced funds sought of up to 50% of the grant award for the qualified project(s). The Advanced Payment Form Invoice shall be submitted on forms provided by the State and shall meet the following format requirements:
    a. Invoice must contain the date of the invoice, the time period covered by the invoice, and the total amount due.
    b. Invoice must be itemized based on the categories (i.e., tasks) specified in Exhibit B.
    c. The State Project Manager will notify the Grantee, in a timely manner, when, upon review of an Advance Payment Form Invoice, the State determines that any portion or portions of the costs claimed are not eligible costs. The Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to cure such deficiency(ies). After the distribution requirements in Paragraph 5, "Basic Conditions" are met, the State will disburse the whole or portions of State funding to the Grantee, following receipt from the Grantee via US mail or Express mail delivery of a "wet signature" invoice for costs incurred, including Cost Share, and timely Progress Reports as required by Paragraph 16, "Submission of Reports."
4. On a quarterly basis, the Grantee will submit an Accountability Report to the State that demonstrates how actual expenditures compare with the scheduled budget. The Accountability Report shall include the following information:
    a. An itemization of how advanced funds have been expended to-date (Expenditure Summary), including documentation that supports the expenditures (e.g., contractor invoices, receipts, personnel hours, etc.). Invoices must be itemized based on the budget categories (i.e., tasks) specified in Exhibit B.
    b. A funding plan which shows how the remaining advanced funds will be expended.
    c. Documentation that the funds were placed in a non-interest bearing account, including the dates of deposits and withdrawals from that account.
    d. The State Project Manager will notify the Grantee, in a timely manner, when, upon review of the Expenditure Summary, the State determines that any portion of the expenditures claimed are not eligible costs. The Grantee may, within thirty (30) calendar days of the date of receipt of such notice, submit additional documentation to cure such deficiency(ies). If costs are not consistent with the tasks in Exhibit B, the State will reject the claim and remove them from the Expenditure Summary.
5. Once the Grantee has expended all advanced funds, then the method of payment will revert to the reimbursement process specified in Paragraph 8, "Method of Payment for Reimbursement.", and any remaining requirements of Paragraph 5, "Basic Conditions."

10) REPAYMENT OF ADVANCES. The State may demand repayment from the Grantee of all or any portion of the advanced State funding along with interest at the California general obligation bond interest rate at the time the State notifies the Grantee, as directed by the State, and take any other action that it deems necessary to protect its interests for the following conditions:
    1. A project is not being implemented in accordance with the provisions of the Grant Agreement.
    2. The Grantee has failed in any other respect to comply with the provisions of this Grant Agreement, and if the Grantee does not remedy any such failure to the State's satisfaction.

3. Repayment amounts may also include:
   a. Advance funds which have not been expended within 18 months of the Grant Agreement's execution.
   b. Actual costs incurred are not consistent with the activities presented in Exhibit A, not supported, or are ineligible.
   c. At the completion of the project, the funds have not been expended.

For conditions 10) 3.a. and 10) 3.b., repayment may consist of deducting the amount from future reimbursement invoices. The State may consider the Grantee's refusal to repay the requested advanced amount a substantial breach of this Grant Agreement subject to the default provisions in Paragraph 12, "Default Provisions." If the State notifies the Grantee of its decision to demand repayment or withhold the entire funding amount from the Grantee pursuant to this paragraph, this Grant Agreement shall terminate upon receipt of such notice by the Grantee and the State shall no longer be required to provide funds under this Grant Agreement and the Grant Agreement shall no longer be binding on either party.

11) WITHHOLDING OF DISBURSEMENTS BY THE STATE. If the State determines that a project is not being implemented in accordance with the provisions of this Grant Agreement, or that the Grantee has failed in any other respect to comply with the provisions of this Grant Agreement, and if the Grantee does not remedy any such failure to the State's satisfaction, the State may withhold from the Grantee all or any portion of the State funding and take any other action that it deems necessary to protect its interests. Where a portion of the State funding has been disbursed to the Grantee and the State notifies the Grantee of its decision not to release funds that have been withheld pursuant to Paragraph 13, "Continuing Eligibility," the portion that has been disbursed shall thereafter be repaid immediately with interest at the California general obligation bond interest rate at the time the State notifies the Grantee, as directed by the State. The State may consider the Grantee's refusal to repay the requested disbursed amount a contract breach subject to the default provisions in Paragraph 12, "Default Provisions." If the State notifies the Grantee of its decision to withhold the entire funding amount from the Grantee pursuant to this paragraph, this Grant Agreement shall terminate upon receipt of such notice by the Grantee and the State shall no longer be required to provide funds under this Grant Agreement and the Grant Agreement shall no longer be binding on either party.

12) DEFAULT PROVISIONS. The Grantee will be in default under this Grant Agreement if any of the following occur:

1. Substantial breaches of this Grant Agreement, or any supplement or amendment to it, or any other agreement between the Grantee and the State evidencing or securing the Grantee's obligations;
2. Making any false warranty, representation, or statement with respect to this Grant Agreement or the application filed to obtain this Grant Agreement;
3. Failure to operate or maintain project in accordance with this Grant Agreement.
4. Failure to make any remittance required by this Grant Agreement.
5. Failure to comply with Labor Compliance Plan requirements.
6. Failure to submit timely progress reports.
7. Failure to routinely invoice the State.
8. Failure to meet any of the requirements set forth in Paragraph 13, "Continuing Eligibility."

Should an event of default occur, the State shall provide a notice of default to the Grantee and shall give the Grantee at least ten (10) calendar days to cure the default from the date the notice is sent via first-class mail to the Grantee. If the Grantee fails to cure the default within the time prescribed by the State, the State may do any of the following:

9. Declare the funding be immediately repaid, with interest, which shall be equal to the State of California general obligation bond interest rate in effect at the time of the default.
10. Terminate any obligation to make future payments to the Grantee.
11. Terminate the Grant Agreement.
12. Take any other action that it deems necessary to protect its interests.

In the event the State finds it necessary to enforce this provision of this Grant Agreement in the manner provided by law, the Grantee agrees to pay all costs incurred by the State including, but not limited to, reasonable attorneys' fees, legal expenses, and costs.

13) CONTINUING ELIGIBILITY. The Grantee must meet the following ongoing requirement(s) to remain eligible to receive State funds:

1. An urban water supplier that receives grant funds pursuant to this Grant Agreement must maintain compliance with the Urban Water Management Planning Act (UWMP; Wat. Code, § 10610 et seq.) and Sustainable Water Use and Demand Reduction (Wat. Code, § 10608 et seq.) by doing the following:
    a. Have submitted their 2015 UWMP and had it deemed consistent by DWR. If the 2015 UWMP has not been submitted to DWR funding disbursements to the urban water supplier will cease until the 2015 UWMP is submitted. If the 2015 UWMP is deemed inconsistent by DWR, the urban water supplier will be ineligible to receive funding disbursements until the inconsistencies are addressed and DWR deems the UWMP consistent. For more information, visit the following website: https://www.water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans.
    b. All urban water suppliers must submit documentation that demonstrates they are meeting the 2015 interim gallons per capita per day (GPCD) target. If not meeting the interim target, the Grantee must submit a schedule, financing plan, and budget for achieving the GPCD target, as required pursuant to Water Code Section 10608.24. Urban water suppliers that did not meet their 2015 interim GPCD target must also submit annual reports that include a schedule, financing plan, and budget for achieving the GPCD target by June 30 of each year.
2. An agricultural water supplier receiving grant funding must:
    a. Comply with Sustainable Water Use and Demand Reduction requirements outlined in Water Code Section 10608, et seq. Submit to the State a schedule, financing plan, and budget for implementation of the efficient water management practices, required pursuant to Water Code Section 10608.48.
    b. Have their Agricultural Water Management Plan (AWMP) deemed consistent by DWR. To maintain eligibility and continue funding disbursements, an agricultural water supply must have their 2015 AWMP identified on the State's website. For more information, visit the following website: https://www.water.ca.gov/Work-With-Us/Grants-And-Loans/Agriculture-Water-Use-Efficiency.
3. The Grantee diverting surface water must maintain compliance with diversion reporting requirements as outlined in Part 5.1 of Division 2 of the Water Code.
4. If applicable, the Grantee must demonstrate compliance with the Groundwater Management Act set forth on pages 7 and 8 of the 2015 SGWP Grant Program Guidelines, dated October 2015.
5. Grantees that have been designated as monitoring entities under the California Statewide Groundwater Elevation Monitoring (CASGEM) Program must maintain reporting compliance, as required by Water Code Section 10932 and the CASGEM Program.

