MEETING OF THE BOARD OF DIRECTORS OF THE
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
Jointly with the
PLANNING & OPERATIONS COMMITTEE
March 1, 2021, 8:30 a.m.

Due to the spread of COVID-19 and as authorized by the Governor's Executive Order, MWDOC will be holding all upcoming Board and Committee meetings by Zoom Webinar and will be available by either computer or telephone audio as follows:

Computer Audio: You can join the Zoom meeting by clicking on the following link:
https://zoom.us/j/8828665300

Telephone Audio:	**(669) 900 9128 fees may apply**
	(877) 853 5247 Toll-free
Webinar ID:	**882 866 5300#**

P&O Committee:
Director Yoo Schneider, Chair
Director Nederhood
Director Seckel

Staff: R. Hunter, J. Berg, V. Osborn, H. De La Torre, T. Dubuque, D. Micalizzi, H. Baez, T. Baca

Ex Officio Member: Director Tamaribuchi

MWDOC Committee meetings are noticed and held as joint meetings of the Committee and the entire Board of Directors and all members of the Board of Directors may attend and participate in the discussion. Each Committee has designated Committee members, and other members of the Board are designated alternate committee members. If less than a quorum of the full Board is in attendance, the Board meeting will be adjourned for lack of a quorum and the meeting will proceed as a meeting of the Committee with those Committee members and alternate members in attendance acting as the Committee.

PUBLIC COMMENTS - Public comments on agenda items and items under the jurisdiction of the Committee should be made at this time.

ITEMS RECEIVED TOO LATE TO BE AGENDIZED - Determine there is a need to take immediate action on item(s) and that the need for action came to the attention of the District subsequent to the posting of the Agenda. (Requires a unanimous vote of the Committee)

ITEMS DISTRIBUTED TO THE BOARD LESS THAN 72 HOURS PRIOR TO MEETING -- Pursuant to Government Code section 54957.5, non-exempt public records that relate to open session agenda items and are distributed to a majority of the Board less than seventy-two (72) hours prior to the meeting will be available for public inspection in the lobby of the District's business office located at 18700 Ward Street, Fountain Valley, California 92708, during regular business hours. When practical, these public records will also be made available on the District's Internet Web site, accessible at http://www.mwdoc.com.

ACTION ITEM

1. CSDA BOARD OF DIRECTORS, SOUTHERN NETWORK, SEAT A - CALL FOR NOMINATIONS

2. ISDOC 2nd VICE PRESIDENT CALL FOR NOMINATIONS

DISCUSSION ITEMS

3. UPDATE ON COVID-19 (ORAL REPORT)

4. UPDATE ON WEROC ASSESSMENT & BUDGET

5. UPDATE RE:ORANGE COUNTY WATER DISTRICT/MOULTON NIGUEL WATER DISTRICT PILOT STORAGE PROGRAM

INFORMATION ITEMS (The following items are for informational purposes only – background information is included in the packet. Discussion is not necessary unless a Director requests.)

6. LOCAL LEGISLATIVE ACTIVITIES
   a. County Legislative Report (Lewis)
   b. Legal and Regulatory Report (Ackerman)

7. APPROVAL OF AMP CAPACITY FLOW EXCEEDANCE REQUEST – SOUTH COAST WD & THE CITY OF SAN CLEMENTE

8. MWDOC Choice School Programs Update

9. 2021 OC WATER SUMMIT UPDATE

10. February 24th Virtual Water Policy Forum

11. STATUS REPORTS
    a. Ongoing MWDOC Reliability and Engineering/Planning Projects
    b. WEROC
    c. Water Use Efficiency Projects
    d. Public and Government Affairs

12. REVIEW OF ISSUES RELATED TO PLANNING OR ENGINEERING PROJECTS, WEROC, WATER USE EFFICIENCY, FACILITY AND EQUIPMENT MAINTENANCE, WATER STORAGE, WATER QUALITY, CONJUNCTIVE USE PROGRAMS, EDUCATION, PUBLIC AFFAIRS PROGRAMS AND EVENTS, PUBLIC INFORMATION PROJECTS, PUBLIC INFORMATION CONSULTANTS, DISTRICT FACILITIES, and MEMBER-AGENCY RELATIONS

ADJOURNMENT

NOTE: At the discretion of the Committee, all items appearing on this agenda, whether or not expressly listed for action, may be deliberated, and may be subject to action by the Committee. On those items designated for Board action, the Committee reviews the items and makes a recommendation for final action to the full Board of Directors; final action will be taken by the Board of Directors. Agendas for Committee and Board meetings may be obtained from the District Secretary. Members of the public are advised that the Board consideration process includes consideration of each agenda item by one or more Committees indicated on the Board Action Sheet. Attendance at Committee meetings and the Board meeting considering an item consequently is advised.

Accommodations for the Disabled. Any person may make a request for a disability-related modification or accommodation needed for that person to be able to participate in the public meeting by telephoning Maribeth Goldsby, District Secretary, at (714) 963-3058, or writing to Municipal Water District of Orange County at P.O. Box 20895, Fountain Valley, CA 92728. Requests must specify the nature of the disability and the type of accommodation requested. A telephone number or other contact information should be included so that District staff may discuss appropriate arrangements. Persons requesting a disability-related accommodation should make the request with adequate time before the meeting for the District to provide the requested accommodation.

Item No. 1

ACTION ITEM
March 17, 2021

TO: **Planning and Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Heather Baez

SUBJECT: **CSDA BOARD OF DIRECTORS, SOUTHERN NETWORK, SEAT A - CALL FOR NOMINATIONS**

STAFF RECOMMENDATION

Staff recommends the Board of Directors discuss and determine if a member of the MWDOC Board of Directors would like to be nominated and run for the CSDA Board of Directors Southern Network, Seat A.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

REPORT

An 18-member Board of Directors elected from its six geographical networks governs CSDA. Each of the six networks (Northern, Sierra, Bay Area, Central, Coastal and Southern) have three seats on the board with staggered three-year terms. Candidates must be affiliated with an independent special district that is a CSDA Regular Member in good standing located within the geographic network they seek to represent.

CSDA is conducting a Call for Nominations for Seat A. The Southern Network Seat A is currently represented by the Honorable Jo McKenzie of the Vista Irrigation District. She intends to run for reelection.

Budgeted (Y/N): n/a	Budgeted amount: n/a	Core X	Choice __
Action item amount: None	Line item:		
Fiscal Impact (explain if unbudgeted):			

The CSDA Board of Directors is the governing body responsible for all policy decisions related to CSDA's member services, legislative advocacy, education and resources. The Board of Directors is crucial to the operation of the association and to the representation of the common interests of all California's special districts before the Legislature and the state administration.

Commitment and Expectations:

- Attend all Board meetings, held every other month at the CSDA office in Sacramento.
- Participate on at least one committee, meets 3-5 times a year at the CSDA office in Sacramento.

(CSDA reimburses Directors for their related expenses for Board and committee meetings as outlined in Board policy).

- Attend CSDA's two annual events: Special Districts Legislative Days (held in the spring) and the CSDA Annual Conference (held in the fall).
- Complete all four modules of CSDA's Special District Leadership Academy within two years.

(CSDA does not reimburse for expenses for the two conferences or the Academy classes even if a Board or committee meeting is held in conjunction with the events).

Nomination Procedure:

Any Regular Member in good standing is eligible to nominate one person, a board member or managerial employee (as defined by that district's Board of Directors) for election to the CSDA Board of Directors. A copy of the member district's resolution or minute action along with the Nomination Form and Candidate Information Sheet must accompany the nomination.

Deadline for receiving nomination applications is March 29, 2021.

Nominations and supporting documentation will be accepted by mail and email. Nominees will receive a Candidate's Packet in the mail. The packet will include campaign guidelines.

BOARD OPTIONS

Option #1

- Discuss and determine if a member of the MWDOC Board would like to run for the CSDA Board, Southern Network, Seat A.

Fiscal Impact: Travel costs associated with attending the CSDA Board meetings in Sacramento

Business Analysis: CSDA provides a strong voice for special districts in Sacramento and throughout California. Serving on their Board of Directors would provide MWDOC with a direct voice for special districts in our region.

Option #2

- Take no action

Fiscal Impact: None
Business Analysis: MWDOC would not have an opportunity to have a Board member on the CSDA Board.

ATTACHED

- CSDA Nomination Form
- CSDA Candidate Information Sheet

California Special
Districts Association
Districts Stronger Together

2021 CSDA BOARD CANDIDATE INFORMATION SHEET

The following information MUST accompany your nomination form and Resolution/minute order:

Name: _____

District/Company: _____

Title: _____

Elected/Appointed/Staff: _____

Length of Service with District: _____

1. **Do you have current involvement with CSDA (such as committees, events, workshops, conferences, Governance Academy, etc.):**

_____

_____

2. **Have you ever been associated with any other state-wide associations (CSAC, ACWA, League, etc.):**

_____

_____

3. **List local government involvement (such as LAFCo, Association of Governments, etc.):**

_____

_____

4. **List civic organization involvement:**

_____

_____

****Candidate Statement –** Although it is not required, each candidate is requested to submit a candidate statement of no more than 300 words in length. **Any statements received in the CSDA office after March 29, 2021 will not be included with the ballot.**

California Special
Districts Association
Districts Stronger Together

2021 BOARD OF DIRECTORS NOMINATION FORM

Name of Candidate: _____

District: _____

Mailing Address: _____

_____

Network: _____ **(see map)**

Telephone:_____
(PLEASE BE SURE THE PHONE NUMBER IS ONE WHERE WE CAN REACH THE CANDIDATE)

Fax:_____

E-mail: _____

Nominated by (optional): _____

Return this <u>form and a Board resolution/minute action supporting the candidate and Candidate Information Sheet</u> by mail or email to:

CSDA
Attn: Amber Phelen
1112 I Street, Suite 200
Sacramento, CA 95814
(877) 924-2732

amberp@csda.net

DEADLINE FOR RECEIVING NOMINATIONS – <u>March 29, 2021</u>

Item No. 2

ACTION ITEM
March 17, 2021

TO: **Planning and Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Heather Baez

SUBJECT: **ISDOC 2nd VICE PRESIDENT CALL FOR NOMINATIONS**

STAFF RECOMMENDATION

Staff recommends the Board of Directors discuss and determine if a member of the MWDOC Board would like to be nominated as a candidate for the ISDOC Executive Committee 2nd Vice President and direct staff as appropriate.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

REPORT

The Independent Special Districts of Orange County (ISDOC) has issued a Call for Candidates to fill the vacancy of the 2nd Vice President position. A formal announcement was recently distributed to all member districts via email and mail. The notice is attached for your reference.

Per the ISDOC Bylaws, officials who wish to seek election/appointment as an officer of ISDOC must first secure from their district an official endorsement in the form of a board resolution. In accordance with these Bylaws, the MWDOC Board must endorse a Director's candidacy through Resolution of the Board.

Budgeted (Y/N): n/a	Budgeted amount: n/a	Core X	Choice __
Action item amount: None	Line item:		
Fiscal Impact (explain if unbudgeted):			

Nominations for the ISDOC Executive Committee close on March 26, 2021 and all Board resolutions must be received at that time. The position will be filled via appointment by the ISDOC Executive Committee at their April 6, 2021 meeting.

BOARD OPTIONS

Option #1

- Discuss if a member of the MWDOC Board of Directors would like to be considered for the 2nd Vice President position on the ISDOC Board.

Fiscal Impact: None
Business Analysis: MWDOC would have a member of their Board of Directors serving in a leadership position for ISDOC.

Option #2

- Take no action

Fiscal Impact: None
Business Analysis: MWDOC would not have a member of their Board of Directors serving in a leadership position for ISDOC.

ATTACHED

- ISDOC Call for Nominations, 2nd Vice President

ISDOC
Independent Special Districts of Orange County

February 2, 2021

PLEASE DISSEMINATE TO ALL BOARD MEMBERS

Mailing Address

P.O. Box 20895
Fountain Valley, CA 92728

Meeting Location

MWDOC/OCWD
18700 Ward Street
Fountain Valley, CA 92708

(714) 963-3058
(714) 964-5930 *fax*

www.mwdoc.com/isdoc

Re: ISDOC Executive Committee 2nd Vice President Vacancy

This email shall serve as official notice and call for candidates to fill the vacancy for the 2nd Vice President position on of the Independent Special Districts of Orange County (ISDOC).The ISDOC Executive Committee will fill the vacancy by appointment.

Per the ISDOC bylaws, Article lll Section ll Point E: "With the exception of the immediate past president, if a vacancy occurs on the Executive Committee, the Committee shall, within 60 days from the commencement of the vacancy, either fill the vacancy by appointment or call a special election to fill the vacancy. A person appointed or elected to fill a vacancy shall hold office for the unexpired term of the former incumbent."

Nominations will close on **Friday, March 26, 2021 at 5:00 p.m.** Any Board Member/Trustee of a regular ISDOC member agency is eligible for nomination for this open position. Individuals who wish to be considered should submit a letter of interest, together with a resolution from their Board authorizing their candidacy. The appointment will be made by the ISDOC Executive Committee **on Tuesday, April 6, 2021.**

Responsibilities of the positions are as follows:

SECOND VICE PRESIDENT: The Second Vice President chairs the Membership Committee. Duties include maintaining a list of current regular and associate members, follow up with any outstanding membership dues as needed, and in the absence of the President and First Vice President, shall perform all duties of the President.

Meetings of the Executive Committee typically occur on the first Tuesday of each month at 7:30 a.m. in the offices of the Municipal Water District of Orange County (MWDOC) in Fountain Valley. Due to COVID-19 restrictions, meetings are currently being held via teleconference until further notice.

If you are seeking nomination to the 2nd Vice President position on the Executive Committee, please send your letter/email of interest and a copy of your Board's authorizing resolution to Heather Baez at Hbaez@mwdoc.com. All nomination requests must be received by **Friday, March 26, 2021.**

If you have any questions about the any of the positions or the election process, please contact either Heather Baez at Hbaez@mwdoc.com or Christina Hernandez at Chernandez@mwdoc.com

Sincerely,

Mark Monin

Mark Monin, President
Independent Special Districts of Orange County

Item No. 4

COMMITTEE DISCUSSION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Vicki Osborn

SUBJECT: **Update on WEROC Assessment and Budget**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee to receive and file report and provide input as appropriate.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

DETAILED REPORT

Over the course of the past few months, the WEROC program assessment has been presented to the MWDOC Board of Directors, the WEROC funding agencies, and member agencies. As part of the assessment, certain areas of the WEROC program were identified as needing improvement. The WEROC team is committed to continuing with the exceptional program in place and making the enhancement to continue the support and foundation of the WEROC Program.

- The WEROC Emergency Operations Plan is 90% completed. Since last report, the draft is with WEROC Management for review.
- In relation to the WEROC Assessment Report, the Records and Data Management project is 78% completed.
- Training and Exercise Plan is 100% competed.

Budgeted (Y/N):	Budgeted amount: n/a	Core	
Action item amount: n/a	Line item:		
Fiscal Impact (explain if unbudgeted):			

- WEROC CalCard solution is 90% completed, card has been received, process authorities documents specific to EOC is process are being created.
- Planning Maintenance and Recommendation Matrix is 30% completed as comparison of federal and state mandates in relationship to current planning continues.

Collaboration with Funding Agencies and Budget Presentation
On February 24th, WEROC is meeting with its funding agencies discuss the proposed WEROC Budget. At the January 27th meeting, one of the WEROC funding agencies implied they may retract the funding for WEROC. Their decision should be presented at the February 24th meeting. At the time of this report, that meeting has not occurred yet, so a verbal update will be provided to the committee regarding the discussion, outcomes and actions WEROC is taking.

Program Assessment Areas with Costs Associated Update
Focusing on the three-six month projects and the larger projects involving fiscal impacts outlined in the WEROC Assessment Report, the following items are for discussion with the P&O Committee for action within the General Manager's authority.

<u>WEROC Coordinator Position:</u>
Based on the outcome of the WEROC funding agency meeting, the Senior Staff Assistant may be reclassified as a WEROC Coordinator. Since the February report, the proposed WEROC budget was reduced as the limited term WEROC position overseeing the AWIA contract received full time employment at another agency. Hours from the WEROC budget for one staff member has been reallocated for the AWIA contract for management and oversight.

In January, MWDOC was allocated a cost increase of approximately $25,000, which includes wages and benefits. MWDOC 50% total allocation to the WEROC Budget is projected at $266,155.50
In the February WEROC Budget, the MWDOC cost share was reduced by $19,128 and MWDOC 50% total allocation to the WEROC Budget is projected at $260,364. This number is based on all the funding agencies participating and a verbal update to this matter will be presented at this committee meeting.

<u>South Emergency Operations Center:</u>
The South EOC facility was constructed in 1982 and has undergone minor renovations in the intervening years. A facility assessment study conducted in 2016, revealed critical defects requiring further renovation to bring this building up to safety standards.

El Toro Water District over the years has partnered with WEROC to allow for the existence of Emergency Operations Center. El Toro Water District is working on moving this project forward as the overall project involves their infrastructure as well. They need to know the intentions of WEROC regarding the South Emergency Operations Center as it impacts the ETWD project and schedule moving forward.

Since the last meeting, additional conversations and planning around the total wrap around costs of the EOC have been analyzed. Add-on expenses not included in the EL Toro Water District Brady Document include the electrical shortfall, plumbing and all FE&E costs.

Option 1: New Building including structure, soft costs, additional electrical work, and FE&E

	Overall Cost	50/50 Partner
FY21/22: Soft Costs & Site Grading	$404,219	$202,109.50
FY22/23: Construction Costs	$670,391	$335,109.50
FY23/24: Construction Costs	$670,391	$335,195.50
Total Costs	$1,745,000	$872,500.50 each agency*

(* with possible partner agency that can use location as alternate EOC and will have the appropriate connectivity and F&E required).

Option 2: Fix only seismic, roof, generator, electrical on the current structure $ 1,125,225

Option 3: Advise El Toro we are unable to move forward jointly, terminate the South Emergency Operations Center Lease Agreement and location.

Attachment A: 2021 WEROC Funding Agency Letter and Draft WEROC Budget (Version 2)

Vicki Osborn
Director of Emergency Management

Municipal Water District of Orange County

Street Address:
18700 Ward Street
Fountain Valley, California 92708

Mailing Address:
P.O. Box 20895
Fountain Valley, CA 92728-0895

Office: (714) 593-5010
Cell: (714) 746-4808
Fax: (714) 964-9389
Email: vosborn@mwdoc.com

MEMBER AGENCIES

City of Anaheim
City of Brea
City of Buena Park
Costa Mesa Sanitary District
East Orange County Water District
El Toro Water District
Emerald Bay Service District
City of Fountain Valley
City of Fullerton
City of Garden Grove
Golden State Water Company
City of Huntington Beach
Irvine Ranch Water District
City of La Habra
City of La Palma
City of Laguna Beach
Laguna Beach County Water District
Mesa Water District
Midway City Sanitary District
Moulton Niguel Water District
Municipal Water District of Orange County
City of Newport Beach
City of Orange
Orange County Sanitation District
Orange County Water District
City of San Clemente
City of San Juan Capistrano
City of Santa Ana
Santa Margarita Water District
City of Seal Beach
Serrano Water District
South Coast Water District
South Orange County Wastewater Authority
Trabuco Canyon Water District
City of Tustin
City of Westminster
Yorba Linda Water District

To: Michael Moore, Craig Parker - City of Anaheim
Betty Burnett - South Orange County Wastewater Authority
Meg McWade, John Orndorff - City of Fullerton
Jim Herberg - Orange County Sanitation District
Mike Markus - Orange County Water District
Nabil Saba - City of Santa Ana
Rob Hunter - Municipal Water District of Orange County

From: Vicki Osborn, WEROC Director of Emergency Management

Date: February 12, 2021 (replaces January 11, 2021 Memo)

Subject: Revised Budget - Water Emergency Response Organization of Orange County (WEROC) Program Accomplishments, Goals and Funding for FY 2021- 2022

The purpose of the Water Emergency Response Organization of Orange County (WEROC) is to protect water and wastewater services through preparedness and response coordination. The services and support provided by WEROC are intended to be an extension of Member Agency staffing in their preparedness efforts, and a resource during emergencies to ensure representation and recovery. In order to build the relationships needed for effective response, WEROC works with its member agencies, Metropolitan Water District of Southern California (MET), the County Operational Area, the State Office of Emergency Services and other emergency response partners throughout the year to educate, network and collaborate.