14) PERMITS, LICENSES, APPROVALS, AND LEGAL OBLIGATIONS. The Grantee shall be responsible for obtaining any and all permits, licenses, and approvals required for performing any work under this Grant Agreement, including those necessary to perform design, construction, or operation and maintenance of

the Project(s). The Grantee shall be responsible for observing and complying with any applicable federal, state, and local laws, rules or regulations affecting any such work, specifically those including, but not limited to, environmental, procurement, and safety laws, rules, regulations, and ordinances. The Grantee shall provide copies of permits and approvals to the State.

15) RELATIONSHIP OF PARTIES. If applicable, the Grantee is solely responsible for design, construction, and operation and maintenance of projects within the work plan. Review or approval of plans, specifications, bid documents, or other construction documents by the State is solely for the purpose of proper administration of funds by the State and shall not be deemed to relieve or restrict responsibilities of the Grantee under this Grant Agreement.

16) SUBMISSION OF REPORTS. The submittal and approval of all reports is a requirement for the successful completion of this Grant Agreement. Reports shall meet generally accepted professional standards for technical reporting and shall be proofread for content, numerical accuracy, spelling, and grammar prior to submittal to the State. All reports shall be submitted to the State's Project Manager, and shall be submitted via Department of Water Resources (DWR) "Grant Review and Tracking System" (GRanTS). If requested, the Grantee shall promptly provide any additional information deemed necessary by the State for the approval of reports. Reports shall be presented in the formats described in the applicable portion of Exhibit F. The timely submittal of reports is a requirement for initial and continued disbursement of State funds. Submittal and subsequent approval by the State of a Project Completion Report is a requirement for the release of any funds retained for such project.

    1. Progress Reports: The Grantee shall submit Progress Reports to meet the State's requirement for disbursement of funds. Progress Reports shall be uploaded via GRanTS, and the State's Project Manager notified of upload. Progress Reports shall, in part, provide a brief description of the work performed, Grantees activities, milestones achieved, any accomplishments and any problems encountered in the performance of the work under this Grant Agreement during the reporting period. The first Progress Report should be submitted to the State no later than four (4) months after the execution of the agreement, with future reports then due on successive three-month increments based on the invoicing schedule and this date.

    2. Groundwater Sustainability Plan: The Grantee shall submit a Final Groundwater Sustainability Plan (GSP) to DWR by the date as specified per the Sustainable Groundwater Management Act (SGMA). The GSP shall be formatted, drafted, prepared, and completed as required by the GSP Regulations, and in accordance with any other regulations or requirements that are stipulated through SGMA.

    3. Coordination Agreement: The Grantee shall provide the State a copy of the executed Coordination Agreement, and all supporting documentation. This condition is only required in basins where GSAs develop multiple GSPs pursuant to Water Code Section 10727(b)(3). Refer to the GSP Regulations for necessary details and requirements to prepare and submit a Coordination Agreement.

    4. Accountability Report: The Grantee shall prepare and submit to the State an Accountability Report on a quarterly basis if the Grantee received an Advanced Payment, consistent with the provisions in Paragraph 9, "Advanced Payment."

    5. Completion Report: The Grantee shall prepare and submit to the State a separate Completion Report for each project or component included in Exhibit A. The Grantee shall submit a Completion Report within ninety (90) calendar days of project/component completion. Each Completion Report shall include, in part, a description of actual work done, any changes or amendments to each project, and a final schedule showing actual progress versus planned progress, copies of any final documents or reports generated or utilized during a project. The Completion Report shall also include, if applicable for Implementation Project(s), certification of final project by a registered civil engineer, consistent with Exhibit D. A "Certification of Project Completion" form will be provided by the State.

    6. Grant Completion Report: Upon completion of the Project included in Exhibit A, the Grantee shall submit to the State a Grant Completion Report. The Grant Completion Report shall be submitted within

ninety (90) calendar days of submitting the Completion Report for the final component or project to be completed under this Grant Agreement. The Grant Completion Report shall include reimbursement status, a brief description of each component completed, and how those components will further the goals of the GSP and sustainable groundwater. Retention for the last component, or project, to be completed as part of this Grant Agreement will not be disbursed until the Grant Completion Report is submitted to be approved by the State.

17) OPERATION AND MAINTENANCE OF PROJECT. For the useful life of construction and implementation projects (pertinent to Implementation Projects) and in consideration of the funding made by the State, the Grantee agrees to ensure or cause to be performed the commencement and continued operation of the project, and shall ensure or cause the project to be operated in an efficient and economical manner; shall ensure all repairs, renewals, and replacements necessary to the efficient operation of the same are provided; and shall ensure or cause the same to be maintained in as good and efficient condition as upon its construction, ordinary and reasonable wear and depreciation excepted. The State shall not be liable for any cost of such maintenance, management, or operation. The Grantee or their successors may, with the written approval of the State, transfer this responsibility to use, manage, and maintain the property. For purposes of this Grant Agreement, "useful life" means period during which an asset, property, or activity is expected to be usable for the purpose it was acquired or implemented; "operation costs" include direct costs incurred for material and labor needed for operations, utilities, insurance, and similar expenses, and "maintenance costs" include ordinary repairs and replacements of a recurring nature necessary for capital assets and basic structures and the expenditure of funds necessary to replace or reconstruct capital assets or basic structures. Refusal by the Grantee to ensure operation and maintenance of the projects in accordance with this provision may, at the option of the State, be considered a breach of this Grant Agreement and may be treated as default under Paragraph 12, "Default Provisions."

18) STATEWIDE MONITORING REQUIREMENTS. The Grantee shall ensure that all groundwater projects and projects that include groundwater monitoring requirements are consistent with the Groundwater Quality Monitoring Act of 2001 (Wat. Code, § 10780 et seq.) and, where applicable, projects that affect water quality shall include a monitoring component that allows the integration of data into statewide monitoring efforts, including where applicable, the Surface Water Ambient Monitoring Program carried out by the State Water Resources Control Board. See Exhibit G for web links and information regarding other State monitoring and data reporting requirements.

19) NOTIFICATION OF STATE. The Grantee shall promptly notify the State, in writing, of the following items:

1. Events or proposed changes that could affect the scope, budget, or work performed under this Grant Agreement. The Grantee agrees that no substantial change in the scope of a project will be undertaken until written notice of the proposed change has been provided to the State and the State has given written approval for such change. Substantial changes generally include changes to the scope of work, schedule or term, and budget.
2. Any public or media event publicizing the accomplishments and/or results of this Grant Agreement and provide the opportunity for attendance and participation by the State's representatives. The Grantee shall make such notification at least fourteen (14) calendar days prior to the event.
3. Applicable to Implementation Projects only, Final inspection of the completed work on a project by a Registered Professional (Civil Engineer, Engineering Geologist, or other State approved certified/license Professional), in accordance with Exhibit D. The Grantee shall notify the State's Project Manager of the inspection date at least 14 calendar days prior to the inspection in order to provide the State the opportunity to participate in the inspection.

20) NOTICES. Any notice, demand, request, consent, or approval that either party desires or is required to give to the other party under this Grant Agreement shall be in writing. Notices may be transmitted by any of the following means:

1. By delivery in person.

2. By certified U.S. mail, return receipt requested, postage prepaid.
3. By "overnight" delivery service; provided that next-business-day delivery is requested by the sender.
4. By electronic means.
5. Notices delivered in person will be deemed effective immediately on receipt (or refusal of delivery or receipt). Notices sent by certified mail will be deemed effective given ten (10) calendar days after the date deposited with the U.S. Postal Service. Notices sent by overnight delivery service will be deemed effective one business day after the date deposited with the delivery service. Notices sent electronically will be effective on the date of transmission, which is documented in writing. Notices shall be sent to the addresses listed below. Either party may, by written notice to the other, designate a different address that shall be substituted for the one below.

21) PERFORMANCE EVALUATION. Upon completion of this Grant Agreement, the Grantee's performance will be evaluated by the State and a copy of the evaluation will be placed in the State file and a copy sent to the Grantee.

22) PROJECT REPRESENTATIVES. The Project Representatives during the term of this Grant Agreement are as follows:

Department of Water Resources

Arthur Hinojosa
Chief, Division of Integrated Regional Water Management
P.O. Box 942836
Sacramento, CA 94236-0001
Phone: (916) 653-4736
Email: Arthur.Hinojosa@water.ca.gov

San Bernardino Valley Municipal Water District

Douglas D. Headrick
General Manager
380 East Vanderbilt Way
San Bernardino, CA 92408
Phone: (909) 387-9226
Email: dough@sbvmwd.com

Direct all inquiries to the Project Manager:

Department of Water Resources

Michael Weil
770 Fairmont Ave., Suite 102
Glendale, CA 91203-1035
Phone: (818) 549-2328
Email: Michael.Weil@water.ca.gov

San Bernardino Valley Municipal Water District

Timothy Kellet
Water Resources Senior Project Manager
380 East Vanderbilt Way
San Bernardino, CA 92408
Phone: (909) 387-9226
Email: timk@sbvmwd.com

Either party may change its Project Representative or Project Manager upon written notice to the other party.

23) STANDARD PROVISIONS. The following Exhibits are attached and made a part of this Grant Agreement by this reference:

Exhibit A – Work Plan

Exhibit B – Budget

Exhibit C – Schedule

Exhibit D – Standard Conditions

Exhibit E – Authorizing Resolution Accepting Funds

Exhibit F – Report Formats and Requirements

Exhibit G – Requirements for Data Submittal

Exhibit H – State Audit Document Requirements and Cost Share Guidelines for Grantees

Exhibit I – Local Project Sponsors (Not Used)

Exhibit J – Project Location

IN WITNESS WHEREOF, the parties hereto have executed this Grant Agreement.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

Arthur Hinojosa
Chief, Division of Integrated Regional Water Management

Date 12/5/18

Approved as to Legal Form and Sufficiency

Robin Brewer, Assistant Chief Counsel
Office of Chief Counsel

Date 11-26-18

San Bernardino Valley Municipal Water District

Douglas D. Headrick
General Manager

Date 11/9/18

EXHIBIT A
WORK PLAN

Project Title: Yucaipa Groundwater Sustainability Plan (Project)

Project Description: The purpose of the Project is to complete two (2) technical studies and to prepare the Yucaipa Groundwater Sustainability Plan (GSP). The first study consists of a groundwater flow model being developed by the United States Geological Survey (USGS). The second study will consist of infiltration testing to estimate recharge rates to enable sizing of future recharge basins. The GSP will include the content to meet the applicable SGMA requirements including a description of the plan area, basin setting, sustainability criteria, projects and management actions to achieve sustainability, and GSP implementation.

Category (a): Grant Administration
Manage and comply with the Grant Agreement requirements and supporting grant documents. Conduct administrative responsibilities associated with the Project such as coordinating with DWR, partnering agencies, and consultants/contractors. Prepare and submit invoices to DWR, compile invoice backup information, and manage contracts and budgets associated with the Grant Agreement. Prepare and submit quarterly Progress Reports with the invoices and a Final Grant Completion Report. All reports will meet generally accepted professional standards for technical reporting and the requirements outlined in Exhibit F.

Deliverables:
- Invoices and associated backup documentation
- Progress Reports
- Environmental Information Form
- Final Grant Completion Report

Category (b): Planning Activities
Task 1. Yucaipa Basin Groundwater Model
Complete the Yucaipa Basin Groundwater Model (Basin Model) in cooperation with the USGS including a final report which provides a model overview, model grid and boundary conditions, summary of model input parameters, a summary of the water availability options tested, and any limits of the model as a predictive tool.

Deliverables:
- Final Report on the Model

Task 2. Infiltration Testing
Plan and conduct infiltration testing. Investigate sites for future recharge facilities, develop an Infiltration Test Work Plan, acquire any permits needed for infiltration testing, and perform up to thirteen (13) short-term infiltration tests.

Deliverables:
- San Bernardino County Flood Control District Flood Control Permit
- California Department of Fish Wildlife Streambed Alteration Agreement
- Notification of Consistency with 2012 Certified Nationwide Permit
- Summary of Infiltration Test Results

Category (c): GSP Development
Task 3. Stakeholder Engagement
Develop a coordinated outreach plan to document communication channels, a communications schedule, and stakeholder engagement opportunities. Contacts associated with outreach to low-income, minority, and Spanish speaking communities will be consulted in development of the plan. The existing "Interested Parties" list will be reviewed to be sure it captures the appropriate contact information for all Yucaipa Basin beneficial users. A website and outreach materials will be developed and updated to facilitate outreach. Interested parties will be contacted to explain how they may participate in the development and implementation of the GSP. To promote specific technical input, a Technical Advisory Committee (TAC) will be formed. Non-technical meetings/workshops will be held and geared to the broad stakeholder list (land use jurisdictions, disadvantaged communities, general public, DWR) during GSP development. If needed, inter-basin agreements will be developed.

Deliverables:
- Outreach Plan
- Meeting summaries included in Quarterly Progress Report as attachment(s)

Task 4. Data Management System
Develop a Data Management System (DMS). A memorandum will discuss the database architecture and the preferred architecture of the DMS. A DMS database specifications sheet will be developed along with a user guide.

Deliverables:
- Memorandum on the DMS

Task 5. GSP Development
Prepare draft and final GSPs that builds off of the information obtained from the activities outlined in the Grant Agreement and will include, but is not limited to, the chapters listed below. The GSP will meet all SGMA regulations and DWR requirements. Include summaries of GSP development activities within the Progress Reports.

1. Current and Historic Groundwater Conditions Chapter

   Use past studies and the Basin Model to establish current and historic groundwater conditions, specifically as they relate to the sustainability indicators defined by SGMA: Groundwater Levels, Groundwater Storage, Water Quality, Subsidence, and Interconnected Surface Water Systems.

2. Plan Area and Land Use Chapter
   Describe physical setting and characteristics of the groundwater Yucaipa Basin, hydrology and drainage features, well distribution and use, soil characteristics, and climate. In addition, this chapter will describe existing water resources management as well as historic and current water supplies and demands. Plans governing land use in the basin will be described. Policies specific to wells (well permitting, well abandonment and destruction) will be described.

3. Water Budget and Sustainable Yield Chapter
   Develop annual water budgets for the period 1980 to 2016. Using information on anticipated changes in precipitation, land use, population, groundwater extraction, and availability of recharge water, the Basin Model will be used to produce a projected future water budget. All assumptions on recharge will be documented. Graphics, maps and tables will be created to illustrate the water budget data. The water budget will provide information on inflows and outflows from the basin and change in annual volume of groundwater in storage between seasonal high and low water level conditions. Water budget information will assist with estimating sustainable yield for the basin.

4. Management Areas Chapter
   Describe the different management areas including a discussion of the conditions in the management areas and reasons for studying and treating them separately. The Basin Model and review of the plan area and groundwater conditions may identify reasons to delineate more than one management area in the Yucaipa Basin.

5. Undesirable Results, Minimum Thresholds, Measurable Objectives Chapter
   Evaluate the potential for the occurrence of undesirable results within the Yucaipa Basin based on historic data and the developed water budget. Undesirable results for sustainability indicators will be examined: land subsidence, degradation of groundwater quality, loss of surface/groundwater connection, significant reduction in groundwater storage, declining groundwater levels, and seawater intrusion. The GSA will develop sustainability goals. The Basin Model will be used to establish minimum thresholds for achieving sustainability goals. Quantitative measurable objectives will be set for 5-, 10-, and 15 years to ensure achievement of the sustainability goals.