WEROC staff works with its member agencies on emergency plans and standard operating procedure development and review; state and federal required trainings for grant eligibility and disaster readiness; disaster exercise development; grant identification and application; and response and recovery coordination. Lastly, WEROC maintains two emergency operation centers, its own response plans and trained staff. In providing these services, WEROC continues to be a strong leader for regional water and wastewater emergency coordination and response.

The WEROC program took on some unexpected efforts as 2020 has been like no other. All the while continued to move projects forward while supporting water and wastewater agencies. Below are some of our accomplishments to date, what we expect to accomplish the remainder of this fiscal year along with next year's goals.

Activities and Accomplishments for 2020 to date:

Since the onset of the COVID-19 pandemic, WEROC has been providing the following on-going support to all agencies:

- WEROC continues to monitor the state and county for changing information and is sharing information with agencies as it becomes available.
- WEROC conducts bi-weekly conference calls with member agencies to report on federal, state and county changes, and facilitate and answer questions regarding changes regulations by providing guidance to the agencies.
- WEROC continues to support logistic requests from agencies supporting the accusation of scare resources and development of a vetted vendors list. WEROC has been a Point of Distribution for donation resources received from CalWarn and others such as face coverings and thermometers made available to water and wastewater agencies. WEROC has procured, transported, warehoused and distributed over 110,000 various pieces of personal protective equipment and sanitizing products. These supplies have been and will continue to be made available to all WEROC member agencies in times of need.
- WEROC monitors changing Cal OSHA regulations and distributes information with member agencies.

WEROC is coordinating with member agencies to ensure compliance with America's Water Infrastructure Act (AWIA). WEROC and its consultant, Herndon Solutions Group (HSG) are continuing to work with WEROC agencies to achieve compliance with America's Water Infrastructure Act (AWIA).

- The modified AWIA Scope of Work reflected changes to the project to accommodate COVID19 and the virtual meeting changes, but the end deliverables remained the same in order for agencies to meet the AWIA standard. There were 18 agencies (both Tier I & II) working concurrently on their AWIA requirements. There were 52 virtual meetings scheduled and conducted just in the months of June and July.
- WEROC submitted and received approval for the Risk and Resiliency Assessment Workshops from the State Water Board as contact hours and continuing education credits.
- All agencies participating has met compliance on schedule with the EPA.

  Tier 1 - 100% completed
  Tier 2 - 50% completed (100% Completion Due Date 6/2021)
  Tier 3 – 0% competed (Set to begin 1/2021)

Completion of the WEROC Program Strategic Assessment Plan. The assessment was a comprehensive review of the current WEROC program, what the future holds and identification for areas collaboratively can make WEROC a stronger organization over the coming years to benefit all members.

WEROC finalized the documentation FEMA required for approval of the Orange County Regional Water and Wastewater Multijurisdictional Hazard Mitigation Plan on behalf of the 17 agencies. On March 9th, 2020, WEROC received written approval from FEMA.

Development of a new long term Exercise and Training Program Plan integrating new requirements including AWIA, on-going ICS trainings offerings (in house), water specific trainings, and development of a long term repeating exercise program incorporating water specific areas.

Creation and delivery of certified virtual ICS training conducted in house approved by the State using the State and Federal standards and incorporating water and wastewater specific applications.

In partnership with the OCIAC, Cyber Security emergency notification secondary and tertiary communication paths for IT personal was created and implemented.

WEROC is proud of the advocacy we routinely engage in on behalf of the water and wastewater sector and specifically for our member agencies. This year on September 26, 2020, the Operational Area Agreement went into effect and with that WEROC is representing the agencies on the Operational Area Executive Board.

Developed and implemented the WEROC Standard Operating Procedures to protect our member agency staff and infrastructure for the Public Safety Power Shut Off program and for Smoke Advisories in correlation to OSHA regulations.

The staff continued to actively partake in discussions regarding the repercussions of the Public Safety Power Shutoff (PSPS) program. WEROC staff continues to work with the County, Southern California Edison and San Diego Gas and Electric specifically, to update and coordinate notification and receipt of vital power grid outage information in support of our member agencies. WEROC will continue its coordination efforts with both SCE and SDG&E utilities to improve the overall communications for power outages and priority restoration as required.

WEROC continues to maintain the member agency phone directory and AlertOC contacts list by ensuring the proper contact information was entered into the system for all 37 agencies. This effort will allow WEROC to distribute timely information to our member agencies during emergencies.

In addition to COVID-19, WEROC staff activated to support member agencies with communication, coordination, and resource needs for the following events in 2020:

- Demonstrations and Protests in Orange County. Beginning in June, numerous demonstrations were scheduled in different member agency service areas. Open source information was shared with the member agencies on these events in order to brief field operations and employees where these locations are for safety reasons.
- August Heat Event and CaISO Stage 3 Power Emergency (Rolling Blackouts). WEROC coordinated with agencies and provided support as needed.

- Public Safety Power Shut Off Events. For both the events on October 23rd and December 2nd WEROC PSPS Standard Operating Procedure was implemented. WEROC sent information out to agencies on the weather and Southern California Edison and San Diego Gas and Electric potential circuits identified for shut off based on the Red Flag Warning and predicted Santa Ana Event. Mutual Aid was supported during these events.
- Silverado, Blue Ridge and Bond Fires. Below outlines WEROC involvement and actions:
  - WEROC coordinated with impacted agencies throughout the events and provided updates to all member agencies.
  - WEROC did logistical coordination between agencies for mutual aid needs for generators.
  - WEROC maintained coordination as a liaison with the OA EOC and as a agency representative at the Incident Command Posts.
  - WEROC engaged and coordinated with Southern California Edison in support of any agency with needs.
  - WEROC participated in the Operational Area After Action Meeting.
  - WEROC participated in Debris Flow Planning

Project goals for the remainder of Fiscal Year 20-21:

- Completion of the WEROC Emergency Operations/Response Plan including the updates of internal forms and documents.
- Implementation of a WEROC Strategic Assessment Plan by following the timelines for items without additional funding requirements in order to bring the program up to date. Items requiring additional funding will be discussed in detail with the funding agencies moving forward.
- Full implementation of the new long term Exercise and Training Program Plan including conducting 14 ICS and EOC trainings, a Regional Tabletop Exercise virtually on Water Loss/Quality.
- Continue discussion with the WEROC Funding agencies regarding the South Emergency Operations Center.
- Continue advocacy for water and wastewater at all levels.
- Staff will continue to work with on implementing non-structural seismic and safety improvements at the South EOC to continue to provide two EOCs.
- Completion of the AWIA Tier III agencies RRAs are due in June 2021. Timelines and meetings are being developed and will be launched with the five agencies in the beginning of the year.
- WEROC will develop a current project and program work plan listing all the program/planning areas.

- Continue to advocate and participate in meetings with South Coast AQMD regarding the potential regulatory solution that would provide water agencies with more flexibility to operate their emergency generators during PSPS events and for routine maintenance and testing.

Some of WEROC's goals for fiscal year 2021-2022:

- Maintain WEROC and OC water and wastewater agencies in a state of readiness to respond to emergency situations. Key aspects include staffing, training, exercises, updating plans and procedures.
- Development and implementation of the Regional Cyber Security Coordination Annex as part the WEROC Emergency Operations Plan.
- Continue implementation of the WEROC Assessment Plan
- Completion of the AWIA compliance project and conduct a closeout audit and meeting with participating agencies.
- Continue to build upon the lessons learned from various training, exercises and real events.
- Full implementation of the plan revision schedule.
- Develop, obtain, and implement a new WEROC platform to meet specific needs of the member agencies to securely store, maintain, and disseminate files and information.
- Develop a Logistics Plan that will incorporate how personnel, supplies, and equipment are requested, procured, tracked, and supported within the WEROC Organization.
- Creation of a GIS dashboard allowing for visibility of information in a none-linear form using open source information and current in house mapping information.
- Work with ETWD regarding opportunities for upgrading the South EOC facilities.
- Revision of the Business Continuity Plan to ensure commonality with the WEROC Emergency Operations/Response Plan

MWDOC contribution accounts for 50% of the WEROC operational budget. In addition, MWDOC will continue to provide:

- Daily administration, including the WEROC staff's work area, day-to-day management, technical support, and accounting services.
- Each fiscal year, MWDOC staff spend an estimated 800+ hours participating in WEROC training, exercises, and programs. This type of commitment is expected of MWDOC staff annually and is included as part of MWDOC's core budget.
- MWDOC's Engineering Department staff will continue to support technical projects and planning as it relates to WEROC and emergency planning.
- MWDOC Member Agencies contribute to the program by providing technical support throughout the year for items such as generator maintenance, technical expertise for a request for proposals development, exercise staffing assistance, and more.

Respectfully, each of the WEROC funding agencies is being asked to renew their continued support for the WEROC program again for the 2020-2021 fiscal year. Included in the budget is the reclassification of the Senior Administrative Assistant to the WEROC Coordinator position as this

will fulfill a gap identified in the WEROC Assessment Report allowing for the continued support of all WEROC programs and emergency management functions associated with the programs and projects.

If you would like WEROC to provide a specialized service, please let me know so that I can assist your agency with its needs. If you have any questions about the WEROC budget, programming, or would like to have further discussions, please contact me at (714) 593-5010 or by email at vosborn@mwdoc.com.

WEROC FY 21-22 Draft Budget

Budget Review

Code	Expense Name	FY 20/21 Budgeted	Actuals (4 months)	Projected 20/21 Annual	Proposed FY 21/22	Comments
6000	Salaries & Wages	$318,348	$91,039.94	$330,561	$338,431	Director (Osborn), Specialist (Harrison), WEROC Coord (Schunk)
6100	Benefits	$105,792	$37,516	$118,287	$126,087	
	Salary & Benefits Sub-Total	$424,140	$128,556	$448,848	$464,518	
6205	Training	$8,226	$0	$8,110	$8,200	Skills Training CSTI,NDTC, ICS Virtual Costs; Janine Grants course and certifications (In House Training Cetification with State and FEMA on Classes and Material Costs)
7020	Legal	$0	$0	$0	$0	
7040	Professional Svc.	$0	$0	$0	$0	
7110	Conferences*	$3,800	$0	$1,600	$3,800	Registration CESA, IAEM, AWWA
7150	Travel & Accommodations*	$4,750	$0	$0	$4,750	Includes Training & Conference Travel (FY 21/22 CESA (May 2022 Central Valley/TBD), IAEM (OCT 2021 MI), (NEMA - EMI Cohort Daniel Fall Ventura)
7210	Memberships	$1,105	$0	$810	$850	CESA, IAEM
7330	Supplies (Office)	$1,800	$396	$1,500	$1,500	
7360	Reproduction	$1,000	$0	$450	$1,000	WEROC Atlas 2021/ EOC Materials
7410	Computer & Peripherals Maint	$5,060	$0	$5,060	$5,060	Computer & printer
7430	Software Purchase	$0	$200	$700	$800	GIS/ESRI Licenses,web-cc solution
7440	Software Support	$9,491	$8,363	$8,363	$8,500	Safety Center- assumes 5% increase (Safety Center did a 20% increase from last year ** need new solution),
7510	EOC Site Cleaning	$900	$0	$600	$700	
7580	Maintenance Expense (misc/ Gen	$1,000	$0	$980	$1,000	maitenance & fuel
7581	Maintenance, Communications-ra	$2,000	$395	$1,580	$2,000	OC Comm maintenance, license and agreements
7582	Maintenance/Equip, EOCs	$2,000	$100	$1,850	$2,000	All Safety Concepts; Sat Phone & Security purchases; UPS
7610	Auto Mileage	$3,000	$252	$600	$2,000	
7615	Toll Road Charges	$200	$0	$40	$50	
7620	Insurance (exercises)	$0	$0	$0	$0	
7640	Utilities - Telephone	$10,000	$2,905	$9,614	$10,000	Cell & Landline Phones, Internet, Satellite, & Cable; CalNET Landline Plan
7670	Miscellaneous (EOC Expenses)	$1,000	$348	$825	$1,000	
7671	Miscellaneous (Training)	$3,000	$0	$0	$3,000	
	Programs Sub-Total	$58,332	$12,959	$42,682	$56,210	
Operations Expenditures		**$ 482,472**	**$ 141,515**	**$ 491,530**	**$ 520,728**	
Contribution to Operating Reserves		**$ -**	**$ -**	**$ -**		** Situational Dashboard and Safety Center replacement development will be pulled from Operating Reserves
Total Operations Budget		**$ 482,472**	**$ 141,515**	**$ 491,530**	**$ 520,728**	
Capital Expenditures						
TOTAL Expenditures		**$ 482,472**	**$ 141,515**	**$ 491,530**	**$ 520,728**	

Operational Revenue Share		FY19/20 Budgeted	Actuals (4 months)	Est 19/20 Annual	Proposed FY20/21	Op. Budget Share (%)
	Anaheim	$ 18,333.94	$ 18,334	$ 18,334	$ 19,787.66	3.8%
	Fullerton	$ 18,333.94	$ 18,334	$ 18,334	$ 19,787.66	3.8%
	Santa Ana	$ 18,333.94	$ 18,334	$ 18,334	$ 19,787.66	3.8%
	SOCWA	$ 18,333.94	$ 18,334	$ 18,334	$ 19,787.66	3.8%
	OCSD	$ 47,282.26	$ 47,282	$ 47,282	$ 51,031.34	9.8%
	OCWD	$ 120,618	$ 120,618	$ 120,618	$ 130,182.00	25.0%
	MWDOC	$ 241,236	$ 47,845	$ 241,236	$ 260,364.00	50.0%
	Grants Rcvd & Outside Rev*	$ -	$ -	$ -	$ -	
Operational Revenue		**$ 482,472**	**$ 289,081**	**$ 482,472**	**$ 520,728**	
Capital Projects Carryover			**$ -**	**$ -**		
MWDOC Capital Contribution			**$ -**			
TOTAL WEROC Revenue		**$ 482,472**	**$ 578,162**	**$ 482,472**	**$ 520,728**	

*Potential grant reimbursements for conferences and trainings

Item No. 5

INFORMATION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Harvey De La Torre

SUBJECT: **UPDATE RE: Orange County Water District/Moulton Niguel Water District Pilot Storage Program**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and file this report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

DETAILED REPORT

In 2017, the Orange County Water District (OCWD) Board broadened its policy for *Developing New Local Water Resources* to work towards the goal of ensuring adequate water supplies are always available to the OCWD service area, and exploring opportunities of enhancing collaborative County-wide water reliability efforts. This policy modification allowed for the consideration of groundwater banking and exchange programs with non-OCWD water agencies.

In 2019, subsequent to this policy modification, OCWD entered into an agreement with Moulton Niguel Water District (MNWD) to develop a pilot program to explore the opportunity to store water in the O.C. groundwater basin. The purpose of such a storage account would provide MNWD access to water during emergencies and/or provide additional water during dry periods. As part of the agreement, OCWD hired consultants Tetra Tech and Westwater Research to prepare the following two studies to assist in the development of this pilot program:

Budgeted (Y/N): N	Budgeted amount: N/A	Core _X_	Choice __
Action item amount: None	Line item:		
Fiscal Impact (explain if unbudgeted):			

1) Evaluation of Groundwater Conveyance Options (Tetra Tech)
2) Review of Existing Water Storage Programs (Westwater Research)

The Groundwater Conveyance Options Study (Attachment A) evaluated where and how to extract groundwater from the O.C. groundwater basin with several options to pump the water to MNWD via the East Orange County Feeder No. 2. The Review of Existing Water Storage Programs Study (Attachment B) provides a review of existing banking/exchange programs in California to determine what compensation methodologies could OCWD assess for a storage/banking program.

John Kennedy, Executive Director Engineering/Local Resources for OCWD, will provide a brief presentation on the OCWD/MNWD Water Storage Pilot Program and associated studies.

Attachments:

(A) Evaluation of Groundwater Conveyance Options Final Draft Preliminary Report

(B) Review of Existing Water Storage Programs: Technical Report

Orange County Water District
Moulton Niguel Water District

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

FINAL DRAFT PRELIMINARY REPORT

(CONNECTIONS TO THE EAST ORANGE COUNTY FEEDER #2)

PREPARED FOR

Orange County Water District
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Fountain Valley, CA 92708

PREPARED BY

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TETRA TECH

September 2020

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

1. INTRODUCTION

1.1 History/Purpose of Evaluation

Retail water agencies in southern Orange County rely primarily on imported water supply from Metropolitan Water District (MWD) and surface storage to meet daily operational demands and fire storage. With heavy reliance on the imported water sources, the South Orange County (SOC) water agencies have a much higher vulnerability during outages of MWD imported water facilities as opposed to water agencies in northern Orange County which have the capability of drawing groundwater from the Orange County Water District's (OCWD) Groundwater Basin. In 2006, OCWD entered into an agreement (Emergency Services Program) with South County Agencies to allow up to 50 cfs of groundwater to move from the basin to South Orange County for up to 30 days in the event of an outage of MWD's imported water infrastructure.

OCWD and Moulton Niguel Water District (MNWD) have requested a study be performed that will provide a review, summary and analysis of conveyance options from the Orange County Groundwater Basin to regional water transmission mains serving South Orange County water agencies. In general, the goal of the study is to evaluate the potential infrastructure and property acquisition required to convey water (in the range of 30 cfs to 50 cfs) from the Orange County Groundwater Basin to Moulton Niguel Water District's distribution system via the regional imported water pipelines. This information will be used by OCWD and MNWD to assist in the potential development of a pilot program to convey groundwater to MNWD during emergencies.

1.2 Study Description

MNWD currently shares an emergency interconnection through Irvine Ranch Water District which can move up to 30 cfs of water to serve South Orange County. MNWD owns 55 percent of the capacity of the interconnection. Due to growth in Irvine Ranch Water District, expiration of the capacity rights in the interconnection facilities, and uncertainty in the ability to convey water into the future, MNWD is interested in alternative conveyance options to move water from the groundwater basin to MNWD during an emergency. MNWD currently receives imported water from the East Orange County Feeder #2, Allen-McCulloch Pipeline and/ or the South County Pipeline.

The study will evaluate potential costs of land acquisition, building new transmission mains and/or pumping plants, utilization of existing available groundwater well capacity or construction of new wells, and connection of transmission mains to the East Orange County Feeder #2. The following is a brief summary of the items that will be addressed in the study:

- Meet with cities of Santa Ana, Orange and Tustin to discuss the agencies existing conveyance facilities, well production facilities, and desired capacity and conveyance goals. The intent of this scope item is to determine the available capacity, if any, the agencies may have to participate in providing emergency water.
- Using data obtained from OCWD and the water agencies, identify alternative locations for developing the desired pumping capacity utilizing either available well capacity or developing new well capacity. Focus will be on areas adjacent to the East Orange County Feeder No. 2 within the cities of Santa Ana, Orange and Tustin.
- Evaluate the existing and new infrastructure necessary to convey the stored water from the identified pumping or well locations to East Orange County Feeder #2. Prepare typical connection facilities including meters, pressure and flow control and valving.