6. Projects and Management Actions to Achieve Sustainability Goal Chapter
   Identify management options designed to meet GSP objectives and achieve sustainability within 20 years of plan implementation. Current and planned projects will be identified. The GSA will also solicit input on proposed management actions and projects to bridge the gap between projected conditions and sustainable conditions. Potential projects and programs will be cataloged and then ranked using a weighting scheme based on objectives and ability to implement. The most feasible projects/ management actions will be evaluated. The GSA shall establish how many projects, programs, or policies are necessary to achieve sustainability in the basin.

7. Plan Implementation Actions Chapter
   Develop an estimate of costs for GSP implementation, including a working annual budget. Potential income streams for funding GSP implementation will be identified. A schedule for implementation of the plan and a template for reporting will be developed. The process and triggers for GSP evaluation will be documented.

8. Existing and Planned Monitoring Network Chapter
   Evaluate the existing monitoring network for its ability to monitor each of the sustainability indicators. Recommendations will be made for enhancing the monitoring network or the monitoring protocols to adequately track progress toward sustainability goals.

9. GSP Adoption
   Circulate the administrative draft GSP for review. Based on the GSA and stakeholder comments on the administrative draft, a draft GSP will be prepared. A public hearing will be held on the draft GSP. The comments received on the draft GSP will be considered by the GSA prior to plan adoption. Upon revision and adoption by the GSA, the GSP will be submitted to DWR for review.

Deliverables:

- Summaries of activities included as attachments in the Progress Reports
- Draft GSP
- Proof of Final GSP submittal to DWR

EXHIBIT B
BUDGET

Project Budget					
Project Title: Yucaipa Groundwater Sustainability Plan					
Budget Category		**Grant Amount**	**Required Cost Share (non-state source)***	**Other Cost Share****	**Total Cost**
(a)	Grant Administration	$0	$0	$20,000	**$20,000**
(b)	Planning Activities	$400,000	$250,000	$325,000	**$975,000**
(c)	GSP Development	$415,100	$250,000	$215,000	**$880,100**
	TOTAL COSTS	**$815,100**	**$500,000**	**$560,000**	**$1,875,100**

NOTES:
**Grantee has received a 50% cost share waiver due to the grantee service area containing SDAC, DAC, and EDA.*
*** The source of this funding is the Yucaipa Sustainable Groundwater Management Agency. These costs will not be reviewed by the State for invoicing purposes; however, the Grantee is required to maintain all financial records associated with the project in accordance with Exhibit H.*

EXHIBIT C
SCHEDULE

Project Schedule			
Project Title: Yucaipa Groundwater Sustainability Plan			
Budget Category		**Start Date**	**End Date**
(a)	Grant Administration	5/8/2018	3/31/2022
(b)	Planning Activities	2/1/2016	9/30/2021
(c)	GSP Development	10/16/2018	12/31/2021

EXHIBIT D

STANDARD CONDITIONS

D.1) ACCOUNTING AND DEPOSIT OF FUNDING DISBURSEMENT:

a) Separate Accounting of Funding Disbursements: The Grantee shall account for the money disbursed pursuant to this Grant Agreement separately from all other Grantee funds. The Grantee shall maintain audit and accounting procedures that are in accordance with generally accepted accounting principles and practices, consistently applied. The Grantee shall keep complete and accurate records of all receipts and disbursements on expenditures of such funds. The Grantee shall require its contractors or subcontractors to maintain books, records, and other documents pertinent to their work in accordance with generally accepted accounting principles and practices. Records are subject to inspection by the State at any and all reasonable times.

b) Disposition of Money Disbursed: All money disbursed pursuant to this Grant Agreement shall be deposited in a non-interest bearing account, administered, and accounted for pursuant to the provisions of applicable law.

c) Remittance of Unexpended Funds: The Grantee shall remit to the State any unexpended funds that were disbursed to the Grantee under this Grant Agreement and were not used to pay Eligible Project Costs within a period of sixty (60) calendar days from the final disbursement from the State to the Grantee of funds or, within thirty (30) calendar days of the expiration of the Grant Agreement, whichever comes first.

D.2) ACKNOWLEDGEMENT OF CREDIT AND SIGNAGE: The Grantee shall include appropriate acknowledgement of credit to the State for its support when promoting the Project or using any data and/or information developed under this Grant Agreement. Signage shall be posted in a prominent location at Project site(s) (if applicable) or at the Grantee's headquarters and shall include the Department of Water Resources color logo and the following disclosure statement: "Funding for this project has been provided in full or in part from the Water Quality, Supply, and Infrastructure Improvement Act of 2014 and through an agreement with the State Department of Water Resources." The Grantee shall also include in each of its contracts for work under this Agreement a provision that incorporates the requirements stated within this paragraph.

D.3) AMENDMENT: This Grant Agreement may be amended at any time by mutual agreement of the Parties, except insofar as any proposed amendments are in any way contrary to applicable law. Requests by the Grantee for amendments must be in writing stating the amendment request and the reason for the request. The State shall have no obligation to agree to an amendment.

D.4) AMERICANS WITH DISABILITIES ACT: By signing this Grant Agreement, the Grantee assures the State that it complies with the Americans with Disabilities Act (ADA) of 1990, (42 U.S.C. § 12101 et seq.), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

D.5) AUDITS: The State reserves the right to conduct an audit at any time between the execution of this Grant Agreement and the completion of the Project, with the costs of such audit borne by the State. After completion of the Project, the State may require the Grantee to conduct a final audit to the State's specifications, at the Grantee's expense, such audit to be conducted by and a report prepared by an independent Certified Public Accountant. Failure or refusal by the Grantee to comply with this provision shall be considered a breach of this Grant Agreement, and the State may elect to pursue any remedies provided in Paragraph 12 or take any other action it deems necessary to protect its interests.

Pursuant to Government Code Section 8546.7, the Grantee shall be subject to the examination and audit by the State for a period of three (3) years after final payment under this Grant Agreement with respect of all matters connected with this Grant Agreement, including but not limited to, the cost of administering this Grant Agreement. All records of the Grantee or its contractor or subcontractors shall

be preserved for this purpose for at least three (3) years after receipt of the final disbursement under this Agreement. If an audit reveals any impropriety, the Bureau of State Audits or the State Controller's Office may conduct a full audit of any or all of the Funding Recipient's activities. (Wat. Code, § 79708, subd. (b).)

D.6) BUDGET CONTINGENCY: If the Budget Act of the current year covered under this Grant Agreement does not appropriate sufficient funds for this program, this Grant Agreement shall be of no force and effect. This provision shall be construed as a condition precedent to the obligation of the State to make any payments under this Grant Agreement. In this event, the State shall have no liability to pay any funds whatsoever to the Grantee or to furnish any other considerations under this Grant Agreement and the Grantee shall not be obligated to perform any provisions of this Grant Agreement. Nothing in this Grant Agreement shall be construed to provide the Grantee with a right of priority for payment over any other Grantee. If funding for any fiscal year after the current year covered by this Grant Agreement is reduced or deleted by the Budget Act, by Executive Order, or by order of the Department of Finance, the State shall have the option to either cancel this Grant Agreement with no liability occurring to the State, or offer a Grant Agreement amendment to the Grantee to reflect the reduced amount.

D.7) CEQA: Activities funded under this Grant Agreement, regardless of funding source, must be in compliance with the California Environmental Quality Act (CEQA). (Pub. Resources Code, § 21000 et seq.) Any work that is subject to CEQA and funded under this Grant Agreement shall not proceed until documents that satisfy the CEQA process are received by the State's Project Manager and the State has completed its CEQA compliance. Work funded under the Grant Agreement subject to a CEQA document shall not proceed until and unless approved by the State Project Manager. Such approval is fully discretionary and shall constitute a condition precedent to any work for which it is required. If CEQA compliance by the Grantee is not complete at the time the State signs this Agreement, once the State has considered the environmental documents, it may decide to require changes, alterations, or other mitigation to the Project; or to not fund the Project. Should the State decide to not fund the Project, this Agreement shall be terminated in accordance with Paragraph 12.

D.8) CHILD SUPPORT COMPLIANCE ACT: The Grantee acknowledges in accordance with Public Contract Code Section 7110, that:

a) The Grantee recognizes the importance of child and family support obligations and shall fully comply with all applicable state and federal laws relating to child and family support enforcement, including, but not limited to, disclosure of information and compliance with earnings assignment orders, as provided in Family Code Section 5200 et seq.; and

b) The Grantee, to the best of its knowledge is fully complying with the earnings assignment orders of all employees and is providing the names of all new employees to the New Hire Registry maintained by the California Employment Development Department.

D.9) CLAIMS DISPUTE: Any claim that the Grantee may have regarding performance of this Agreement including, but not limited to, claims for additional compensation or extension of time, shall be submitted to the DWR Project Representative, within thirty (30) days of the Grantee's knowledge of the claim. The State and the Grantee shall then attempt to negotiate a resolution of such claim and process an amendment to this Agreement to implement the terms of any such resolution.

D.10) COMPETITIVE BIDDING AND PROCUREMENTS: The Grantee shall comply with all applicable laws and regulations regarding securing competitive bids and undertaking competitive negotiations in the Grantee's contracts with other entities for acquisition of goods and services and construction of public works with funds provided by the State under this Grant Agreement.

D.11) COMPUTER SOFTWARE: The Grantee certifies that it has appropriate systems and controls in place to ensure that State funds will not be used in the performance of this Grant Agreement for the acquisition, operation, or maintenance of computer software in violation of copyright laws.

D.12) CONFLICT OF INTEREST: All participants are subject to state and federal conflict of interest laws. Failure to comply with these laws, including business and financial disclosure provisions, will result in the application being rejected and any subsequent contract being declared void. Other legal action may also be taken. Applicable statutes include, but are not limited to, Government Code Section 1090 and Public Contract Code Sections 10410 and 10411, for State conflict of interest requirements.

a) Current State Employees: No State officer or employee shall engage in any employment, activity, or enterprise from which the officer or employee receives compensation or has a financial interest and which is sponsored or funded by any State agency, unless the employment, activity, or enterprise is required as a condition of regular State employment. No State officer or employee shall contract on his or her own behalf as an independent contractor with any State agency to provide goods or services.

b) Former State Employees: For the two-year period from the date he or she left State employment, no former State officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements, or any part of the decision-making process relevant to the contract while employed in any capacity by any State agency. For the twelve-month period from the date he or she left State employment, no former State officer or employee may enter into a contract with any State agency if he or she was employed by that State agency in a policy-making position in the same general subject area as the proposed contract within the twelve-month period prior to his or her leaving State service.

c) Employees of the Grantee: Employees of the Grantee shall comply with all applicable provisions of law pertaining to conflicts of interest, including but not limited to any applicable conflict of interest provisions of the California Political Reform Act. (Gov. Code, § 87100 et seq.)

d) Employees and Consultants to the Grantee: Individuals working on behalf of the Grantee may be required by DWR to file a Statement of Economic Interests (Fair Political Practices Commission Form 700) if it is determined that an individual is a consultant for Political Reform Act purposes.

D.13) DELIVERY OF INFORMATION, REPORTS, AND DATA: The Grantee agrees to expeditiously provide throughout the term of this Grant Agreement, such reports, data, information, and certifications as may be reasonably required by the State.

D.14) DISPOSITION OF EQUIPMENT: The Grantee shall provide to the State, not less than 30 calendar days prior to submission of the final invoice, an itemized inventory of equipment purchased with funds provided by the State. The inventory shall include all items with a current estimated fair market value of more than $5,000.00 per item. Within 60 calendar days of receipt of such inventory the State shall provide the Grantee with a list of the items on the inventory that the State will take title to. All other items shall become the property of the Grantee. The State shall arrange for delivery from the Grantee of items that it takes title to. Cost of transportation, if any, shall be borne by the State.

D.15) DRUG-FREE WORKPLACE CERTIFICATION: Certification of Compliance: By signing this Grant Agreement, the Grantee, its contractors or subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Gov. Code § 8350 et seq.) and have or will provide a drug-free workplace by taking the following actions:

a) Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by Government Code Section 8355.

b) Establish a Drug-Free Awareness Program, as required by Government Code Section 8355 to inform employees, contractors, or subcontractors about all of the following:

i) The dangers of drug abuse in the workplace,

ii) The Grantee's policy of maintaining a drug-free workplace,

iii) Any available counseling, rehabilitation, and employee assistance programs, and

iv) Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.

c) Provide, as required by Government Code Section 8355, that every employee, contractor, and/or subcontractor who works under this Grant Agreement:

i) Will receive a copy of the Grantee's drug-free policy statement, and

ii) Will agree to abide by terms of the Grantee's condition of employment, contract or subcontract.

D.16) EASEMENTS: Where the Grantee acquires property in fee title or funds improvements to real property already owned in fee by the Grantee using State funds provided through this Grant Agreement, an appropriate easement or other title restriction providing for floodplain preservation and agricultural and/or wildlife habitat conservation for the subject property in perpetuity, approved by the State, shall be conveyed to a regulatory or trustee agency or conservation group acceptable to the State. The easement or other title restriction must be in first position ahead of any recorded mortgage or lien on the property unless this requirement is waived by the State.

Where the Grantee acquires an easement under this Agreement, the Grantee agrees to monitor and enforce the terms of the easement, unless the easement is subsequently transferred to another land management or conservation organization or entity with State permission, at which time monitoring and enforcement responsibilities will transfer to the new easement owner.

Failure to provide an easement acceptable to the State can result in termination of this Agreement.

D.17) FINAL INSPECTIONS AND CERTIFICATION OF REGISTERED PROFESSIONAL: Upon completion of the Project, the Grantee shall provide for a final inspection and certification by a California Registered Professional (i.e., Professional Civil Engineer, Engineering Geologist, that the Project has been completed in accordance with submitted final plans and specifications and any modifications thereto and in accordance with this Grant Agreement.

D.18) GRANTEE'S RESPONSIBILITY. The Grantee and its representatives shall:

a) Faithfully and expeditiously perform or cause to be performed all project work as described in Exhibit A and in accordance with Project Exhibit B and Exhibit C.

b) Accept and agree to comply with all terms, provisions, conditions, and written commitments of this Grant Agreement, including all incorporated documents, and to fulfill all assurances, declarations, representations, and statements made by the Grantee in the application, documents, amendments, and communications filed in support of its request for funding.

c) Comply with all applicable California, federal, and local laws and regulations.

d) Implement the Project in accordance with applicable provisions of the law.

e) Fulfill its obligations under the Grant Agreement and be responsible for the performance of the Project.

f) Obtain any and all permits, licenses, and approvals required for performing any work under this Grant Agreement, including those necessary to perform design, construction, or operation and maintenance of the Project. The Grantee shall provide copies of permits and approvals to the State.

g) Be solely responsible for design, construction, and operation and maintenance of projects within the work plan. Review or approval of plans, specifications, bid documents, or other construction documents by the State is solely for the purpose of proper administration of funds by the State and shall not be deemed to relieve or restrict responsibilities of the Grantee under this Agreement.

h) Be solely responsible for all work and for persons or entities engaged in work performed pursuant to this Grant Agreement, including, but not limited to, contractors, subcontractors, suppliers, and providers of services. The Grantee shall be responsible for any and all disputes arising out of its contracts for work on the Project, including but not limited to payment disputes with contractors and subcontractors. The State will not mediate disputes between the Grantee and any other entity concerning responsibility for performance of work.

D.19) GOVERNING LAW: This Grant Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.

D.20) INCOME RESTRICTIONS: The Grantee agrees that any refunds, rebates, credits, or other amounts (including any interest thereon) accruing to or received by the Grantee under this Agreement shall be paid by the Grantee to the State, to the extent that they are properly allocable to costs for which the Grantee has been reimbursed by the State under this Agreement.