- If property acquisition is recommended, identify the needed property, and include a ball park cost of the property.
- For the recommended alternatives, prepare conceptual site layouts of the facilities, including meter and valving, conceptual alignment of any conveyance infrastructure, and estimate the probable construction costs for the facility, the conveyance piping and any land acquisition needed.
- A technical paper summarizing the evaluation and findings will be prepared. Within the appendix will be the preliminary locations identified, all of the backup calculations and supporting documentation.
- Presentations will be made to each of the OCWD and MNWD respective boards.
- Review similar work the Municipal Water District of Orange County is performing regarding pumping groundwater into the East Orange County Feeder No. 2.
- Coordinate the work with the possible transmission of Poseidon Resources Ocean Desalination water to South Orange County via the East Orange County Feeder No. 2.

Future work will need to be completed to evaluate the hydraulic constraints of regional infrastructure as well as possible water quality impacts. The above study does not contemplate those work products.

1.3 Metropolitan Water District's Policy Regarding Deliveries in an Emergency

Administrative Code amendments have been approved by Metropolitan Water District to enable deliveries of member agency water supplies in Metropolitan's system in an emergency. These deliveries are intended to provide Metropolitan's member agencies the ability to deliver member agency water through Metropolitan's system under specific emergency conditions. Emergency deliveries can only be made if Metropolitan is unable to make deliveries to a member agency due to physical damage to Metropolitan's system resulting from a natural disaster or other emergency, and there are no alternate means for Metropolitan or the member agency to provide service to an area without the use of a portion of Metropolitan's system.

1.4 Joint Ownership of East Orange County Feeder No. 2

East Orange County Feeder No. 2 ownership is: MWDOC 58.5%; MWD 31.7%; Anaheim 3.3%; and Santa Ana 6.5%. MWDOC's share is split among thirteen (13) agencies. Any use of the East Orange County Feeder No. 2 to convey emergency water would need to be approved by downstream agencies.

2. POTENTIAL AVAILABLE GROUNDWATER SUPPLY

2.1 Water Supply Summary

Tetra Tech met with the cities of Santa Ana, Orange and Tustin to discuss the agencies existing conveyance and well production facilities, and their desired capacity and conveyance goals. The intent of the meetings was to identify how much groundwater pumping capacity may be available from all of the cities facilities and what modifications could be implemented to increase groundwater pumping so that that excess groundwater could be conveyed in an emergency. **For this report, during an emergency when the excess groundwater will be conveyed to South Orange County, no import water was assumed to be available from MWD via the East Orange County Feeder No. 2.**

Tetra Tech obtained import and well production data as well as copies of the latest Urban Water Management Plan and Water Master Plan for each agency. Three-year historical data (July 2016 through June 2019) of the monthly quantities of ground water pumped and import water were tabulated. Included within Appendix A are Tables A-1 through A-3 which summarize the average historical groundwater and import water supply and demand for each agency per month. It should be noted that the yearly demand within each of the agencies systems will fluctuate based on seasonal demand requirements.

In addition, Tetra Tech worked with each of the agencies to summarize the current well operations, the available production wells, the rated maximum capacity of each well, and any proposed well improvements planned in the next few years. A concern noted by all three cities is the Perfluoralkyl Substances (PFAS) contamination of the groundwater basin and how this will dramatically influence future groundwater pumping operations.

In discussions with the operators for each agency, it is assumed the pumps will typically be utilized less in the winter months (November through April) to allow for maintenance activities on the wells. Within the Appendix and the appropriate Table "A" for each of the agencies, Tetra Tech has tabulated the following existing well information: well name; estimated average well capacity; theoretical maximum daily production; typical winter daily production; and typical summer daily production. Included within the table, will be any wells that have been identified or expected to have potential issues that will impact production/operation in the future.

For this study, Tetra Tech has assumed that OCWD will be responsible for all capital costs and 50% of operation and maintenance cost up to $75/AF for PFAS treatment required at any of the existing or future wells and that this work will be completed in the next two to four years.

2.2 City of Santa Ana

The City of Santa Ana Water System has a total of 21 groundwater wells and seven (7) import water connections. Fourteen (14) of the City wells pump into surface reservoirs with booster pump stations pumping the water into the City's distribution system. The remaining seven (7) wells pump directly into the City's distribution system. The City is concerned that potentially nine (9) wells may be impacted in the near term by PFAS and will need PFAS treatment facilities. Five (5) of the import water connections are connected to MET's Orange County Feeder (SA-1, SA-2, SA-3, SA-4 and SA-5). Two (2) of the import water connections are connected to the East Orange County Feeder No. 2 (SA-6 and SA-7).

Table A-1 (within Appendix A), summarizes the eighteen (18) wells that had operated during the three-year historical period. During the three-year historical period, the City has pumped on an average 71% of its water demand from the groundwater basin. Well 29 and Well 32 are currently under design for major rehabilitation. As stated in the City's Water Master Plan and approved CIP, the City is planning to drill and equip a new well at Washington Street and a new well to replace the abandoned Well 22 at the Cambridge Facility.

For the purpose of this study, we have assumed that the operable wells will have a typical production rate of 60% during the winter months (November through April) and 80% during the summer months (May through October).

The following Table 2.1 summarizes the City of Santa Ana demands and potential available excess groundwater.

Table 2.1 City of Santa Summary of Demands and Potential Available Excess Groundwater

	Winter Months (Average)	***Summer Months (Average)***	***Total Annual***
Demands (3-year Historical Average)			
City System Demands	822 MG	1,016 MG	11,020 MG
Import Water	165 MG	371 MG	3,210 MG
Groundwater Production	657 MG	645 MG	7,810 MG
Basin Production Percentage	80%	63%	71%
Typical Wells Operating (Potential Wells Available for Excess Groundwater)			
Historical Operation	9 wells operating (9 wells available)	7 wells operating (11 wells available)	8 wells operating (10 wells available)
Assuming No Import Water	11 wells operating (7 wells available)	11 wells operating (7 wells available)	11 wells operating (7 wells available)

Note: Above table does not include the future wells (Washington and Well 22 Replacement)

To support the above findings, the 2017 Water Master Plan for the City identified that the City's water system has adequate capacity and distribution capabilities to supply the entire City's water system demands for existing, near-term and buildout maximum day demand scenarios using only groundwater wells (with the assumption that the largest well in both the Low and High Zone are out of service).

In summary the City of Santa has potential well capacity that could be available to convey groundwater per the Emergency Services Program. The quantity of water will depend on the City's distribution system and corresponding facilities at the specific location of the proposed source connection. The potential available groundwater water will be summarized in Section 4.

2.3 City of Orange

The City of Orange Water System has a total of twelve (12) groundwater wells and eight (8) import water connections. Ten (10) of the City wells pump into the City's 370 Zone and the remaining two (2) pump into the 490 Zone. Five (5) of the wells are currently not in service due to PFAS. The City is also concerned that four (4) additional wells will be impacted in the near term by PFAS and will need PFAS treatment facilities as well.

The following is a summary of the import water connections: OC-3 connected to MET's Orange County Feeder; OC-40 and OC-42 connected to East Orange County Feeder No. 2; OC-67 and OC-69 connected to Allen-McColloch Pipeline; one EOCWD Connection, source is the Allen-McColloch Pipeline; and two connections with Serrano Water District (SWD-1 and SWD-2).

Table A-2 (within Appendix A), summarizes the eleven (11) wells that had operated during the three-year historical period. During the three-year historical period, the City has pumped on an average 77% of its water demand from the groundwater basin. City is currently under design for two new wells, Well No. 28 and Well No. 29, which will replace Well No. 8.

For the purpose of this study, we have assumed that the operable wells will have a typical production rate of 70% during the winter months (November through April) and 90% during the summer months (May through October).

The following Table 2.2 summarizes the City of Orange demands and potential available excess groundwater.

Table 2.2 City of Orange Summary of Demands and Potential Available Excess Groundwater

	Winter Months (Average)	***Summer Months (Average)***	***Total Annual***
Demands (3-year Historical Average)			
City System Demands	678 MG	905 MG	9,496 MG
Import Water	130 MG	232 MG	2,175 MG
Groundwater Production	548 MG	673 MG	7,321 MG
Basin Production Percentage	81%	74%	77%
Typical Wells Operating (Potential Wells Available for Excess Groundwater)			
Historical Operation	8 wells operating (3 wells available)	7 wells operating (4 wells available)	8 wells operating (3 wells available)
Assuming No Import Water	10 wells operating (1 well available)	10 wells operating (1 well available)	10 wells operating (1 well available)

Note: Above table does not include the future wells (Well No. 28 and Well No. 29)

In summary, the City of Orange may have one well or at most two wells capacity (if all of their wells are operable and in service and import water is available at their OC-67 and OC-69 MWD connections) that could be available to convey groundwater per the Emergency Services Program. The quantity of water will depend on the City's distribution system and corresponding facilities at the specific location of the proposed source connection. The potential available groundwater water will be summarized in Section 4.

2.4 City of Tustin

The City of Tustin owns 11 groundwater wells but only have a total of eight (8) groundwater wells that are currently active and three (3) import water connections from East Orange County Water District (EOCWD). Two (2) of the City's wells currently are not active since their treatment system (RO) is not operable. The City is concerned that five (5) additional wells may be impacted in the near term by PFAS and will either need PFAS treatment facilities or blending facilities before they could be brought back online. If these five (5) wells are shut down, the City will lose approximately 50 percent of its total groundwater well capacity.

The City of Tustin purchases it's imported water from the EOCWD. OC-43 and OC-48 are connected to the East Orange County Feeder No. 2. OC-60 is connected to the Allen-McColloch Pipeline.

Table A-3 (within Appendix A), summarizes the eight (8) wells that had operated during the three-year historical period. During the three-year historical period, the City has pumped on an average 77% of its water demand from the groundwater basin.

The City is currently planning (in two to three years) a new well to replace the existing Beneta Well.

For the purpose of this study, we have assumed that the operable wells will have a typical production rate of 70% during the winter months (November through April) and 90% during the summer months (May through October).

The following Table 2.3 summarizes the City of Tustin demands and potential available excess groundwater.

Table 2.3 City of Tustin Summary of Demands and Potential Available Excess Groundwater

	Winter Months (Average)	***Summer Months (Average)***	***Total Annual***
Demands (3-year Historical Average)			
City System Demands	228 MG	320 MG	3,286 MG
Import Water	44 MG	81 MG	753 MG
Groundwater Production	184 MG	239 MG	2,533 MG
Basin Production Percentage	81%	75%	77%
Typical Wells Operating (Potential Wells Available for Excess Groundwater)			
Historical Operation	6 wells operating (2 wells available)	6 wells operating (2 wells available)	6 wells operating (2 wells available)
Assuming No Import Water	7 wells operating (1 well available)	8 wells operating (0 wells available)	7 wells operating (1 well available)

Note: Above table does not include the future well replacement for the Beneta Well

In summary, the City of Tustin does not have excess groundwater that could be available to be conveyed per the Emergency Services Program unless all of their wells are operable and in service and import water is available from East Orange County Water District import connection OC-60. It is possible once a new well is constructed and the RO treatment system for the two wells is placed back into operation that the City may be able to provide up to 3 to 5 cfs excess groundwater during the winter months as is summarized in Section 4.

3. FACILITY SYSTEM CONSTRAINTS

3.1 Hydraulic Grade Requirements

Based on the Preliminary Design Report for the Interconnection of the IRWD Water System to the South Orange County Water Transmission System prepared for Municipal Water District of Orange County, dated July 2006, a minimum hydraulic grade line (HGL) of 455 feet is required to meet the South Orange County water agencies system requirements. However, the Joint Regional Transmission Main (JTM) also has a high point at a surge tower within the Laguna Woods community. Based on an assumption of up to 50 cfs of water conveyed to the South Orange County water agencies, the HGL required at the connection to the JTM is 490 to 500 feet. This HGL will meet the requirements of delivering water to MNWD.

3.2 Cities of Santa Ana, Orange and Tustin Pressure Zones

The following is a summary of the existing pressure zones for each of the cities under consideration.

City of Santa Ana

The City of Santa has two pressure zones (High Zone and Low Zone). The High Zone, approximate HGL of about 340 to 350, is located north of the Santa Ana Freeway (the area within the City bordered by the Costa Mesa Freeway, the Garden Grove Freeway and the Santa Ana Freeway). The High Zone has four (4) wells that are currently in operation. The proposed Well 22 replacement is located within the City's High Zone. The Low Zone, approximate HGL of about 270, includes the remaining service area of the City. The Low Zone has fourteen (14) wells that are currently in operation. The proposed new Washington Well is located within the City's Low Zone.

City of Orange

The City of Orange has five (5) primary pressure zones: Zone 370; Zone 490; Zone 736; Zone 900; and Zone 1100. Nine (9) of the City wells pump into the City's 370 Zone and the remaining two (2) pump into the 490 Zone. The proposed new Wells, Well No. 28 and Well No. 29 will also pump into the City's 370 Zone.

The East Orange County Feeder No. 2 is mostly located within the City's 370 Zone. In general, the City's 490 Zone is located east of the Costa Mesa (SR-55) Freeway.

City of Tustin

The City of Tustin has three (3) pressure zones: Zone 1 (HGL of about 308); Zone 2 (HGL of about 380); and Zone 3 (HGL of about 480). The majority of the City is included within the Zone 1. The East Orange County Feeder No. 2 is located within the City's Zone 1.

3.3 Pump Station to East Orange County Feeder #2

In order to convey the excess groundwater from the cities, a pump station will be required to lift the water from the city's pressure zone to the required HGL stated above (HGL of 500 plus all head losses). To maximize the flow potential and to minimize impacts to the city's distribution systems, it is recommended that a new East Orange County Feeder #2 (EOCF#2) Pump Station be constructed. Ideally, it would be beneficial to get the proposed pump station suction from a reservoir instead of from the distribution system. This will require additional lift but will minimize pressure surges and potential pressure impacts to the adjacent distribution system. However, if a reservoir is not available, the proposed pump station can get its suction from the distribution system as long as the pump station design flow is not too high to impact the pressures in the service area adjacent to the proposed pump station. It is not recommended to modify the wells to pump to the higher pressure as this will limit the available excess flow to only what the individual well can produce (which will be lower than normal due to the higher lift).

For this study, we have assumed the layout of the proposed EOCF#2 Pump Station will be similar to the South County Zone 1-3 Booster Pump Station designed and constructed for the IRWD Interconnection to SOC Water Transmission Mains. The proposed pump station will include: three or four vertical turbine pumps and motors (including one standby); PRV bypass piping; surge tank on the discharge side; variable frequency drives; building to house the pumps; separate building to house the electrical equipment; and additional surge tank on the suction side if the suction is being provided by the distribution system instead of a reservoir. The following are the approximate footprint dimensions of the proposed pump station: pump room for four pumps, 48 feet by 24 feet; pump room for three pumps, 40 feet by 24 feet; electrical building, 24 feet by 16 feet; and additional site yard to house the surge tank and bypass piping. The approximate total minimum pump station footprint is about 10,000 to 12,000 square feet, with a minimum width of about 50 to 60 feet. See Appendix B for conceptual layout for the proposed pump station and corresponding facilities.

The proposed EOCF#2 Pump Station will, most of the time, not be used to convey excess groundwater to South Orange County. Therefore, the proposed pump station will need to be operated periodically to maintain its condition and operation availability. We have assumed a pressure reducing facility will be required to discharge the pump flow back to the city's distribution systems each time it is operated for maintenance purposes. Ideally, the pressure reducing facility should be located in the vicinity of the connection to the East Orange County Feeder No. 2 or at the end of the high pressure discharge piping.

3.4 East Orange County Feeder No. 2 Connections

For the initial evaluation of potential location of the proposed facilities, we have assumed that the connection to the East Orange County Feeder No. 2 will be at an existing connection (i.e. do not propose to construct a new outlet to the existing East Orange County Feeder No. 2).

For the limits of the initial evaluation, the East Orange County Feeder No. 2 is located within Tustin Avenue in the cities of Orange and Santa Ana and within Walnut Avenue and Red Hill Avenue in the cities of Santa Ana and Tustin.

The following are the potential locations for the connections to the East Orange County Feeder No. 2: OC-40 and OC-42 in the City of Orange; SA-6 and SA-7 in the City of Santa Ana; and OC-43 and OC-48 (East Orange County Water District turnouts) in the City of Tustin. See Exhibit 1 for an Overview of the study area which shows the East Orange County Feeder No. 2 alignment and the location of each of the existing import water connections.

The following is a brief summary of the locations of these import water connections:

- OC-40 (City of Orange): Heim Avenue and Tustin Ave.
- OC-42 (City of Orange): La Veta and Tustin Ave.
- SA-6 (City of Santa Ana): Santa Clara Ave. and Tustin Ave. (design capacity is 20 cfs with normal operating capacity of 12 cfs)
- SA-7 (City of Santa Ana): Warner Ave. and Red Hill Ave. (design capacity is 50 cfs with normal operating capacity of 7.5 cfs)
- OC-48 (East Orange County Water District – City of Tustin): Fairhaven Ave and Tustin Ave.
- OC-43 (East Orange County Water District – City of Tustin): Walnut Ave. and Newport Ave.

The location of the proposed EOCF#2 Pump Station should be in vicinity of the appropriate agency import water connection.

3.5 Potential Inter-agency Connections

An option for conveying excess groundwater could be achieved by constructing a potential inter-agency connection which could be used to convey excess groundwater from one agency to another to minimize the number of new EOCF#2 Pump Stations. The reason to evaluate this option is that the City of Santa Ana does have excess available well capacity and that maybe this available capacity could be conveyed through the City of Orange or Tustin distribution systems to minimize the number of EOCF#2 Pump Stations. The intent of the inter-agency connections is that they would be able to be used for emergency purposes or on as-needed situations and not just for conveying the excess groundwater to South Orange County. The following is a summary of the corresponding pressure zones that are adjacent to each of the cities:

- City of Santa Ana High Zone (HGL of 340 to 350) and City of Orange 390 Zone
- City of Santa Ana Low Zone (HGL of 270) and City of Tustin Zone 1 (HGL of 308)

During times of normal operation, the City of Orange and City of Tustin can provide water to the City of Santa Ana but the City of Santa Ana can not provide water the other direction without a substantial drop in pressure within the other cities' distribution system. For the conveyance of excess groundwater, the City of Santa Ana has the most potential excess groundwater available. However, the operating pressure of Santa Ana's distribution system is lower than the adjacent cities distribution system so that the excess groundwater will not be able to be conveyed within the City of Orange/Tustin's distribution system without increasing the discharge pressure from the City of Santa Ana's distribution system. Therefore, it does not make sense to evaluate any potential inter-agency connections for the purpose of conveying excess groundwater to South Orange County.

4. PROPOSED FACILITY PLANS

4.1 General Selection Criteria

The proposed facilities to convey excess groundwater to South Orange County will need to consist of the following: source of the excess groundwater (i.e. reservoir or connection to a distribution system with enough capacity); EOCF#2 Pump Station; new high pressure discharge piping from the proposed pump station to the connection to the East Orange County Feeder No. 2; pressure reducing facility to allow high pressure water to be relieved back into the City's distribution system; and connection to the East Orange County Feeder No. 2 existing piping facilities (between the meter vault and the MWD connection vault).

The general criteria implemented was to identify any potential locations for the proposed EOCF#2 Pump Station in the vicinity of an existing East Orange County Feeder No. 2 connection. Potential locations included open space/empty lots and properties owned by the corresponding water agency.