D.21) INDEMNIFICATION: The Grantee shall indemnify and hold and save the State, its officers, agents, and employees, free and harmless from any and all liabilities for any claims and damages (including inverse condemnation) that may arise out of the Project and this Agreement, including, but not limited to any claims or damages arising from planning, design, construction, maintenance and/or operation of this Project and any breach of this Agreement. The Grantee shall require its contractors or subcontractors to name the State, its officers, agents and employees as additional insureds on their liability insurance for activities undertaken pursuant to this Agreement.

D.22) INDEPENDENT CAPACITY: The Grantee, and the agents and employees of the Grantees, in the performance of the Grant Agreement, shall act in an independent capacity and not as officers, employees, or agents of the State.

D.23) INSPECTION OF BOOKS, RECORDS, AND REPORTS: During regular office hours, each of the parties hereto and their duly authorized representatives shall have the right to inspect and to make copies of any books, records, or reports of either party pertaining to this Grant Agreement or matters related hereto. Each of the parties hereto shall maintain and shall make available at all times for such inspection accurate records of all its costs, disbursements, and receipts with respect to its activities under this Grant Agreement. Failure or refusal by the Grantee to comply with this provision shall be considered a breach of this Grant Agreement, and the State may withhold disbursements to the Grantee or take any other action it deems necessary to protect its interests.

D.24) INSPECTIONS OF PROJECT BY STATE: The State shall have the right to inspect the work being performed at any and all reasonable times during the term of the Grant Agreement. This right shall extend to any subcontracts, and the Grantee shall include provisions ensuring such access in all its contracts or subcontracts entered into pursuant to its Grant Agreement with the State.

D.25) LABOR CODE COMPLIANCE: The Grantee agrees to be bound by all the provisions of the Labor Code regarding prevailing wages and shall monitor all contracts subject to reimbursement from this Agreement to assure that the prevailing wage provisions of the Labor Code are being met. Current Department of Industrial Relations (DIR) requirements may be found at http://www.dir.ca.gov/lcp.asp. For more information, please refer to DIR's *Public Works Manual* at: http://www.dir.ca.gov/dlse/PWManualCombined.pdf. The Grantee affirms that it is aware of the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance, and the Grantee affirms that it will comply with such provisions before commencing the performance of the work under this Agreement and will make its contractors and subcontractors aware of this provision.

D.26) MODIFICATION OF OVERALL WORK PLAN: At the request of the Grantee, the State may at its sole discretion approve non-material changes to the portions of Exhibit A which concern the budget and schedule without formally amending this Grant Agreement. Non-material changes with respect to the budget are changes that only result in reallocation of the budget and will not result in an increase in the

amount of the State Grant Agreement. Non-material changes with respect to the Project schedule are changes that will not extend the term of this Grant Agreement. Requests for non-material changes to the budget and schedule must be submitted by the Grantee to the State in writing and are not effective unless and until specifically approved by the State's Program Manager in writing.

D.27) NONDISCRIMINATION: During the performance of this Grant Agreement, the Grantee and its contractors or subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex (gender), sexual orientation, race, color, ancestry, religion, creed, national origin (including language use restriction), pregnancy, physical disability (including HIV and AIDS), mental disability, medical condition (cancer/genetic characteristics), age (over 40), marital status, and denial of medial and family care leave or pregnancy disability leave. The Grantee and its contractors or subcontractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. The Grantee and its contractors or subcontractors shall comply with the provisions of the California Fair Employment and Housing Act (Gov. Code, § 12990.) and the applicable regulations promulgated there under (Cal. Code Regs., tit. 2, § 11000 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing the California Fair Employment and Housing Act are incorporated into this Agreement by reference. The Grantee and its contractors or subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

The Grantee shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the Grant Agreement.

D.28) OPINIONS AND DETERMINATIONS: Where the terms of this Grant Agreement provide for action to be based upon, judgment, approval, review, or determination of either party hereto, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable.

D.29) PRIORITY HIRING CONSIDERATIONS: If this Grant Agreement includes services in excess of $200,000, the Grantee shall give priority consideration in filling vacancies in positions funded by the Grant Agreement to qualified recipients of aid under Welfare and Institutions Code Section 11200 in accordance with Public Contract Code Section 10353.

D.30) PROHIBITION AGAINST DISPOSAL OF PROJECT WITHOUT STATE PERMISSION: The Grantee shall not sell, abandon, lease, transfer, exchange, mortgage, hypothecate, or encumber in any manner whatsoever all or any portion of any real or other property necessarily connected or used in conjunction with the Project, or with the Grantee's service of water, without prior permission of the State. The Grantee shall not take any action, including but not limited to actions relating to user fees, charges, and assessments that could adversely affect the ability of the Grantee to meet its obligations under this Grant Agreement, without prior written permission of the State. The State may require that the proceeds from the disposition of any real or personal property be remitted to the State.

D.31) REMEDIES NOT EXCLUSIVE: The use by either party of any remedy specified herein for the enforcement of this Grant Agreement is not exclusive and shall not deprive the party using such remedy of, or limit the application of, any other remedy provided by law.

D.32) RETENTION: The State shall withhold ten percent (10%) of the funds requested by the Grantee for reimbursement of Eligible Project Costs until the Project is completed and Final Project Completion Report is approved. Any retained amounts due to the Grantee will be promptly disbursed to the Grantee, without interest, upon completion of the Project.

D.33) RIGHTS IN DATA: The Grantee agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes and other written or graphic work produced in the performance of this Grant Agreement shall be made available to the State and shall be in the public domain to the extent to which release of such materials is required under the California Public Records Act. (Gov.

Code, § 6250 et seq.) The Grantee may disclose, disseminate and use in whole or in part, any final form data and information received, collected and developed under this Grant Agreement, subject to appropriate acknowledgement of credit to the State for financial support. The Grantee shall not utilize the materials for any profit-making venture or sell or grant rights to a third party who intends to do so. The State shall have the right to use any data described in this paragraph for any public purpose.

D.34) SEVERABILITY: Should any portion of this Grant Agreement be determined to be void or unenforceable, such shall be severed from the whole and the Grant Agreement shall continue as modified.

D.35) SUSPENSION OF PAYMENTS: This Grant Agreement may be subject to suspension of payments or termination, or both if the State determines that:

a) The Grantee, its contractors, or subcontractors have made a false certification, or

b) The Grantee, its contractors, or subcontractors violates the certification by failing to carry out the requirements noted in this Grant Agreement.

D.36) SUCCESSORS AND ASSIGNS: This Grant Agreement and all of its provisions shall apply to and bind the successors and assigns of the parties. No assignment or transfer of this Grant Agreement or any part thereof, rights hereunder, or interest herein by the Grantee shall be valid unless and until it is approved by State and made subject to such reasonable terms and conditions as the State may impose.

D.37) TERMINATION BY GRANTEE: Subject to State approval which may be reasonably withheld, the Grantee may terminate this Agreement and be relieved of contractual obligations. In doing so, the Grantee must provide a reason(s) for termination. The Grantee must submit all progress reports summarizing accomplishments up until termination date.

D.38) TERMINATION FOR CAUSE: Subject to the right to cure under Paragraph 12, the State may terminate this Grant Agreement and be relieved of any payments should the Grantee fail to perform the requirements of this Grant Agreement at the time and in the manner herein, provided including but not limited to reasons of default under Paragraph 12.

D.39) TERMINATION WITHOUT CAUSE: The State may terminate this Agreement without cause on 30 days advance written notice. The Grantee shall be reimbursed for all reasonable expenses incurred up to the date of termination.

D.40) THIRD PARTY BENEFICIARIES: The parties to this Agreement do not intend to create rights in, or grant remedies to, any third party as a beneficiary of this Agreement, or any duty, covenant, obligation or understanding established herein.

D.41) TIMELINESS: Time is of the essence in this Grant Agreement.