It should be noted that in the immediate vicinity of the existing East Orange County Feeder No. 2 import water connections, the area is fully developed (mostly commercial) and there are almost no vacant lots/sites that are existing. Therefore, the initial focus was identifying properties owned by the corresponding city as then no land acquisition would be required.

The following is a summary of the preliminary locations that were identified as potential sites that did not require land acquisition.

4.2 City of Santa Ana

Two potential locations were identified in the City of Santa Ana: East Station Facility and the Cambridge Facility. The following is a summary of each of these facilities.

East Station Facility:

The East Station Facility is located within the City's Low Zone and consists of a 6 MG storage reservoir fed by one groundwater well (Well 26) and a booster pump station that supplies water to the distribution system from the storage reservoir. If Well 26 is out of service, the reservoir is filled from the distribution system. The booster pump station includes two pumps with a firm capacity of approximately 2,300 gpm. Both pumps are operated with VFDs that are controlled by pressure of the discharge header pipe. See Figure 1A for the existing East Station Facility layout as well as the proposed improvements.

Proposed improvements for potential of 7 cfs excess groundwater: EOCF#2 Pump Station (three pumps) with surge tank on discharge side; suction from East Reservoir; and new high pressure discharge to City of Santa Ana's SA-7 Pressure Regulating Station at Ritchey Street and Costa Mesa Freeway (SR-55). Intent is to convey Well 26 groundwater water to South Orange County. The existing East Pump Station can also take water from the East Reservoir as needed to maintain distribution pressure.

Due to the size of the East Reservoir (6 MG), additional excess groundwater could be conveyed to the South Orange County if it was able to be consistently supplied to the reservoir. The City's distribution system could handle some additional flow (flow to meet the City's demands and provide excess to the reservoir) but not a guaranteed amount and not an additional 7 cfs. If a new well is constructed at the East Station Facility, the groundwater pumped by both of the wells could be conveyed to South Orange County. Thus, a total of about 14 cfs excess groundwater could be made available with the new well and a fourth pump in the proposed EOCF#2 Pump Station.

To allow the City the availability of moving the additional well water from the new well from the reservoir during normal operation activities, an additional pump or pump upgrades to increase the pump capacity would be needed by the City.

In summary, the above proposed improvements can provide up to 14 cfs excess groundwater to South Orange County. The City of Santa Ana will benefit from having a new well that can be used at its discretion all year long except during the time of conveying excess groundwater to South Orange County as well as pump upgrades and additional pumping capacity at its existing pump station.

Cambridge Facility:

The Cambridge Station Facility is located within the City's High Zone and consists of a 1.3 MG storage reservoir fed from the distribution system and a booster pump station that supplies water to the distribution system from the storage reservoir. Well 38 is also onsite and supplies groundwater directly to the distribution system. Also, on-site is the abandoned Well 22. The booster pump station includes three pumps with a firm capacity of approximately 5,400 gpm. All booster pumps are constant speed that turn on and off based on the pressure of the discharge header pipe. See Figure 3A for the existing Cambridge Station Facility layout as well as the proposed improvements.

It should be noted that per the OCWD PFAS Treatment Systems Planning Study Producer Report for City of Santa Ana, the City may be adding up to eight IX vessels and prefiltration facilities at the Cambridge Station Facility. The City may want to receive the open space adjacent to the Cambridge Reservoir for these proposed improvements and move the proposed improvements noted below to the open space to the west of the site. There appears to be sufficient space for both proposed improvements to be constructed.

Proposed improvements for 10 cfs excess groundwater: new Well 22 replacement (feeds groundwater to reservoir); EOCF#2 Pump Station (four pumps) with surge tank on discharge side; suction from Cambridge Reservoir; and new high pressure discharge to City of Santa Ana's SA-6 connection to the East Orange County Feeder No. 2 at Santa Clara Ave. and Tustin Ave. The intent is to convey the new Well 22 and portion of Well 38 groundwater to South Orange County. The existing Cambridge Pump Station can also take water from the Cambridge Reservoir as needed to maintain distribution pressure.

Due to the smaller size of the Cambridge Reservoir (1.3 MG), some of the Well 38 groundwater will need to be used by the City's distribution system to maintain pressure and meet demands.

In summary, the above proposed improvements can provide up to 10 cfs excess groundwater to South Orange County. The City of Santa Ana will benefit from having a new well (replacement Well 22) that can be utilized at the City's discretion at all times except during the time it is used to provide excess groundwater to South Orange County.

4.3 City of Orange

Two potential locations were identified in the City of Orange: City Yard and the Batavia Plant. The following is a summary of each of these locations.

City Yard Facility:

The City Yard Facility is located at Jamison Street and Almond Ave and is within the City's 390 Zone. The site includes the City Public Works yard, including buildings, material storage bins, workshops, and Well No. 25. It should be noted that Well No. 25 was drilled in 2000. Well No. 25 supplies groundwater directly to the distribution system. See Figure 4A for the existing City Yard Facility site layout as well as the proposed improvements.

Proposed improvements for 7 cfs excess groundwater: EOCF#2 Pump Station (three pumps) with surge tank on suction and discharge pipelines; suction from distribution system (18-inch pipe) located within Almond Ave.; and new high pressure discharge to City of Orange's OC-42 MWD connection at La Veta and Tustin Ave. The intent is to convey Well No. 25 and a portion of the adjacent Well No. 27 groundwater to South Orange County. It should be noted that the City of Orange does not receive any benefits from these proposed improvements to provide the 7 cfs excess groundwater.

With no reservoir within the vicinity to take suction from, the distribution piping in the area restricts the maximum excess groundwater available to the amount of one well or about 7 cfs. If additional excess groundwater capacity is desired, an additional new well will need to be constructed within the City Yard Facility. This could provide an additional 5 cfs of excess groundwater available to be conveyed to South Orange County. However, due to the distribution system piping, the City will not be able to operate the three wells (Well No. 25, No. 27 and the new well at the same time) without additional pipeline distribution improvements.

Proposed additional pipeline distribution improvements: 700 feet of new 12-inch pipeline within Lincoln Street from Almond Avenue to Chapman Avenue (shown on Figure 4); and 1,400 feet of new 12-inch pipeline within Chapman Avenue from westerly 55 Freeway off-ramp to east of the 55 Freeway and Santiago Creek. It should be noted that the proposed pipeline within Chapman Avenue will need to be bored across the Santiago Creek as well as the easterly off-ramp from the 55 Freeway (about 600 feet in length).

In summary, the above proposed improvements can provide up to 7 cfs excess groundwater to South Orange County, and up to 12 cfs if an additional new well is constructed onsite and about 2,100 feet of new 12-inch pipeline is constructed to improve the City's distribution system.

The City of Orange will benefit from the new well as long as the additional distribution improvements are constructed. With the additional distribution pipeline improvements, the City will be able to operate all three wells, if they desire, and will be able to convey the additional groundwater to a portion of the City that currently needs additional capacity as well as providing reliability to the hospital located near the proposed improvements.

It should be noted that it appears there are two sites in close proximity to the OC-42 connection that could possibly be used to construct the proposed EOCF#2 Pump Station: 1800 E La Veta (Rehabilitation Institute of Southern California); and Caltrans right-of-way adjacent to the Garden Grove Freeway (SR-22). Based on the existing size of the City's distribution piping adjacent to these sites (24-inches in diameter), the EOCF#2 pump station may be able to convey 7 cfs excess groundwater from the City's existing wells and up to 14 cfs excess groundwater if a new well was construction within this general area of the City. The ability to convey this capacity of excess groundwater would need to be confirmed by utilizing the City's existing water model once it is determined that purchasing one of these properties is potentially feasible and the anticipated land cost would be reasonable (comparable to the cost of the high pressure discharge from EOCF#2 Pump Station to OC-42 MWD connection).

Batavia Plant Facility:

The City of Orange Batavia Plant Facility is located at 2443 N. Batavia Street (just south of Fletcher Avenue) and is within the City's 390 Zone. The site includes the following: 0.5 MG steel reservoir (constructed in 1970 and is off-line); Well No. 1 (drilled in 1950 and is off-line); and Plant B-1, B-2 and B-3 booster pump station (off-line). These existing facilities would need to be demolished in order for the site to be used for the proposed new well and EOCF#2 Pump Station.

Proposed improvements for 7 cfs excess groundwater: demolition of existing steel reservoir and pump station; abandon/demolish existing Well No. 1; EOCF#2 Pump Station (three pumps) with surge tank on suction and discharge pipelines; suction from new well and supported by distribution system (16/12-inch pipe located within Batavia St.); and new high pressure discharge to City of Orange's OC-40 MWD connection at Hein Ave. and Tustin Ave. The intent is to convey the new well groundwater to South Orange County.

In summary, the above proposed improvements can provide up to 7 cfs excess groundwater to South Orange County. The City of Orange will benefit from the new well as the only wells within this area of the distribution system are no longer in service (Well No. 1 and Well No. 15). The City's water system will be improved with the new well at the Batavia Plant.

4.4 City of Tustin

Two potential locations were identified in the City of Tustin: Walnut Well site and the Pasadena Well site. Due to PFAS levels, the City will need to abandon the Tustin Well facility. This would make this site available, however, due to its limited property, constructing any facility at this location would require the purchase of additional private property. In addition, the only EOCF#2 connection in the vicinity of the well site is Santa Ana's SA-06 Connection.

The following is a summary of the two potential locations.

Walnut Well Site:

The Walnut Well, located at the southwest corner of Red Hill Ave. and Walnut Ave., was drilled in 1922 for the Irvine Company. City of Tustin Water took over the operation of the well in 1977. The City is planning to abandon the existing well. However, the City may be required to abandon the Tustin Avenue Well prior to the Walnut Well due to it exceeding the PFAS Response Level. This will force the City to keep the Walnut Well operational longer, until at least, the PFAS treatment can be built for the remaining wells. Access to the site is only available from the surrounding streets and any work at the site will impact traffic at the intersection.

The Walnut Well is located within the City's Zone 1 (HGL 308). See Figure 6 for the existing Walnut Well site location as well as the proposed improvements.

Proposed improvements for 3 to 5 cfs excess groundwater: demolish/abandon existing Walnut Well; EOCF#2 Pump Station (three pumps) with no surge tanks due to site limitations; suction from distribution system (16-inch pipe within Walnut Ave.); new high pressure discharge to OC-43 at Newport Ave. and Walnut Ave.; and upgrade OC-43 connection and meter facilities (owned by East Orange County Water District). In addition, increase the well capacity within Zone 1 by at least 5 cfs (additional new well as well as upgrading the RO Treatment facilities for the wells at the Main Plant). The intent is to convey excess groundwater from the Zone 1 distribution system to South Orange County.

One potential site for replacement of the Walnut Well may be within the existing orange grove at 14462 Red Hill (across the street from the existing Walnut Well site).

In summary, the above proposed improvements can provide up to 3 to 5 cfs excess groundwater to South Orange County.

The City of Tustin will benefit from the new well and the upgrade of the RO Treatment facilities for the wells at the Main Plant.

Pasadena Well Site:

The Pasadena Well, located at the corner of West 2nd Street and Pasadena Ave. adjacent to Costa Mesa Freeway – SR-55. Adjacent to the existing Pasadena Well building is a narrow grass landscape area that may be used for the proposed EOCF#2 Pump Station. The site is narrow and may require the reduction in size of the proposed facilities. The Pasadena Well is located within the City's Zone 1 (HGL 308). See Figure 6 for the existing Pasadena Well site location as well as the proposed improvements.

Proposed improvements for 3 to 4 cfs excess groundwater: remove existing landscape/hardscape improvements; EOCF#2 Pump Station (three pumps) with no surge tanks due to site limitations; suction from distribution system; new high pressure discharge to OC-43 at Newport Ave. and Walnut Ave.; and upgrade OC-43 connection and meter facilities (owned by East Orange County Water District). In addition, increase the well capacity within Zone 1 by at least 5 cfs (additional new well as well as upgrading the RO Treatment facilities for the wells at the Main Plant). Intent is to convey excess groundwater from the Pasadena Well to South Orange County.

In summary, the above proposed improvements can provide up to 3 to 4 cfs excess groundwater to South Orange County. The City of Tustin will benefit from the new well and the upgrade of the RO Treatment facilities for the wells at the Main Plant.

5. PROPOSED CONVEYANCE FACILITIES

5.1 Identification of Conveyance Options

The proposed conveyance facilities consist of the following: new high pressure discharge piping from the proposed pump station to the connection to the East Orange County Feeder No. 2; pressure reducing facility to allow high pressure water to be relieved back into the City's distribution system; and connection to the East Orange County Feeder No. 2 existing piping facilities (between the meter vault and the MWD connection vault).

The general criteria for the identification of conveyance options was to locate the new high pressure discharge piping within public streets and to minimize the length of piping within major arterial streets.

Below is a summary of the preliminary conveyance options that were identified for each of the above possible locations for the proposed EOCF#2 Pump Stations.

5.2 Typical Connection to the East Orange County Feeder No. 2

The typical connection to the East Orange County Feeder No. 2 consist of the following: pressure reducing vault and corresponding piping that allows for the manual discharge of the high pressure excess groundwater back into the City's distribution system; additional manual valves to keep the excess groundwater from flowing through the existing meter in the meter vault; new flow control meter vault; new connection to the existing piping between the MWD connection vault and the meter vault.

For this study, we have assumed the layout of the proposed new flow control meter vault will be similar to the IRWD Interconnection to SOC Water Transmission Mains, Phase A JTM/ATM Connection. The proposed flow control facility will include: magnetic flowmeter; modulating butterfly valve; blind transmitters and pressure gages; meter test tap; precast concrete vault; double door aluminum vault hatch; forced ventilation; sump pump; and corresponding electrical and controls. Typical sketches of the proposed facilities are included in Appendix C.

5.3 City of Santa Ana

East Station Facility

Figure 1 shows the facility location and the corresponding proposed conveyance piping. The following is the proposed alignment: St. Andrews Place to S. Grand Ave. to St. Gertrude Pl. to S Lyon St. to Richey Street to City of Santa Ana's SA-7 Pressure Regulating Station. Assuming 14 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 24-inches in diameter and rated for 200 psi. The pressure reducing facility can be located within the SA-7 Pressure Regulating Station and can connect to both the Lower Zone distribution piping as well to the existing City of Santa Ana 24-inch high pressure water main that goes to the existing SA-7 MWD service connection.

Figure 2 shows the proposed MWD connection facilities at Warner Ave. and Red Hill Ave. These proposed facilities will include: connection to the existing City of Santa Ana 24-inch piping upstream of the existing SA-7 meter vault including a new 24-inch valve; proposed meter flow control vault with 24-inch modulating butterfly valve and magnetic flow meter; connection to the existing 24-inch piping between the meter vault and connection vault, including two 24-inch valves (one on the downstream side of the flow control vault and one between the connection and the existing SA-7 meter vault; and new electrical and SCADA control facilities.

The proposed flow control vault is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

Cambridge Facility

Figure 3 shows the facility location and the corresponding proposed conveyance piping. The following is the proposed alignment: Waverly St. to Fairhaven Ave. to Tustin Ave. to St. Andrews Place to S. Grand Ave. to St. Gertrude Pl. to S Lyon St. to Richey Street to City of Santa Ana's SA-6 meter vault. Assuming 10 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 18-inches in diameter and rated for 200 psi. The pressure reducing facility can be located within Tustin Ave. in the vicinity of the existing SA-6 MWD service connection. The PR facility is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

Figure 3 also shows the proposed MWD connection facilities at Santa Clara Ave. and Tustin Ave. These proposed facilities will include: proposed meter flow control vault with 18-inch modulating butterfly valve and magnetic flow meter; connection to the existing piping between the meter vault and connection vault, including one 18-inch valve (downstream side of the flow control vault) and one valve matching size of piping between the connection and the existing SA-7 meter vault; and new electrical and SCADA control facilities.

The proposed flow control vault is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

5.4 City of Orange

City Yard Facilities

Figure 4 shows the potential facility location and the corresponding proposed conveyance piping. The following is the proposed alignment: Almond Ave. to Lincoln St. to Palmyra Ave. to Tustin Ave. to City of Orange's OC-No. 42 meter vault. It should be noted that the proposed pipeline will need to be bored across the Santiago Creek (about 360 feet in length). Assuming 12 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 18-inches in diameter and rated for 200 psi.

The pressure reducing facility can be located within Tustin Ave. in the vicinity of the existing OC-No. 42 MWD service connection. The PR facility is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor. The construction of the facility will have a large impact on traffic on Tustin Ave.

Figure 4 also shows the proposed MWD connection facilities at La Veta and Tustin Ave. These proposed facilities will include: proposed meter flow control vault with 18-inch modulating butterfly valve and magnetic flow meter; connection to the existing piping between the meter vault and connection vault, including one 18-inch valve (downstream side of the flow control vault) and one valve matching size of piping between the connection and the existing OC-42 meter vault; and new electrical and SCADA control facilities. The proposed flow control vault is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor. The construction of the facility will have a large impact on traffic on Tustin Ave.

Batavia Plant

Figure 5 shows the potential facility location and the corresponding proposed conveyance piping. The following is the proposed alignment: Batavia St. from Batavia Plant to Fletcher Ave. to Olive Road to Heim Ave. to Tustin Ave. to City of Orange's OC-No. 40 meter vault. It should be noted that the proposed pipeline will need to be bored across the storm drain channel within Fletcher Ave., bored under the railroad from Fletcher Ave. to Olive Road, and bored across Tustin Ave. (about 400 feet in length). Assuming 7 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 16-inches in diameter and rated for 200 psi.

The pressure reducing facility can be located within Heim Ave. cul-da-sac in the vicinity of the existing OC-No. 40 MWD service connection. The PR facility is recommended to be located in the existing public parkway right-of-way or it could be located within the street if there is open utility corridor. By locating the facility within Heim Ave. there will be minimal impact on traffic on Tustin Ave.

Figure 5 also shows the proposed MWD connection facilities at Heim Ave. and Tustin Ave. These proposed facilities will include: proposed meter flow control vault with 16-inch modulating butterfly valve and magnetic flow meter; connection to the existing piping between the meter vault and connection vault, including one 16-inch valve (downstream side of the flow control vault) and one valve matching size of piping between the connection and the existing OC-40 meter vault; and new electrical and SCADA control facilities. The proposed flow control vault is recommended to be located in the existing public parkway right-of-way within Heim Ave. cul-da-sac or it could be located within the street if there is open utility corridor. By locating the facility within Heim Ave. there will be minimal impact on traffic on Tustin Ave.

5.5 City of Tustin

Walnut Well Site

Figure 6 shows the facility location and the corresponding proposed conveyance piping. The following is the proposed alignment: Walnut Ave to Newport Lane to OC-43 meter vault. Assuming 5 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 12-inches in diameter and rated for 200 psi. The pressure reducing facility can be located within Walnut Ave. in the vicinity of the existing OC-43 MWD service connection. The PR facility is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

Figure 6 also shows the proposed MWD connection facilities at Newport Lane and Walnut Ave. These proposed facilities will include: proposed meter flow control vault with 12-inch modulating butterfly valve and magnetic flow meter; connection to the existing piping between the meter vault and connection vault, including one 12-inch valve (downstream side of the flow control vault) and one valve matching size of piping between the connection and the existing OC-43 meter vault; and new electrical and SCADA control facilities. In addition, the City of Tustin stated that the existing meter vault needs to be upgraded at the same time. The proposed flow control vault is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

Pasadena Well Site

Figure 6 also shows the facility location and the corresponding proposed conveyance piping for the Pasadena Well. The following is the proposed alignment: 2nd Street to Myrtle Ave. to Main St. to B St. to Walnut Ave. to Newport Lane to OC-43 meter vault. Assuming 4 cfs excess groundwater, the EOCF#2 Discharge Water Main is proposed to be 12-inches in diameter and rated for 200 psi. It should be noted that this proposed alignment includes the bore/jack of the Santa Ana Freeway on B Street (about 500 feet in length). The pressure reducing facility can be located within Walnut Ave. in the vicinity of the existing OC-43 MWD service connection. The PR facility is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

Figure 6 also shows the proposed MWD connection facilities at Newport Lane and Walnut Ave. These proposed facilities will include: proposed meter flow control vault with 12-inch modulating butterfly valve and magnetic flow meter; connection to the existing piping between the meter vault and connection vault, including one 12-inch valve (downstream side of the flow control vault) and one valve matching size of piping between the connection and the existing OC-43 meter vault; and new electrical and SCADA control facilities.