D.42) TRAVEL – DAC, EDA, or SDAC PROJECT/COMPONENT: If a Project/Component obtains a DAC, EDA, or SDAC Cost Share Waiver, the Grantee may submit travel and per diem costs for eligible reimbursement with State funds. Travel includes the reasonable and necessary costs of transportation, subsistence, and other associated costs incurred by personnel during the term of this Grant Agreement. Any reimbursement for necessary travel and per diem shall be at rates not to exceed those set by the California Department of Human Resources. These rates may be found at: http://www.calhr.ca.gov/employees/Pages/travel-reimbursements.aspx. Reimbursement will be at the State travel and per diem amounts that are current as of the date costs are incurred. No travel outside the State of California shall be reimbursed unless prior written authorization is obtained from the State. All travel approved expenses will be reimbursed at the percentage rate of the DAC, EDA, or SDAC Cost Share Waiver. For example, if the Grantee obtains a 100% Waiver, 100% of all approved travel expenses can be invoiced for reimbursement. If the Grantee obtains a 50% Waiver, only 50% of eligible travel expenses will be reimbursed by these grant funds.

D.43) TRAVEL – NON-DAC, EDA, or SDAC PROJECT/COMPONENT: The Grantee agrees that travel and per diem costs shall NOT be eligible for reimbursement with State funds, unless the Grantee's service area is considered a DAC, EDA, or SDAC. The Grantee also agrees that travel and per diem costs shall NOT be eligible for computing Grantee Local Cost Share. Travel includes the costs of transportation, subsistence, and other associated costs incurred by personnel during the term of this Grant Agreement.

D.44) UNION ORGANIZING: The Grantee, by signing this Grant Agreement, hereby acknowledges the applicability of Government Code Sections 16645 through 16649 to this Grant Agreement. Furthermore, the Grantee, by signing this Grant Agreement, hereby certifies that:

a) No State funds disbursed by this Grant Agreement will be used to assist, promote, or deter union organizing.

b) The Grantee shall account for State funds disbursed for a specific expenditure by this Grant Agreement to show those funds were allocated to that expenditure.

c) The Grantee shall, where State funds are not designated as described in (b) above, allocate, on a pro rata basis, all disbursements that support the program.

d) If the Grantee makes expenditures to assist, promote, or deter union organizing, the Grantee will maintain records sufficient to show that no State funds were used for those expenditures and that the Grantee shall provide those records to the Attorney General upon request.

D.45) VENUE: The State and the Grantee hereby agree that any action arising out of this Agreement shall be filed and maintained in the Superior Court in and for the County of Sacramento, California, or in the United States District Court in and for the Eastern District of California. The Grantee hereby waives any existing sovereign immunity for the purposes of this Agreement.

D.46) WAIVER OF RIGHTS: None of the provisions of this Grant Agreement shall be deemed waived unless expressly waived in writing. It is the intention of the parties here to that from time to time either party may waive any of its rights under this Grant Agreement unless contrary to law. Any waiver by either party of rights arising in connection with the Grant Agreement shall not be deemed to be a waiver with respect to any other rights or matters, and such provisions shall continue in full force and effect.

EXHIBIT E

AUTHORIZING RESOLUTION ACCEPTING FUNDS

4058

RESOLUTION No. 1061

RESOLUTION OF THE BOARD OF DIRECTORS OF SAN BERNARDINO VALLEY MUNICIPAL WATER DISTRICT AUTHORIZING APPLICATION FOR A GRANT UNDER THE 2017 SUSTAINABLE GROUNDWATER PLANNING GRANT PROGRAM

WHEREAS, on September 16, 2014, Governor Jerry Brown signed into law Senate Bills 1168 and 1319, and Assembly Bill 1739, collectively known as the Sustainable Groundwater Management Act (SGMA), which amended the Water Code (Part 2.74 of Division 6 of the Water Code, Sections 10720-10737.8) and provides the framework for sustainable groundwater management planning and implementation; and

WHEREAS, SGMA went into effect on January 1, 2015; and

WHEREAS, SGMA requires local public agencies and Groundwater Sustainability Agencies (GSAs) to develop and implement Groundwater Sustainability Plans (GSPs) or alternatives to GSPs for designated high and medium priority groundwater basins and subbasins; and

WHEREAS, the Yucaipa Sub-Basin (Upper Santa Ana Valley Yucaipa 8-002.07) is designated by the California Department of Water Resources (DWR) as medium-priority and is required to be managed by a GSP or coordinated GSPs by January 31, 2022; and

WHEREAS, a Memorandum of Agreement (MOA) to form a GSA for the Yucaipa Sub-Basin was entered into by and among San Bernardino Valley Municipal Water District, San Gorgonio Pass Water Agency, South Mesa Water Company, South Mountain Water Company, Western Heights Water Company, Yucaipa Valley Water District, the City of Calimesa, the City of Redlands, and the City of Yucaipa; and

WHEREAS, the San Bernardino Valley Municipal Water District, and other parties to the MOA are seeking funding to develop a GSP for the Yucaipa Sub-Basin; and

WHEREAS, The Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) authorized $100 million to be available for competitive grants for projects that develop and implement GSPs and projects in accordance with groundwater planning requirements established under Division 6 (commencing with Section 10000) (Water Code Section 79775); and

WHEREAS, DWR is administering the Sustainable Groundwater Planning Grant Program, using funds authorized by Proposition 1, to encourage sustainable management of groundwater resources that support SGMA; and

WHEREAS, the San Bernardino Valley Municipal Water District has been selected to submit an application to the Sustainable Groundwater Planning Grant Program on behalf of the Yucaipa Sub-Basin.

NOW THEREFORE, be it resolved by the Board of Directors of the San Bernardino Valley Municipal Water District as follows:

1. That application be made to the California Department of Water Resources to obtain a grant under the 2017 Sustainable Groundwater Planning Grant Program pursuant to the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) (Water Code Section 79700 et seq.), and to enter into an agreement to receive a grant for the *Yucaipa Sub-Basin Groundwater Sustainability Plan*.

4059

a. The General Manager, or Designee, of the San Bernardino Valley Municipal Water District is hereby authorized and directed to prepare the necessary data, conduct investigations, file such application, and execute a grant agreement with DWR.

PASSED AND ADOPTED by the governing body of the San Bernardino Valley Municipal Water District this October 17, 2017.

Susan Longville, President

ATTEST:

Steve Copelan, Secretary

EXHIBIT F

REPORT FORMATS AND REQUIREMENTS

The following reporting formats should be utilized. Please obtain State approval prior to submitting a report in an alternative format.

PROGRESS REPORTS

Progress reports shall generally use the following format. This format may be modified as necessary to effectively communicate information. For the Project, or each component, discuss the following at the task level, as organized in Exhibit A:

- Percent complete estimate.
- Discussion of work accomplished during the reporting period.
- Milestones or deliverables completed/submitted during the reporting period.
- Meetings held or attended.
- Scheduling concerns and issues encountered that may delay completion of the task.

For each project, discuss the following at the project level, as organized in Exhibit A:

- Work anticipated for the next reporting period.
- Photo documentation, as appropriate.
- Any schedule or budget modifications approved by DWR during the reporting period.

COMPLETION REPORT

The Completion Report shall generally use the following format provided below for each Component or Project after completion.

Executive Summary

The Executive Summary should include a brief summary of project information and include the following items:

- Brief description of work proposed to be done in the original Grant application.
- Description of actual work completed and any deviations from Exhibit A. List any official amendments to this Grant Agreement, with a short description of the amendment.

Reports and/or Products

The following items should be provided, unless already submitted as a deliverable:

- A copy of the Groundwater Sustainability Plan (GSP) that meets all the requirements of the GSP Regulations (for GSP Development Projects), or verification (e.g., acceptance email, or other approved documentation from SGMA), that the GSP was submitted to DWR as required.
- A copy of any final technical report or study, produced for or utilized in this Project as described in the Work Plan
- Electronic copies of any data collected, not previously submitted
- Discussion of problems that occurred during the work and how those problems were resolved
- Final Component schedule showing actual progress versus planned progress

Additional information that may be applicable for Implementation Projects and/or Components includes the following:

- As-built drawings
- Final geodetic survey information
- Project or Component photos

Cost & Disposition of Funds

A list showing:

- Summary of Project costs including the following items:
  - Accounting of the cost of project expenditure
  - Include all internal and external costs not previously disclosed (i.e., additional cost share); and
  - A discussion of factors that positively or negatively affected the project cost and any deviation from the original Project cost estimate.