In addition, the City of Tustin stated that the existing meter vault needs to be upgraded at the same time. The proposed flow control vault is recommended to be located in the existing public parkway right-of-way or within an easement adjacent to the parkway. If not feasible or easement is difficult to obtain, it could be located within the street if there is open utility corridor.

The option of locating the proposed pump station at the Pasadena Well site is not recommended due to the site restrictions at the well site, the long conveyance piping and the bore and jack of the Santa Ana Freeway.

6. REQUIRED PERMITS, LAND ACQUISITION AND EASEMENTS

6.1 City of Santa Ana

East Station Facility will not require any land acquisitions as all of the proposed facilities are located within the City of Santa Ana property or public right-of-way. The only easement that may be required would be at the proposed connection to the SA-7 MWD meter vault facility for construction of the vault in the adjacent landscaping area to the public parkway. City of Santa Ana encroachment permit will be required for the conveyance piping. Traffic control will be a major concern for the City for the pipeline work in S. Grand Ave. and Ritchey St.

Cambridge Station Facility will not require any land acquisitions as all of the proposed facilities are located within the City of Santa Ana property or public right-of-way. The only easement that may be required would be at the proposed connection to the SA-6 MWD meter vault facility for construction of the vault in the adjacent landscaping area to the public parkway. City of Santa Ana encroachment permit will be required for the conveyance piping. Traffic control will be a major concern for the City for the pipeline work in Fairhaven and Tustin Ave.

6.2 City of Orange

City Yard Facility and the Batavia Plan will not require any land acquisitions as both of the proposed facilities are located within the City of Orange properties or public right-of-way. The only easement that may be required would be at the proposed connection to the OC No. 42 MWD meter vault facility for construction of the vault in the adjacent landscaping area to the public parkway. City of Orange encroachment permit will be required for the conveyance piping for both options. Traffic control will be a major concern for the City for the pipeline work in and or crossing Tustin Ave. as well as the railroad bore and jack operation at Olive Road and Fletcher Avenue. An Orange County Flood Control District and Army Corp or Fish and Game Permit will be required for crossing the Santiago Creek. In addition, an Orange County Flood Control District will be required for crossing of the existing culvert on Fletcher Avenue and a railroad permit for the railroad crossing at Olive Road and Fletcher Avenue.

6.3 City of Tustin

Walnut Well Facility will not require any land acquisitions as all of the proposed facilities are located within the City of Tustin properties or public right-of-way. The only easement that may be required would be at the proposed connection to the OC No. 43 MWD meter vault facility for construction of the vault in the adjacent landscaping area to the public parkway. A City of Tustin encroachment permit will be required for the conveyance piping. Traffic control will be a major concern for the City for the pipeline work in Walnut Ave. and for the pump station construction that will impact Red Hill Ave.

7. ESTIMATE OF PROBABLE CONSTRUCTION COSTS

7.1 Probable Construction Costs

The preliminary estimates of the probable construction costs for each of the proposed locations and facilities are summarized in Appendix D. Construction costs were based on the experience of our engineers, construction cost estimates recently prepared for similar projects, recently bid projects of a similar nature for the cities or other agencies, and industry standards.

A contingency of 30% has been included in the construction cost to provide for uncertainties and unknowns associated with a preliminary design. The overall project cost includes a 10% design cost, 15% construction contingency, and 15% technical, legal and administrative costs.

The estimate of construction costs are based on 2020 dollars, ENR Construction Cost Index of 11436 for June 2020.

The following Table 7.1 summarizes the proposed excess groundwater potential, the probable construction costs, and the overall total project cost.

Table 7.1 Summary of Excess Groundwater Potential and Project Costs

Proposed Facility	***Potential Excess Groundwater***	**Probable Construction Cost**	**Total Project Cost**
City of Santa Ana – East Station Facility	14 cfs	$ 16,000,000	$ 22,400,000
City of Santa Ana – Cambridge Facility	10 cfs	$ 15,000,000	$ 21,000,000
City of Orange – City Yard Facility	12 cfs	$ 17,000,000	$ 23,800,000
City of Orange – Batavia Plant	7 cfs	$ 17,000,000	$ 23,800,000
City of Tustin – Walnut Well Site	3 to 5 cfs	$ 14,000,000	$ 19,600,000

8. SIMILAR STUDIES

8.1 MWDOC Planning Level Reliability Alternatives Analysis

Municipal Water District of Orange County (MWDOC) had an evaluation performed to update the available emergency water supply from Irvine Ranch Water District (IRWD) that could be made available to South Orange County (SOC) Agencies during an emergency shutdown or outage of MWD treated imported water supply from Diemer Filtration Plant. The study was titled: "Planning Level Reliability Alternatives Analysis", dated April 9, 2019, and was prepared by Dudek. The study evaluated IRWD's ability to convey groundwater supply through their system to the Joint Transmission Main (JTM) for conveyance to SOC. In addition, a scenario to convey groundwater via the East Orange County Feeder #2 (EOCF#2) to the JTM was also discussed.

Determination of available emergency potable water supply was based on a two-part analysis of:

- Part 1: IRWD's water balance of water supply versus their demands, assuming no MWD treated imported water supply from the Diemer Filtration Plant is available.
- Part 2: IRWD system's hydraulic capacity to convey available water supply across their system to an interconnection with the JTM.

The ability to convey groundwater supply through IRWD system is contingent on the hydraulic capacity of their system complicated by varying demand conditions. The amount of emergency supply capable of being conveyed to SOC by IRWD will vary and not necessarily be a single fixed "reliable" supply amount provided during emergencies that could occur at any time during the year.

If the groundwater is conveyed using the EOCF#2, the available supply flow is much more predictable since fluctuations of the retail water system does not significantly impact the ability to convey water due to the size of the EOCF#2.

Based on the results of the analysis, five (5) scenarios were identified, along with the available 60 day supply, the planning level estimate of construction cost and target year of operation. The following is a brief summary of the results:

Table 8.1 Study Results Summary

Scenarios	***Available 60 day Supply to SOC***	***Planning Level Estimate of Construction Cost***	***Target Year of Operation***
1 – Existing w/ VFD Imp.	28.9 cfs avg.	$800K	2020 (supply declining until after additional improvements are made)
2 – Future w/VFD, 4 new wells, Treatment	15 cfs avg	$136M	2026+
3 – Future w/VFD, 4 new wells, Treatment, Pipelines	23.1 cfs avg	$156M	2026+
4a – EOCF#2/DRWF Supply, Treatment	23.1 cfs (constant supply)	$144M	2026+
4b – EOCF#2/Other GW supply	23.1 cfs (constant supply)	$48M	2026+

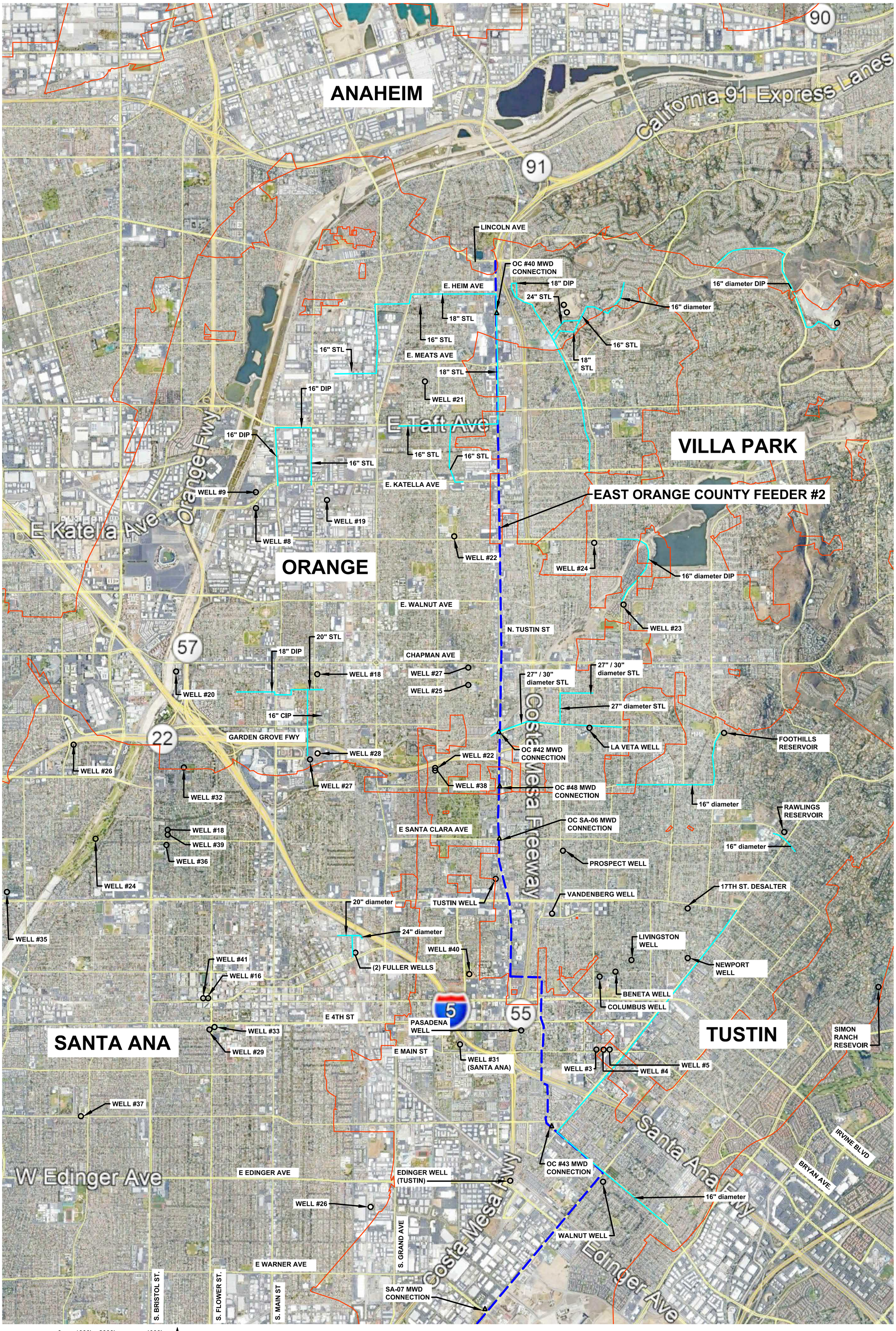
8.2 New Local Water Supply Integration Utilizing the East Orange County Feeder No. 2

Municipal Water District of Orange County (MWDOC) is currently supporting development of several potential new water supply projects, including ocean desalination from Huntington Beach Desalination Plant (HBDP); ground water pump back; and ocean desalination from Doheny Desalination Plant (DDP). If implemented, these new supplies will enhance water supply reliability for the region by providing locally controlled sources of supply that have less risk of interruption. It is envisioned that water from these sources will be conveyed to MWDOC Member Agencies and other retail agencies in Orange County through a combination of new and existing conveyance facilities.

To establish a work plan for addressing both physical infrastructure needs and impacts of water quality differences, MWDOC had several White Papers prepared to address these topics. Black & Veatch prepared a White Paper titled "MWDOC New Local Water Supply Integration into the Metropolitan Water District System Utilizing the East Orange County Feeder No. 2" dated October 2019. This White Paper focuses on the integration issues associated with the HBDP and the groundwater pump back concepts with a particular focus on the concept of utilizing the EOCF#2 as a means of introducing these supply sources into the Orange County Distribution System.

The Groundwater Pump Back will comprise of installation of new groundwater wells or use of existing wells in the OC basin that are located near the southern end of the EOCF#2. The OC Water Reliability Study included a concept involving installation of three groups of new wells with a capacity of approximately 10 mgd. Under normal conditions, it is envisioned that these new groundwater production wells would be used to deliver water directly to retail water agencies in their vicinity. Under drought or emergency conditions, these wells would be called on to deliver water into the EOCF#2 to augment imported supplies.

The White Paper summarized the various recommendations to address the outstanding issues of using the EOCF#2 as a means of introducing these new water supplies into the OC Distribution System.



0 1000' 2000' 4000'

SCALE: 1" = 2000'

LEGEND

- WELLS
- EOCF #2 CONNECTIONS
- EOCF #2
- LARGE DIAMETER WATER PIPELINES
- CITY LIMITS

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ORANGE COUNTY WATER DISTRICT

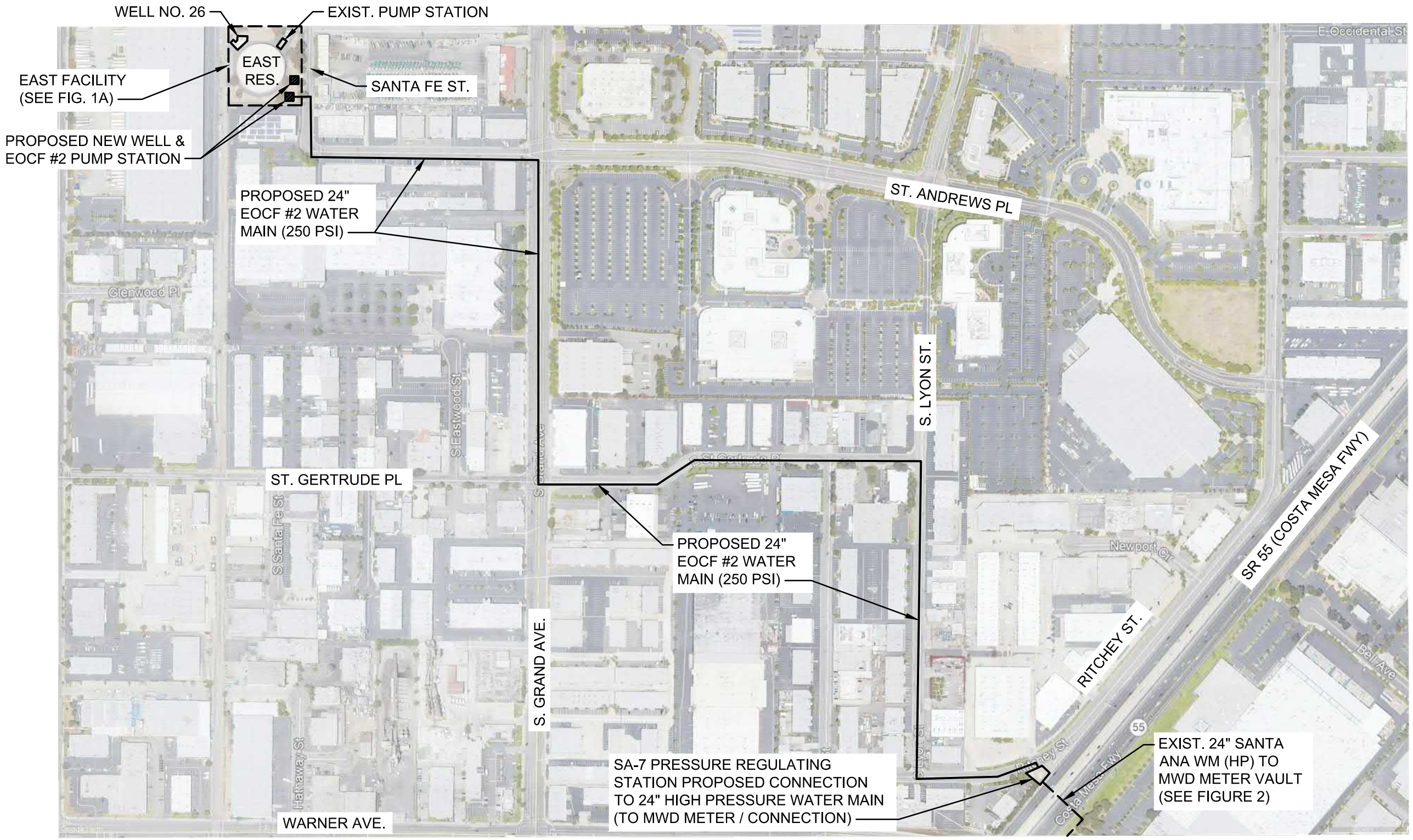
EVALUATION OF GROUNDWATER CONVEYANCE OPTIONS

OVERVIEW - STUDY AREA

PROJ:	200-09267-19002
DATE:	SEPTEMBER 2020
DESN:	

EXHIBIT 1

Bar Measures 1 inch



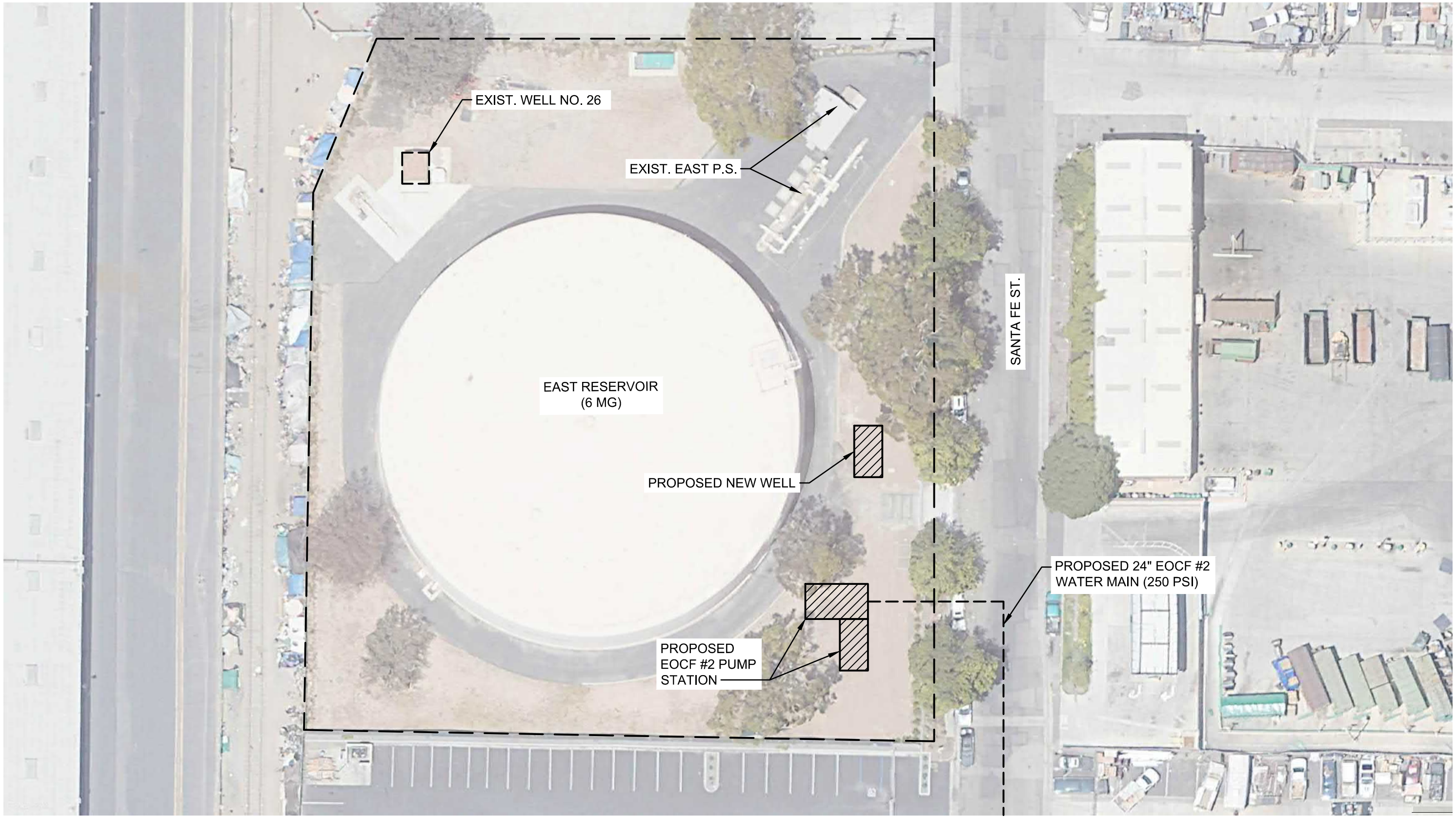
SUMMARY OF CONVEYANCE PIPING

EOCF #2 PUMP STATION TO SA-7 PRS: 5,600' ±
SA-7 PRS TO MWD METER VAULT: 3,000' ±

0 200' 400'
SCALE: 1" = 400'

TETRA TECH www.tetratech.com 17885 VON KARMAN AVE. SUITE 500 IRVINE, CA 92614	ORANGE COUNTY WATER DISTRICT GROUND WATER CONVEYANCE OPTIONS CITY OF SANTA ANA - EAST STATION FACILITY LOCATION / CONVEYANCE PIPING
PROJ: 200-09267-19002 DATE: MARCH 2020 DESN: KFL FIG 1	

Bar Measures 1 inch



0 20' 40'
SCALE: 1" = 40'

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ORANGE COUNTY WATER DISTRICT

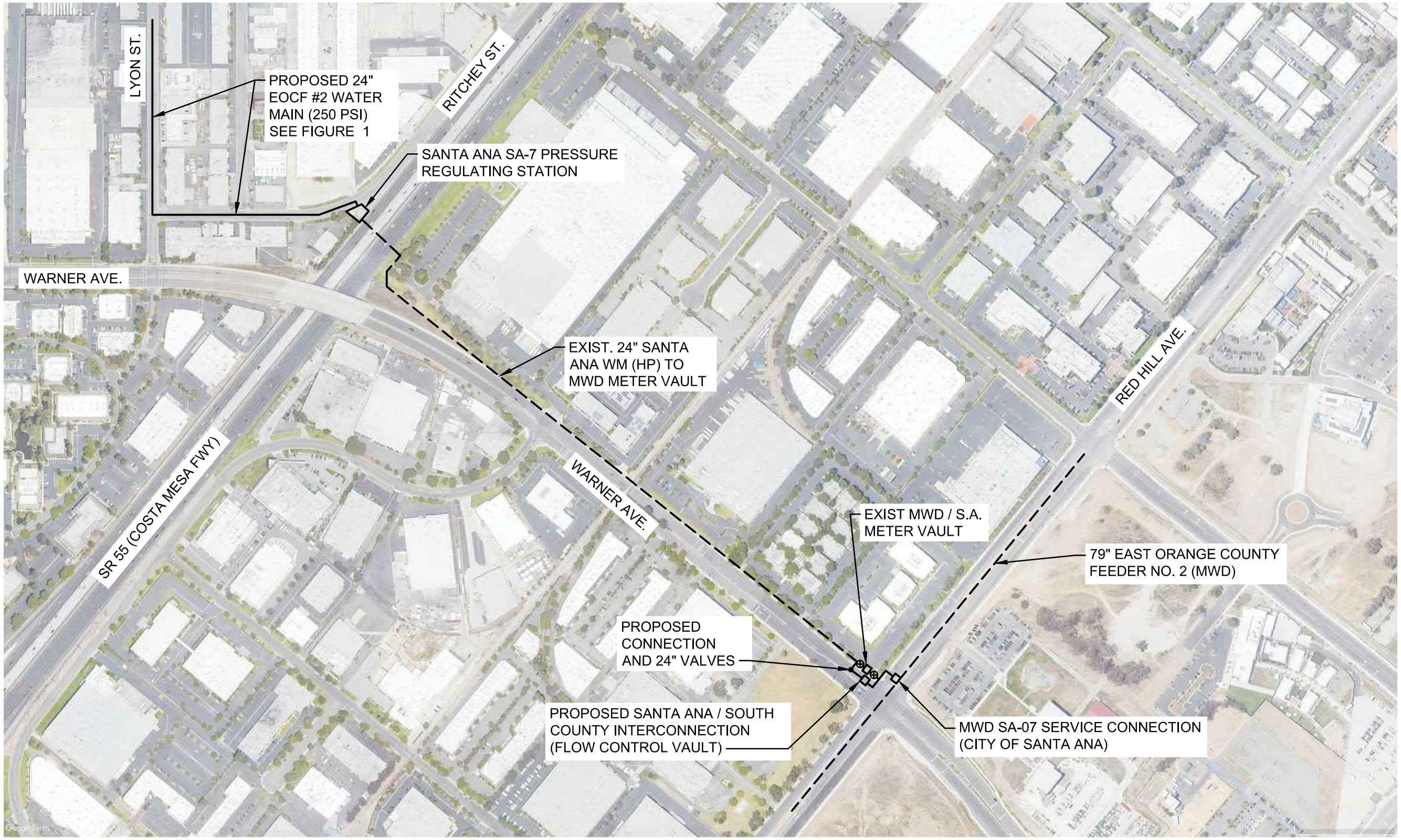
GROUND WATER CONVEYANCE OPTIONS

CITY OF SANTA ANA - EAST STATION
EAST FACILITIES PROPOSED IMPROVEMENTS

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 1A

Bar Measures 1 inch



0 200' 400'
SCALE: 1" = 400'

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ORANGE COUNTY WATER DISTRICT

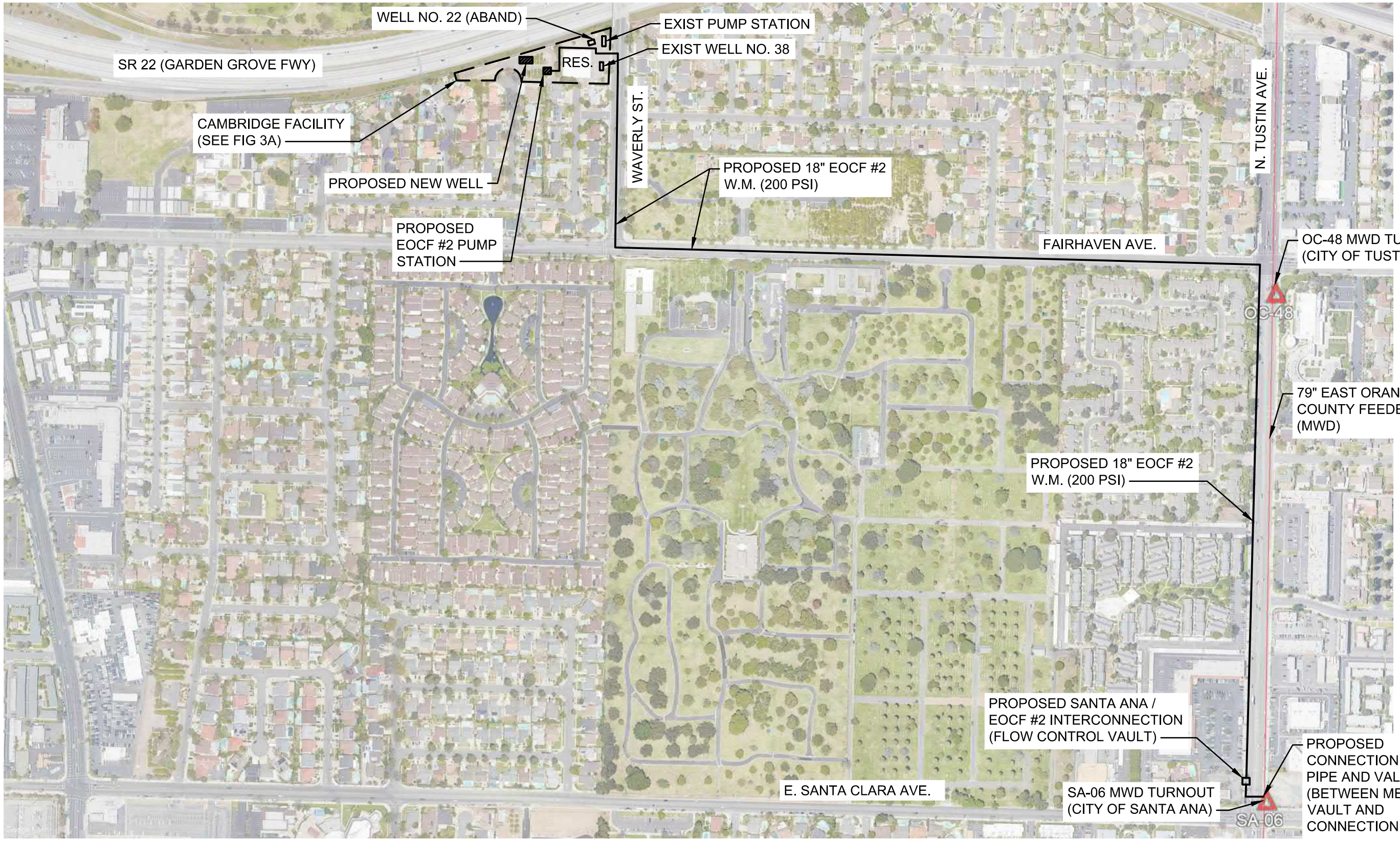
GROUND WATER CONVEYANCE OPTIONS

CITY OF SANTA ANA - EAST STATION
PROPOSED MWD CONNECTION

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 2

Bar Measures 1 inch



SUMMARY OF CONVEYANCE PIPING

S.C. PUMP STATION TO MWD CONNECTION: 6,100' ±

N

0 200' 400'

SCALE: 1" = 400'

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ORANGE COUNTY WATER DISTRICT

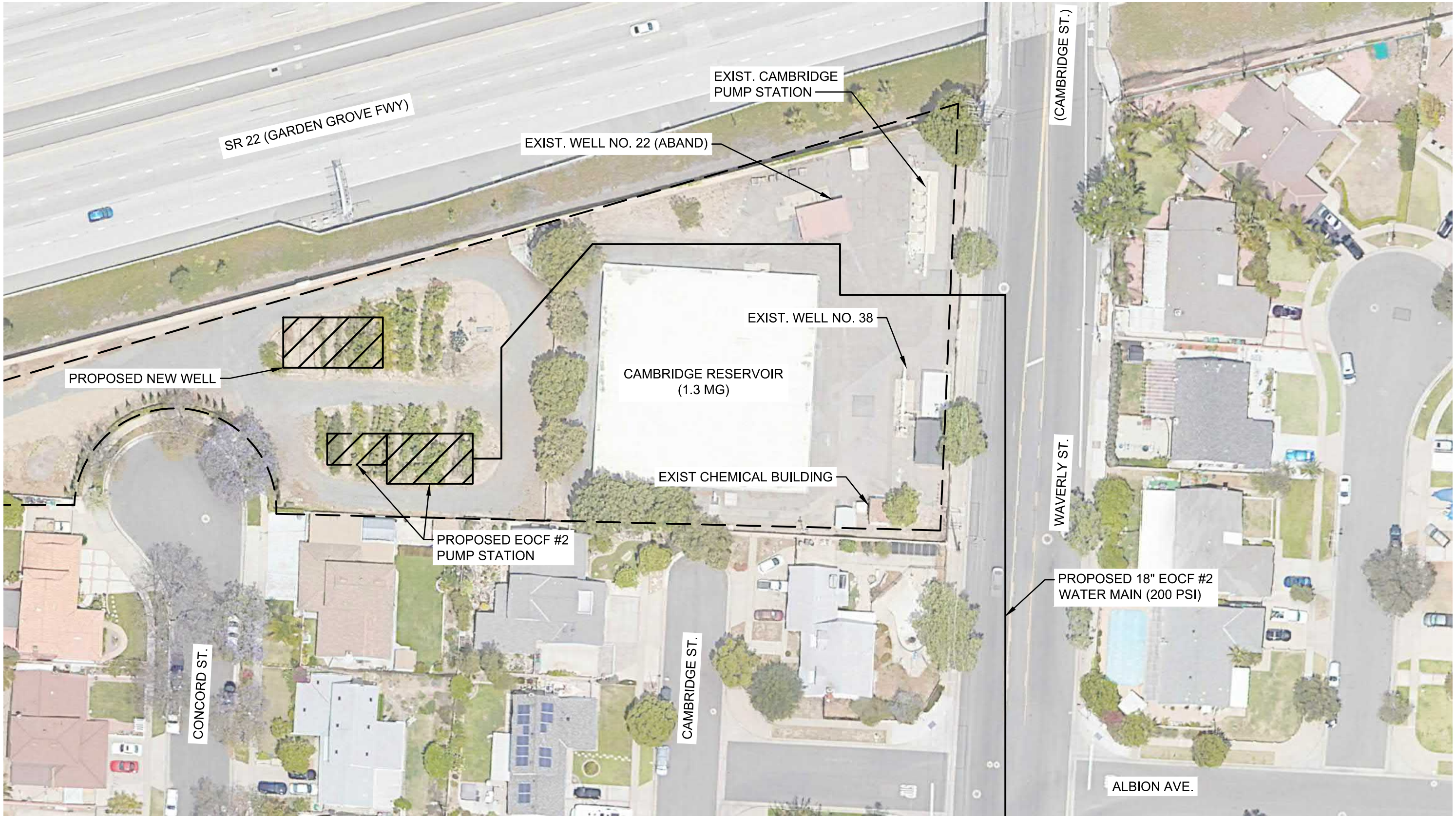
GROUND WATER CONVEYANCE OPTIONS

CITY OF SANTA ANA - CAMBRIDGE STATION
FACILITY LOCATION / CONVEYANCE PIPING

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 3

Bar Measures 1 inch



0 25' 50'

SCALE: 1" = 50'

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ORANGE COUNTY WATER DISTRICT

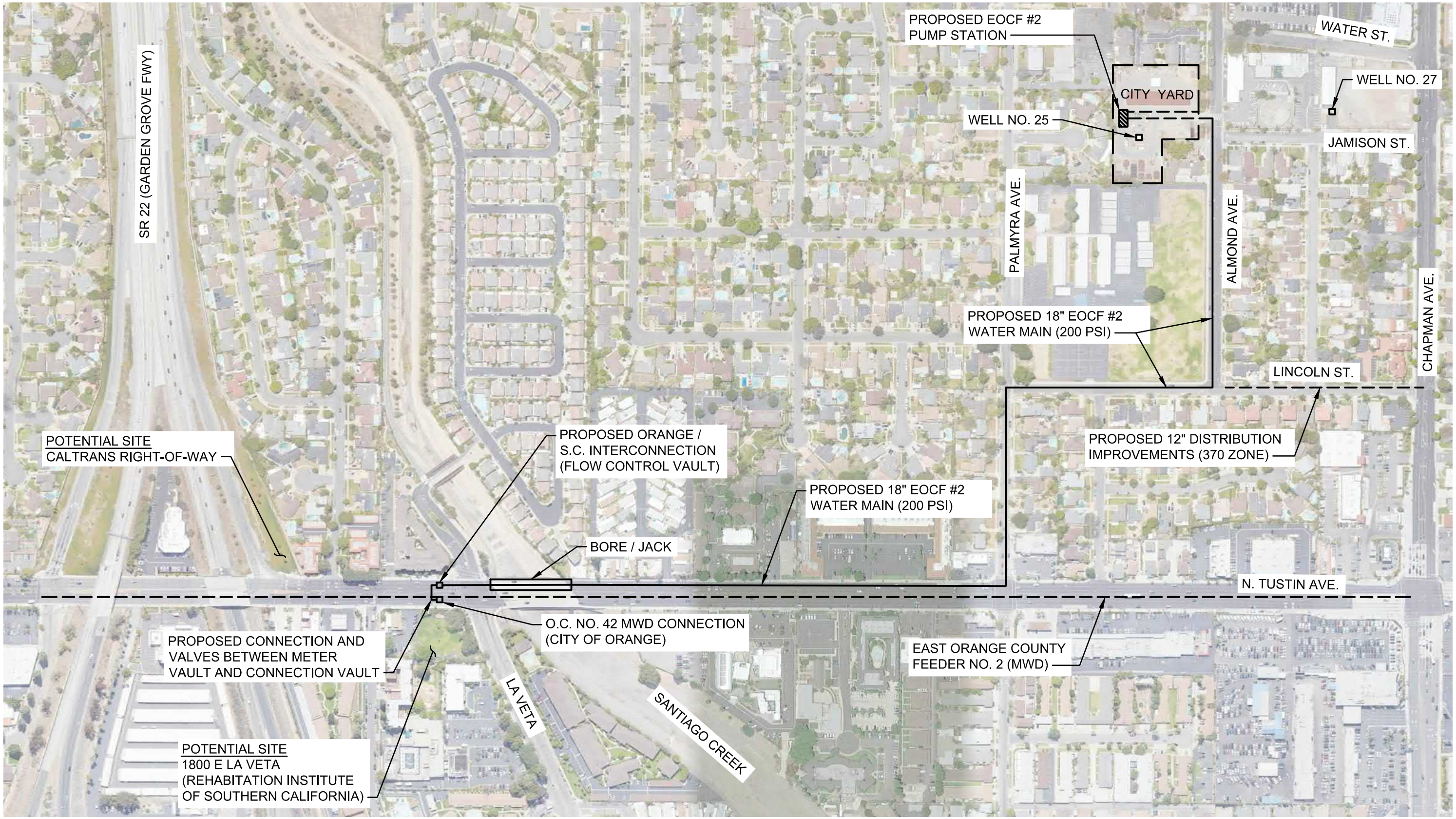
GROUND WATER CONVEYANCE OPTIONS

CITY OF SANTA ANA - CAMBRIDGE STATION
CAMBRIDGE FACILITIES PROPOSED IMPROVEMENTS

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 3A

Bar Measures 1 inch



SUMMARY OF CONVEYANCE PIPING

EOCF #2 PUMP STATION TO MWD CONNECTION: 4,300' ±

0 150' 300'
SCALE: 1" = 300'

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ORANGE COUNTY WATER DISTRICT