Additional Information

- Benefits derived from the Component, with quantification of such benefits provided, applicable for Implementation Components.
- A final project schedule showing actual progress versus planned progress as shown in Exhibit C.
- Certification from a California Registered Professional (Civil Engineer or Geologist, as appropriate) that the project was conducted in accordance with the approved work plan and any approved modifications thereto.

GRANT COMPLETION REPORT

The Grant Completion Report shall generally use the following format. This format may be modified as necessary to effectively communicate information on the various projects in the SGWP Grant Program funded by this Grant Agreement, and includes the following:

Executive Summary

The Executive Summary consists of a maximum of ten (10) pages summarizing information for the grant as well as the individual components.

Reports and/or products

- Brief comparison of work proposed in the original 2017 SGWP Grant application and actual work done.
- Brief description of the Project or components completed and how they achieve either or both of the following:
  - Serve SDAC(s) and support groundwater sustainability planning and management in the basin (Implementation Projects); and/or
  - Support planning, development, and/or preparation of GSP(s) that will comply with and meet the requirements of the GSP Regulations (GSP Development Projects).
- Identify remaining work and mechanism for their implementation (Implementation Projects).
- If applicable (e.g., if a DAC, EDA, or SDAC Cost Share Waiver was approved), a discussion of the benefits to DAC, EDA, and/or SDAC as part of this Grant Agreement.

Cost & Disposition of Funds Information

- A summary of final funds disbursement for the Project, or each component.

EXHIBIT G

REQUIREMENTS FOR DATA SUBMITTAL

Surface and Groundwater Quality Data:

Groundwater quality and ambient surface water quality monitoring data that include chemical, physical, or biological data shall be submitted to the State as described below, with a narrative description of data submittal activities included in project reports, as described in Exhibit F.

Surface water quality monitoring data shall be prepared for submission to the California Environmental Data Exchange Network (CEDEN). The CEDEN data templates are available on the CEDEN website. Inclusion of additional data elements described on the data templates is desirable. Data ready for submission should be uploaded to your CEDEN Regional Data Center via the CEDEN website. (CEDEN website: http://www.ceden.org).

If a project's Work Plan contains a groundwater ambient monitoring element, groundwater quality monitoring data shall be submitted to the State for inclusion in the State Water Resources Control Board's Groundwater Ambient Monitoring and Assessment (GAMA) Program Information on the GAMA Program can be obtained at: http://www.waterboards.ca.gov/water_issues/programs/gama/. If further information is required, the Grantee can contact the State Water Resources Control Board (SWRCB) GAMA Program. A listing of SWRCB staff involved in the GAMA program can be found at: http://www.swrcb.ca.gov/water_issues/programs/gama/contact.shtml

Groundwater Level Data

The Grantee shall submit to DWR groundwater level data collected as part of this grant. Water level data must be submitted using the California Statewide Groundwater Elevation Monitoring (CASGEM) online data submission system. The Grantee should use their official CASGEM Monitoring Entity or Cooperating Agency status to gain access to the online submittal tool and submit data. If the data is from wells that are not part of the monitoring network, the water level measurements should be classified as voluntary measurements in the CASGEM system. If the Grantee is not a Monitoring Entity or Cooperating Agency, please contact your DWR grant project manager for further assistance with data submittal. The activity of data submittal should be documented in appropriate progress or final project reports, as described in Exhibit F. Information regarding the CASGEM program can be found at: http://www.water.ca.gov/Programs/Groundwater-Management/Groundwater-Elevation-Monitoring--CASGEM

EXHIBIT H

STATE AUDIT DOCUMENT REQUIREMENTS AND COST SHARE GUIDELINES FOR GRANTEES

The following provides a list of documents typically required by State Auditors and general guidelines for Grantees. List of documents pertains to both State funding and the Grantee's Cost Share and details the documents/records that State Auditors would need to review in the event of this Grant Agreement is audited. Grantees should ensure that such records are maintained for each funded project.

State Audit Document Requirements

Internal Controls

1. Organization chart (e.g., Agency's overall organization chart and organization chart for the State funded Program/Project).
2. Written internal procedures and flowcharts for the following:
   a) Receipts and deposits
   b) Disbursements
   c) State reimbursement requests
   d) Expenditure tracking of State funds
   e) Guidelines, policy, and procedures on State funded Program/Project
3. Audit reports of the Agency internal control structure and/or financial statements within the last two years.
4. Prior audit reports on the State funded Program/Project.

State Funding:

1. Original Grant Agreement, any amendment(s) and budget modification documents.
2. A listing of all bond-funded grants, loans, or subventions received from the State.
3. A listing of all other funding sources for each Program/Project.

Contracts:

1. All subcontractor and consultant contracts and related or partners documents, if applicable.
2. Contracts between the Agency and member agencies as related to the State funded Program/Project.

Invoices:

1. Invoices from vendors and subcontractors for expenditures submitted to the State for payments under the Grant Agreement.
2. Documentation linking subcontractor invoices to State reimbursement, requests and related Grant Agreement budget line items.
3. Reimbursement requests submitted to the State for the Grant Agreement.

Cash Documents:

1. Receipts (copies of warrants) showing payments received from the State.
2. Deposit slips (or bank statements) showing deposit of the payments received from the State.
3. Cancelled checks or disbursement documents showing payments made to vendors, subcontractors, consultants, and/or agents under the grants or loans.
4. Bank statements showing the deposit of the receipts.

Accounting Records:

1. Ledgers showing entries for the Grantee's receipts and cash disbursements.
2. Ledgers showing receipts and cash disbursement entries of other funding sources.
3. Bridging documents that tie the general ledger to requests for Grant Agreement reimbursement.

Administration Costs:

1. Supporting documents showing the calculation of administration costs.

Personnel:

1. List of all contractors and Agency staff that worked on the State funded Program/Project.
2. Payroll records including timesheets for contractor staff and the Agency personnel who provided services charged to the program

Project Files:

1. All supporting documentation maintained in the project files.
2. All Grant Agreement related correspondence.

Cost Share Guidelines

Cost Share consists of non-State funds, including in-kind services. In-kind services are defined as work performed (i.e., dollar value of non-cash contributions) by the Grantee (and potentially other parties) directly related to the execution of the funded project. Examples include volunteer services, equipment use, and use of facilities. The cost of in-kind service can be counted as cost share in-lieu of actual funds (or revenue) provided by the Grantee. Other cost share and in-kind service eligibility conditions may apply. Provided below is guidance for documenting cost share with and without in-kind services.

1. Although tracked separately, in-kind services shall be documented and, to the extent feasible, supported by the same methods used by the Grantee for its own employees. Such documentation should include the following:
    a. Detailed description of the contributed item(s) or service(s)
    b. Purpose for which the contribution was made (tied to project work plan)
    c. Name of contributing organization and date of contribution
    d. Real or approximate value of contribution. Who valued the contribution and how was the value determined? (e.g., actual, appraisal, fair market value, etc.). Justification of rate. (See item #2, below)
    e. Person's name and the function of the contributing person
    f. Number of hours contributed
    g. If multiple sources exist, these should be summarized on a table with summed charges
    h. Source of contribution if it was provided by, obtained with, or supported by government funds
2. Rates for volunteer or in-kind services shall be consistent with those paid for similar work in the Grantee's organization. For example, volunteer service of clearing vegetation performed by an attorney shall be valued at a fair market value for this service, not the rate for professional legal services. In those instances in which the required skills are not found in the recipient organization, rates shall be consistent with those paid for similar work in the labor market. Paid fringe benefits that are reasonable, allowable and allocable may be included in the valuation.
3. Cost Share contribution (including in kind services) shall be for costs and services directly attributed to activities included in the Grant Agreement. These services, furnished by professional and technical

personnel, consultants, and other skilled and unskilled labor may be counted as in-kind if the activities are an integral and necessary part of the project funded by the Grant Agreement.

4. Cash contributions made to a project shall be documented as revenue and in-kind services as expenditure. These costs should be tracked separately in the Grantee's accounting system.

EXHIBIT I

LOCAL PROJECT SPONSORS (NOT USED)

EXHIBIT J
PROJECT LOCATION