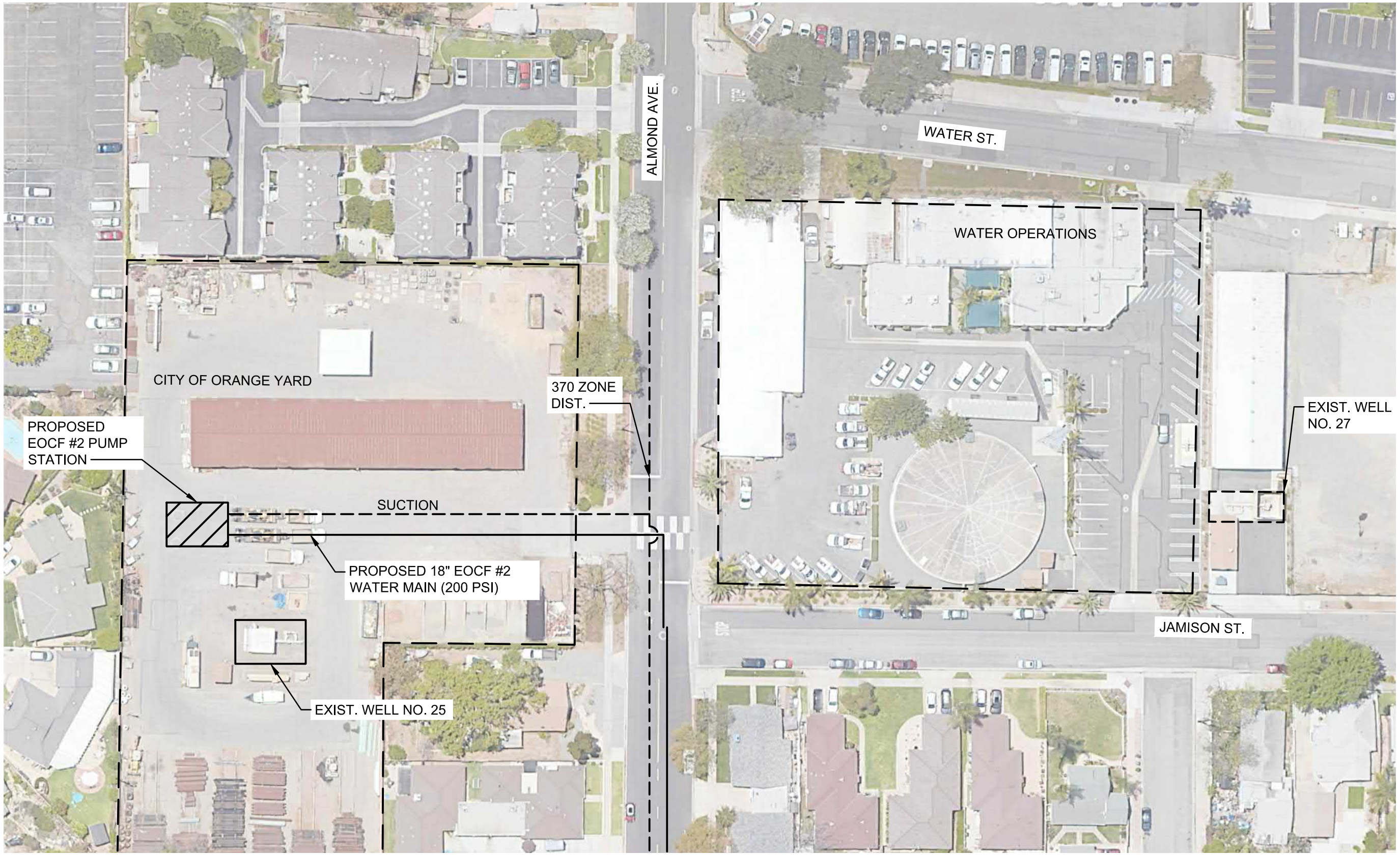
GROUND WATER CONVEYANCE OPTIONS

CITY OF ORANGE - CITY YARD FACILITY
LOCATION / CONVEYANCE PIPING

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 4

Bar Measures 1 inch



0 30' 60'
SCALE: 1" = 60'

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ORANGE COUNTY WATER DISTRICT

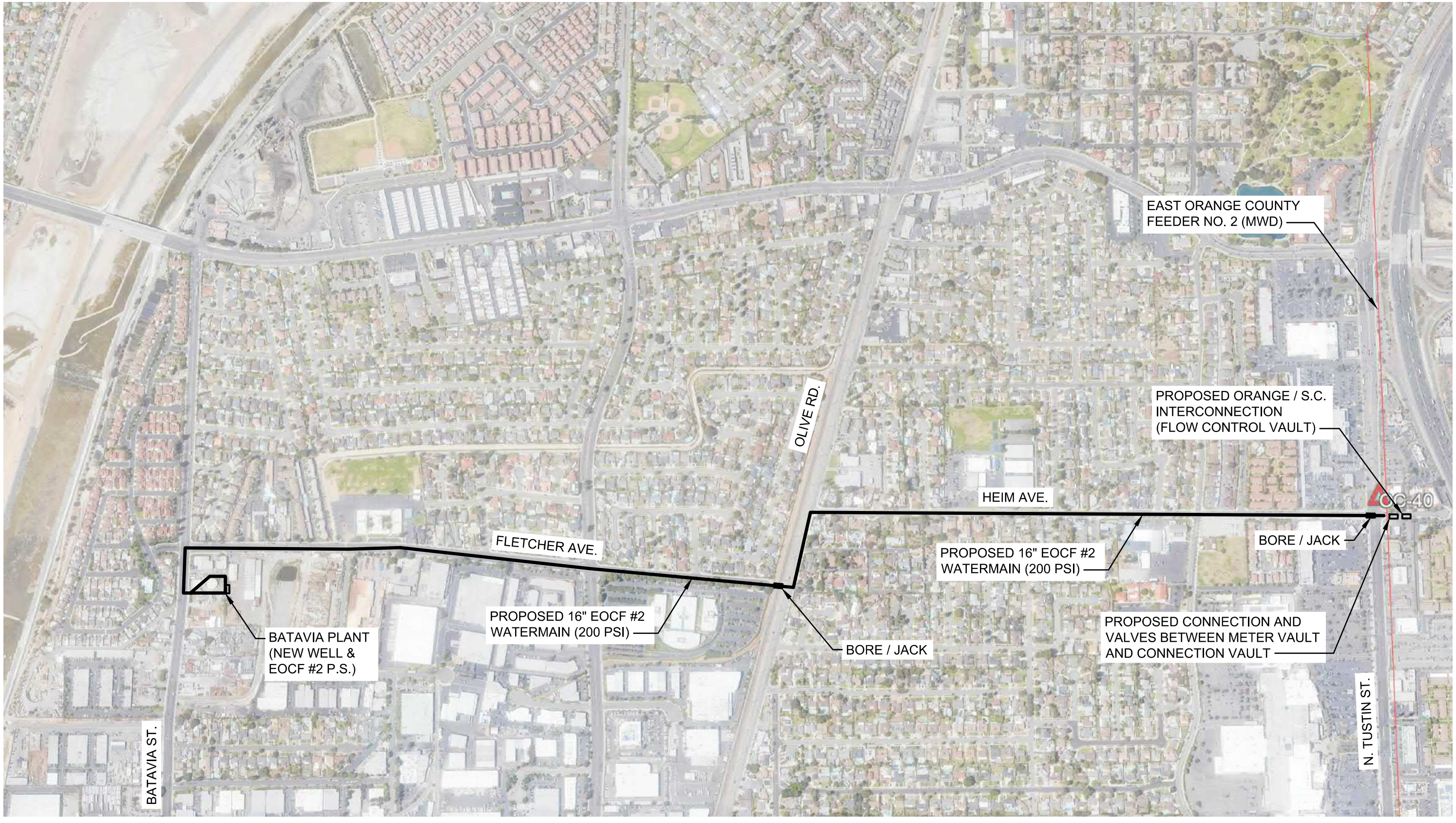
GROUND WATER CONVEYANCE OPTIONS

CITY OF ORANGE - CITY YARD FACILITY
FACILITY PROPOSED IMPROVEMENTS

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 4A

Bar Measures 1 inch



SUMMARY OF CONVEYANCE PIPING

EOCF #2 PUMP STATION TO MWD CONNECTION: 8,700'±

0 300' 600'
SCALE: 1" = 600'

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ORANGE COUNTY WATER DISTRICT

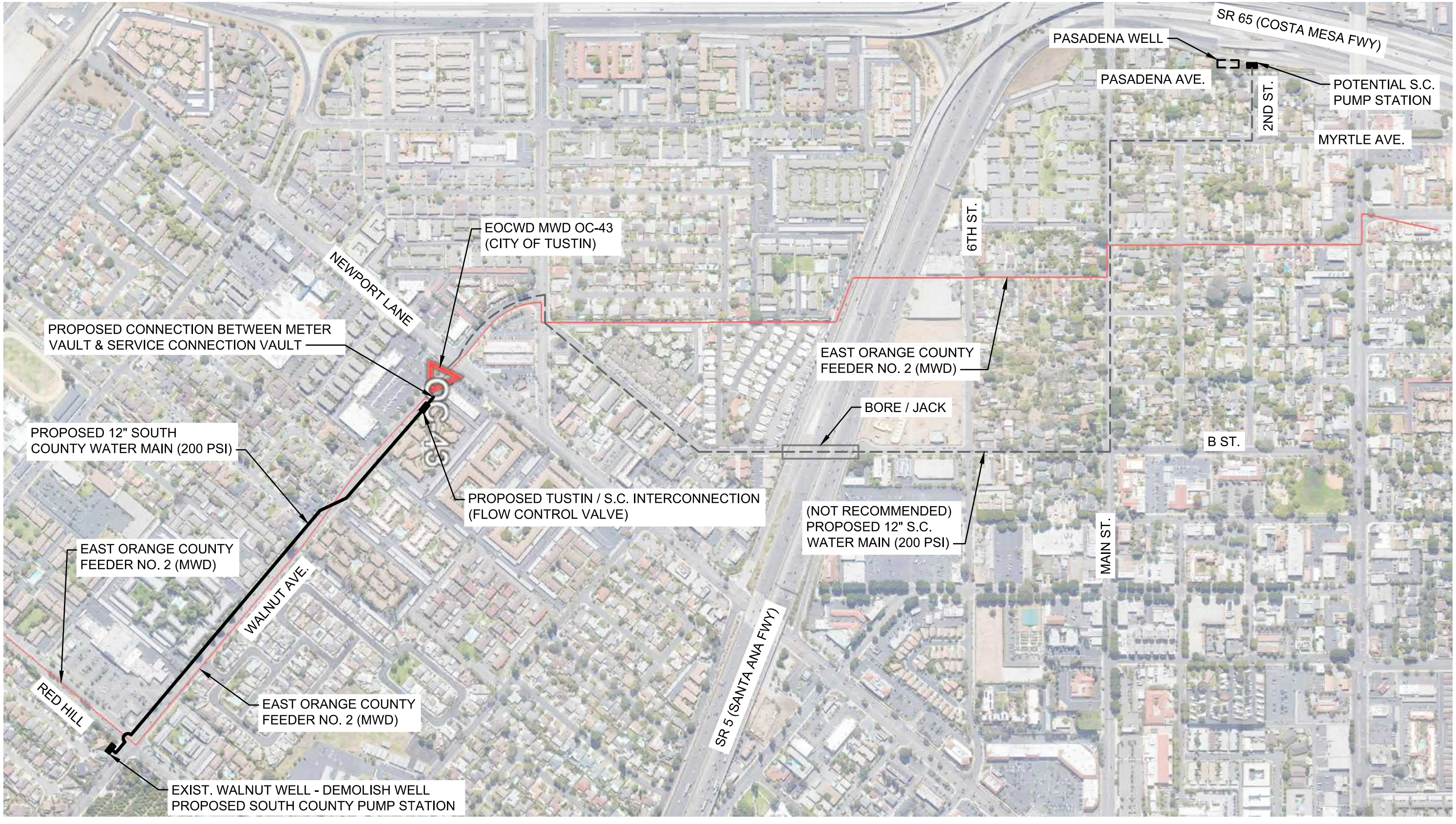
GROUND WATER CONVEYANCE OPTIONS

CITY OF ORANGE - BATAVIA PLANT
FACILITY LOCATION / CONVEYANCE PIPING

PROJ:	200-09267-19002
DATE:	MARCH 2020
DESN:	KFL

FIG 5

Bar Measures 1 inch



SUMMARY OF CONVEYANCE PIPING

WALNUT WELL (S.C. P.S. TO MWD CONNECTION): 3,300' ±
PASADENA WELL (S.C. P.S. TO MWD CONNECTION): 7,000' ±
(NOT RECOMMENDED)

0 250' 500'
SCALE: 1" = 500'

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ORANGE COUNTY WATER DISTRICT

GROUND WATER CONVEYANCE OPTIONS

CITY OF TUSTIN - WALNUT WELL
FACILITY LOCATION / CONVEYANCE PIPING

PROJ: 200-09267-19002
DATE: MARCH 2020
DESN: KFL

FIG 6

Bar Measures 1 inch

Orange County Water District
Moulton Niguel Water District

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

FINAL DRAFT PRELIMINARY REPORT

(CONNECTIONS TO THE EAST ORANGE COUNTY FEEDER #2)

APPENDIX A
HISTORICAL WATER DATA

TABLE A-1
CITY OF SANTA ANA HISTORICAL AND PROJECTED WATER SUPPLY AND DEMAND

WELL NUMBER	Estimated Ave Well Capacity (GPM)	Theoretical Maximum (100%) Daily Production (GAL)	Winter Maximum Run Daily Production at Estimated % Capacity (GAL)		Summer Maximum Run Daily Production at Estimated % Capacity (GAL)		January Month Maximum Production - Winter (GAL)	February Month Maximum Production - Winter (GAL)	March Month Maximum Production - Winter (GAL)	April Month Maximum Production - Summer (GAL)	May Month Maximum Production - Summer (GAL)	June Month Maximum Production - Summer (GAL)	July Month Maximum Production - Summer (GAL)	August Month Maximum Production - Summer (GAL)	September Month Maximum Production - Summer (GAL)	October Month Maximum Production - Winter (GAL)	November Month Maximum Production - Winter (GAL)	December Month Maximum Production - Winter (GAL)	TOTAL Annual Production (GAL)
THREE-YEAR HISTORICAL PERIOD																			
3-YEAR HISTORICAL AVERAGE WELL SUPPLY							**629,824,373**	**564,834,562**	**702,906,681**	**673,925,765**	**592,750,960**	**663,128,528**	**726,087,068**	**700,430,051**	**595,510,013**	**589,285,851**	**694,423,137**	**671,970,531**	**7,805,077,518**
3-YEAR HISTORICAL AVERAGE IMPORT							**150,878,903**	**132,858,161**	**107,440,117**	**257,113,292**	**375,394,096**	**316,997,769**	**352,811,142**	**381,759,470**	**410,284,164**	**387,516,548**	**186,398,990**	**155,908,199**	**3,215,360,851**
3-YEAR HISTORICAL AVERAGE DEMAND							**780,703,275**	**697,692,723**	**810,346,798**	**931,039,057**	**968,145,057**	**980,126,297**	**1,078,898,209**	**1,082,189,520**	**1,005,794,177**	**976,802,399**	**880,822,127**	**827,878,731**	**11,020,438,370**
BASIN PRODUCTION PERCENTAGE							**80.7%**	**81.0%**	**86.7%**	**72.4%**	**61.2%**	**67.7%**	**67.3%**	**64.7%**	**59.2%**	**60.3%**	**78.8%**	**81.2%**	**70.8%**
FUTURE POTENTIAL PRODUCTION OF EXISTING WELLS																			
20	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
21	1800	2,592,000	60%	1,555,200	80%	2,073,600	48,211,200	43,545,600	48,211,200	62,208,000	64,281,600	62,208,000	64,281,600	64,281,600	62,208,000	48,211,200	46,656,000	48,211,200	
26	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
29	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
30	2800	4,032,000	60%	2,419,200	80%	3,225,600	74,995,200	67,737,600	74,995,200	96,768,000	99,993,600	96,768,000	99,993,600	99,993,600	96,768,000	74,995,200	72,576,000	74,995,200	
33	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
34	3600	5,184,000	60%	3,110,400	80%	4,147,200	96,422,400	87,091,200	96,422,400	124,416,000	128,563,200	124,416,000	128,563,200	128,563,200	124,416,000	96,422,400	93,312,000	96,422,400	
36	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
39	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
31	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
32	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
35	2775	3,996,000	60%	2,397,600	80%	3,196,800	74,325,600	67,132,800	74,325,600	95,904,000	99,100,800	95,904,000	99,100,800	99,100,800	95,904,000	74,325,600	71,928,000	74,325,600	
37	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
40	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
41	2575	3,708,000	60%	2,224,800	80%	2,966,400	68,968,800	62,294,400	68,968,800	88,992,000	91,958,400	88,992,000	91,958,400	91,958,400	88,992,000	68,968,800	66,744,000	68,968,800	
27 [1]	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
28 [1]	2500	3,600,000	60%	2,160,000	80%	2,880,000	66,960,000	60,480,000	66,960,000	86,400,000	89,280,000	86,400,000	89,280,000	89,280,000	86,400,000	66,960,000	64,800,000	66,960,000	
38 [1]	3000	4,320,000	60%	2,592,000	80%	3,456,000	80,352,000	72,576,000	80,352,000	103,680,000	107,136,000	103,680,000	107,136,000	107,136,000	103,680,000	80,352,000	77,760,000	80,352,000	
Washington [2]	2500	3,600,000	60%	2,160,000	80%	2,880,000	-	-	-	-	-	-	-	-	-	-	-	-	
Replace 22 [2]	2500	3,600,000	60%	2,160,000	80%	2,880,000	-	-	-	-	-	-	-	-	-	-	-	-	
SUBTOTAL	**54,050**	**77,832,000**		**46,699,200**		**62,265,600**	**1,313,755,200**	**1,186,617,600**	**1,313,755,200**	**1,695,168,000**	**1,751,673,600**	**1,695,168,000**	**1,751,673,600**	**1,751,673,600**	**1,695,168,000**	**1,313,755,200**	**1,271,376,000**	**1,313,755,200**	
SUMMARY PER MONTH																			
Average Per Well per Month (Gal) (Assuming 18 wells)							72,986,400	65,923,200	72,986,400	94,176,000	97,315,200	94,176,000	97,315,200	97,315,200	94,176,000	72,986,400	70,632,000	72,986,400	
Average Number of Wells Required to Meet Average Well Supply							8.6	8.6	9.6	7.2	6.1	7.0	7.5	7.2	6.3	8.1	9.8	9.2	
Average Number of Wells Required to Meet Average Demand (Well & Import)							10.7	10.6	11.1	9.9	9.9	10.4	11.1	11.1	10.7	13.4	12.5	11.3	
SUMMARY PER TYPICAL WINTER/SUMMER MONTHS							**Ave Winter Month**		**Ave Summer Month**		**Annual (Total)**								
3-year Historical Average Well Supply (Gal)							656,314,175		644,532,078		**7,805,077,518**								
3-year Historical Average Demand (Gal)							821,413,785		1,015,325,943		**11,020,438,370**								
Average Well Potential Production (Gal)							1,349,071,200		1,659,852,000		**18,053,539,200**								
Average Per Well (assuming 18 wells) (Gal)							74,948,400		92,214,000		**1,002,974,400**								
Average Number of Wells Required to Meet Average Well Supply							8.8		7.0		**7.8**								
Average Number of Wells Required to Meet Average Demand (Well & Import)							11.0		11.0		**11.0**								

NOTES [1]: Wells expected to require PFAS Treatment in Future
NOTES [2]: Future Wells

TABLE A-2
CITY OF ORANGE HISTORICAL AND PROJECTED WATER SUPPLY AND DEMAND

WELL NUMBER	Estimated Ave Well Capacity (GPM)	Theoretical Maximum (100%) Daily Production (GAL)		Winter Maximum Run Daily Production at Estimated % Capacity (GAL)		Summer Maximum Run Daily Production at Estimated % Capacity (GAL)	January Month Maximum Production - Winter (GAL)	February Month Maximum Production - Winter (GAL)	March Month Maximum Production - Winter (GAL)	April Month Maximum Production - Summer (GAL)	May Month Maximum Production - Summer (GAL)	June Month Maximum Production - Summer (GAL)	July Month Maximum Production - Summer (GAL)	August Month Maximum Production - Summer (GAL)	September Month Maximum Production - Summer (GAL)	October Month Maximum Production - Winter (GAL)	November Month Maximum Production - Winter (GAL)	December Month Maximum Production - Winter (GAL)	TOTAL Annual Production (GAL)
THREE-YEAR HISTORICAL PERIOD																			
3-YEAR HISTORICAL AVERAGE WELL SUPPLY							**461,731,000**	**511,222,833**	**574,312,333**	**770,922,667**	**757,851,500**	**688,821,833**	**727,434,500**	**675,185,167**	**628,488,667**	**556,316,833**	**505,626,167**	**463,065,667**	**7,320,979,167**
3-YEAR HISTORICAL AVEARAGE IMPORT							**122,133,121**	**82,858,390**	**84,053,955**	**88,278,557**	**118,765,428**	**162,666,405**	**232,045,877**	**320,180,624**	**302,601,705**	**259,888,414**	**224,292,908**	**177,109,114**	**2,174,874,498**
3-YEAR HISTORICAL AVERAGE DEMAND							**583,864,121**	**594,081,223**	**658,366,288**	**859,201,224**	**876,616,928**	**851,488,239**	**959,480,377**	**995,365,791**	**931,090,372**	**816,205,248**	**729,919,074**	**640,174,781**	**9,495,853,665**
BASIN PRODUCTION PERCENTAGE							**79.1%**	**86.1%**	**87.2%**	**89.7%**	**86.5%**	**80.9%**	**75.8%**	**67.8%**	**67.5%**	**68.2%**	**69.3%**	**72.3%**	**77.1%**
FUTURE POTENTIAL PRODUCTION OF EXISTING WELLS																			
25	1,631	2,348,720	70%	1,644,104	90%	2,113,848	50,967,224	46,034,912	50,967,224	63,415,440	65,529,288	63,415,440	65,529,288	65,529,288	63,415,440	50,967,224	49,323,120	50,967,224	
26	3,029	4,361,160	70%	3,052,812	90%	3,925,044	94,637,172	85,478,736	94,637,172	117,751,320	121,676,364	117,751,320	121,676,364	121,676,364	117,751,320	94,637,172	91,584,360	94,637,172	
27	2,856	4,112,320	70%	2,878,624	90%	3,701,088	89,237,344	80,601,472	89,237,344	111,032,640	114,733,728	111,032,640	114,733,728	114,733,728	111,032,640	89,237,344	86,358,720	89,237,344	
8 [1]	1,519	2,187,080	70%	1,530,956	90%	1,968,372	47,459,636	42,866,768	47,459,636	59,051,160	61,019,532	59,051,160	61,019,532	61,019,532	59,051,160	47,459,636	45,928,680	47,459,636	
9 [1]	1,426	2,053,280	70%	1,437,296	90%	1,847,952	44,556,176	40,244,288	44,556,176	55,438,560	57,286,512	55,438,560	57,286,512	57,286,512	55,438,560	44,556,176	43,118,880	44,556,176	
18 [2]	1,000	1,440,000	70%	1,008,000	90%	1,296,000	31,248,000	28,224,000	31,248,000	38,880,000	40,176,000	38,880,000	40,176,000	40,176,000	38,880,000	31,248,000	30,240,000	31,248,000	
19 [3]	2,312	3,328,960	70%	2,330,272	90%	2,996,064	72,238,432	65,247,616	72,238,432	89,881,920	92,877,984	89,881,920	92,877,984	92,877,984	89,881,920	72,238,432	69,908,160	72,238,432	
20 [3]	2,272	3,272,280	70%	2,290,596	90%	2,945,052	71,008,476	64,136,688	71,008,476	88,351,560	91,296,612	88,351,560	91,296,612	91,296,612	88,351,560	71,008,476	68,717,880	71,008,476	
21 [3]	2,634	3,792,560	70%	2,654,792	90%	3,413,304	82,298,552	74,334,176	82,298,552	102,399,120	105,812,424	102,399,120	105,812,424	105,812,424	102,399,120	82,298,552	79,643,760	82,298,552	
22 [3]	2,099	3,023,255	70%	2,116,279	90%	2,720,930	65,604,639	59,255,803	65,604,639	81,627,891	84,348,821	81,627,891	84,348,821	84,348,821	81,627,891	65,604,639	63,488,360	65,604,639	
23 [1]	1,598	2,301,069	70%	1,610,748	90%	2,070,962	49,933,199	45,100,954	49,933,199	62,128,865	64,199,828	62,128,865	64,199,828	64,199,828	62,128,865	49,933,199	48,322,451	49,933,199	
24 [1]	3,512	5,057,236	70%	3,540,065	90%	4,551,513	109,742,029	99,121,833	109,742,029	136,545,382	141,096,895	136,545,382	141,096,895	141,096,895	136,545,382	109,742,029	106,201,964	109,742,029	
28*	3,000	4,320,000	70%	3,024,000	90%	3,888,000	-	-	-	-	-	-	-	-	-	-	-	-	
29*	3,000	4,320,000	70%	3,024,000	90%	3,888,000	-	-	-	-	-	-	-	-	-	-	-	-	
SUBTOTAL	**31,887**	**45,917,921**		**32,142,544**		**41,326,129**	**808,930,879**	**730,647,246**	**808,930,879**	**1,006,503,859**	**1,281,109,987**	**1,006,503,859**	**1,281,109,987**	**1,281,109,987**	**1,006,503,859**	**808,930,879**	**782,836,335**	**808,930,879**	
SUMMARY PER MONTH																			
Average Per Well per Month (Gal) (Assuming 12 wells)							67,410,907	60,887,270	67,410,907	83,875,322	106,759,166	83,875,322	106,759,166	106,759,166	83,875,322	67,410,907	65,236,361	67,410,907	
Average Number of Wells Required to Meet Average Well Supply							6.8	8.4	8.5	9.2	7.1	8.2	6.8	6.3	7.5	8.3	7.8	6.9	
Average Number of Wells Required to Meet Average Demand (Well & Import)							8.7	9.8	9.8	10.2	8.2	10.2	9.0	9.3	11.1	12.1	11.2	9.5	
SUMMARY PER TYPICAL WINTER/SUMMER MONTHS							**Ave Winter Month**		**Ave Summer Month**		**Annual (Total)**								
3-year Historical Average Well Supply (Gal)							547,813,444		672,349,750		**7,320,979,167**								
3-year Historical Average Demand (Gal)							677,601,119		905,041,159		**9,495,853,665**								
Average Well Potential Production (Gal)							824,463,346		1,110,878,093		**11,612,048,634**								
Average Per Well (assuming 11 wells) (Gal)							74,951,213		100,988,918		**1,055,640,785**								
Average Number of Wells Required to Meet Average Well Supply							7.3		6.7		**6.9**								
Average Number of Wells Required to Meet Average Demand (Well & Import)							9.0		9.0		**9.0**								

NOTES:

[1]	Wells 8, 9, 19, 23, and 24 not currently producing due to PFAS.
[2]	Well 18 expected to be shut down in 5-7 years.
[3]	Wells 20, 21, and 22 to possibly be shut down due to PFAS.
*	Future Wells

TABLE A-3
CITY OF TUSTIN HISTORICAL AND PROJECTED WATER SUPPLY AND DEMAND

WELL NAME	Estimated Ave Well Capacity (GPM)	Theoretical Maximum (100%) Daily Production (GAL)		Winter Maximum Run Daily Production at Estimated % Capacity (GAL)		Summer Maximum Run Daily Production at Estimated % Capacity (GAL)	January Month Maximum Production - Winter (GAL)	February Month Maximum Production - Winter (GAL)	March Month Maximum Production - Winter (GAL)	April Month Maximum Production - Summer (GAL)	May Month Maximum Production - Summer (GAL)	June Month Maximum Production - Summer (GAL)	July Month Maximum Production - Summer (GAL)	August Month Maximum Production - Summer (GAL)	September Month Maximum Production - Summer (GAL)	October Month Maximum Production - Winter (GAL)	November Month Maximum Production - Winter (GAL)	December Month Maximum Production - Winter (GAL)	TOTAL Annual Production (GAL)
THREE-YEAR HISTORICAL PERIOD																			
3-YEAR HISTORICAL AVERAGE WELL SUPPLY							**142,330,184**	**183,828,943**	**210,850,279**	**239,364,111**	**251,682,086**	**280,967,149**	**267,649,832**	**220,485,239**	**212,664,302**	**199,173,186**	**179,751,194**	**144,068,170**	**2,532,814,676**
3-YEAR HISTORICAL AVERAGE IMPORT							**62,295,933**	**2,324,556**	**3,204,412**	**37,779,469**	**44,644,513**	**26,200,138**	**77,764,008**	**126,840,385**	**106,505,950**	**103,268,951**	**78,426,615**	**84,183,693**	**753,438,621**
3-YEAR HISTORICAL AVERAGE DEMAND							**204,626,117**	**186,153,499**	**214,054,691**	**277,143,580**	**296,326,599**	**307,167,287**	**345,413,839**	**347,325,624**	**319,170,252**	**302,442,137**	**258,177,808**	**228,251,863**	**3,286,253,297**
BASIN PRODUCTION PERCENTAGE							**69.6%**	**98.8%**	**98.5%**	**86.4%**	**84.9%**	**91.5%**	**77.5%**	**63.5%**	**66.6%**	**65.9%**	**69.6%**	**63.1%**	**77.1%**
FUTURE POTENTIAL PRODUCTION OF EXISTING WELLS																			
T-17S4	1,500	2,160,000	70%	1,512,000	90%	1,944,000	46,872,000	42,336,000	46,872,000	58,320,000	60,264,000	58,320,000	60,264,000	60,264,000	58,320,000	46,872,000	45,360,000	46,872,000	
T-COLU	1,200	1,728,000	70%	1,209,600	90%	1,555,200	37,497,600	33,868,800	37,497,600	46,656,000	48,211,200	46,656,000	48,211,200	48,211,200	46,656,000	37,497,600	36,288,000	37,497,600	
T-ED	1,200	1,728,000	70%	1,209,600	90%	1,555,200	37,497,600	33,868,800	37,497,600	46,656,000	48,211,200	46,656,000	48,211,200	48,211,200	46,656,000	37,497,600	36,288,000	37,497,600	
T-NEWP	800	1,152,000	70%	806,400	90%	1,036,800	24,998,400	22,579,200	24,998,400	31,104,000	32,140,800	31,104,000	32,140,800	32,140,800	31,104,000	24,998,400	24,192,000	24,998,400	
T-PAS	1,800	2,592,000	70%	1,814,400	90%	2,332,800	56,246,400	50,803,200	56,246,400	69,984,000	72,316,800	69,984,000	72,316,800	72,316,800	69,984,000	56,246,400	54,432,000	56,246,400	
T-WAL	800	1,152,000	70%	806,400	90%	1,036,800	-	-	-	-	-	-	-	-	-	-	-	-	
T-MS3 [2]	550	792,000	70%	554,400	90%	712,800	-	-	-	-	-	-	-	-	-	-	-	-	
T-MS4 [2]	650	936,000	70%	655,200	90%	842,400	-	-	-	-	-	-	-	-	-	-	-	-	
T-PROS [3]	650	936,000	70%	655,200	90%	842,400	20,311,200	18,345,600	20,311,200	25,272,000	26,114,400	25,272,000	26,114,400	26,114,400	25,272,000	20,311,200	19,656,000	20,311,200	
T-TUST [3]	650	936,000	70%	655,200	90%	842,400	20,311,200	18,345,600	20,311,200	25,272,000	26,114,400	25,272,000	26,114,400	26,114,400	25,272,000	20,311,200	19,656,000	20,311,200	
T-VNBG [3]	1,200	1,728,000	70%	1,209,600	90%	1,555,200	37,497,600	33,868,800	37,497,600	46,656,000	48,211,200	46,656,000	48,211,200	48,211,200	46,656,000	37,497,600	36,288,000	37,497,600	
NEW [1]	1,500	2,160,000	70%	1,512,000	90%	1,944,000	-	-	-	-	-	-	-	-	-	-	-	-	
SUBTOTAL	**12,500**	**18,000,000**		**12,600,000**		**16,200,000**	**281,232,000**	**254,016,000**	**281,232,000**	**349,920,000**	**361,584,000**	**349,920,000**	**361,584,000**	**361,584,000**	**349,920,000**	**281,232,000**	**272,160,000**	**281,232,000**	
SUMMARY PER MONTH																			
Average Per Well per Month (Gal) (Assuming 8 wells)							35,154,000	31,752,000	35,154,000	43,740,000	45,198,000	43,740,000	45,198,000	45,198,000	43,740,000	35,154,000	34,020,000	35,154,000	
Average Number of Wells Required to Meet Average Well Supply							4.0	5.8	6.0	5.5	5.6	6.4	5.9	4.9	4.9	5.7	5.3	4.1	
Average Number of Wells Required to Meet Average Demand (Well & Import)							5.8	5.9	6.1	6.3	6.6	7.0	7.6	7.7	7.3	8.6	7.6	6.5	
SUMMARY PER TYPICAL WINTER/SUMMER MONTHS							**Ave Winter Month**		**Ave Summer Month**		**Annual (Total)**								
3-year Historical Average Well Supply (Gal)							183,365,480		238,770,299		**2,532,814,676**								
3-year Historical Average Demand (Gal)							228,067,927		319,640,956		**3,286,253,297**								
Average Well Potential Production (Gal)							286,632,000		344,304,000		**3,785,616,000**								
Average Per Well (assuming 8 wells) (Gal)							35,829,000		43,038,000		**473,202,000**								
Average Number of Wells Required to Meet Average Well Supply							5.1		5.5		**5.4**								
Average Number of Wells Required to Meet Average Demand (Well & Import)							6.4		7.4		**6.9**								

NOTES:

[1] New well expected in 2-3 years as replacement for T-BENE well.

[2] Wells T-MS3 and T-MS4 not producing since RO system is not operable.

[3] Wells T-PROS, T-TUST, AND T-VNBG to possibly be shut down due to PFAS.

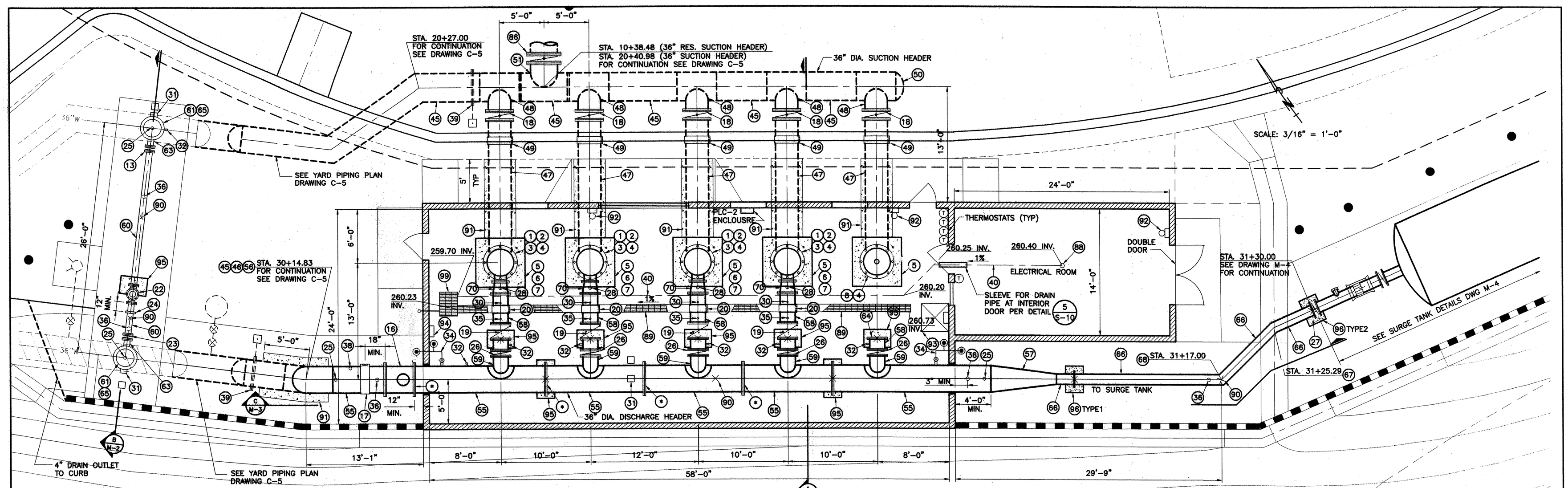
Orange County Water District
Moulton Niguel Water District

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

FINAL DRAFT PRELIMINARY REPORT

(CONNECTIONS TO THE EAST ORANGE COUNTY FEEDER #2)

APPENDIX B
PUMP STATION CONCEPTUAL LAYOUT



CONSTRUCTION NOTES:

PUMP ASSEMBLY

(1) VERTICAL TURBINE PUMP, 4500 GPM @ 250' TDH/6000 GPM @ 192' TDH, 1770 RPM
(2) ELECTRIC MOTOR, 400 HP, 1800 RPM, 480V (PREMIUM EFFICIENCY)(WP1)
(3) FABRICATED STEEL PUMP DISCHARGE HEAD WITH 16" DISCHARGE FLANGE (FUSION EPOXY LINED)
(4) 42" O.D. X 1/2" STEEL PUMP BARREL WITH VORTEX BREAKER (FUSION EPOXY LINED) PER DETAIL 5/D-5
(5) 5'-6" X 5'-6" PUMP BASE PER DETAIL 3/D-5
(6) PUMP BASE PLATE PER DETAIL 6/D-5
(7) PUMP BARREL: AIR VENT WITH LOW PRESSURE SWITCH PER DETAIL 1/D-5
(8) BLIND FLANGE – BASE PLATE W/ 1" TAP AND SS BALL VALVE W/ FULL FACE GASKET

VALVES AND METERS

(13) 8" GATE VALVE W/ HAND WHEEL OPERATOR
(16) 36" MAGNETIC FLOWMETER (ABB MAG MASTER PLUS OR TOSHIBA)
(17) 36" DEPEND-O-LOK COUPLING (FXF TYPE 2) (1/4" THK. X 12"W)
(18) 30" BUTTERFLY VALVE W/VALVE BOX PER IRWD STD DWG. W-22
(19) 20" SILENT CHECK VALVE
(20) 20" DEPEND-O-LOK COUPLING (FXF TYPE 2) (1/4" THK. X 12"W)
(22) 8" PRESSURE RELIEF VALVE W/ VALVE POSITION TRANSMITTER (SET TO RELIEF HIGH PRESSURE AT 130 PSI)
(23) 8" BUTTERFLY VALVE W/ HAND WHEEL OPERATOR
(24) 8" GROOVED END COUPLING
(25) 2" COMBINATION AIR AND VACUUM VALVE PER DETAIL 6/D-4
(26) 20" BUTTERFLY VALVE W/ HAND WHEEL OPERATOR
(27) 14" BUTTERFLY VALVE W/ HANDWHEEL OPERATOR
(28) 2" AIR VALVE – VERTICAL PUMP PER DETAIL 5/D-4
(86) 36" BUTTERFLY VALVE W/ VALVE BOX PER IRWD STD. DWG. W-22

APPURTENANCES

(30) HIGH PRESSURE SWITCH AND GAUGE PER DETAIL 3/D-4
(31) PRESSURE TRANSMITTER AND PRESSURE GAUGE PER DETAIL 4/D-4
(32) WATER QUALITY SAMPLING TAP PER DETAIL 1/D-4
(33) FLANGE INSULATING TEST KIT PER IRWD STD. DWG. CP-13 AND CP-14
(34) WASH DOWN CONNECTION PER DETAIL 5/D-6
(35) 2" EXTRA HEAVY COUPLING, 2" X 1" SS BUSHING, AND 1" SS BALL VALVE
(36) DRAIN CONNECTION: 2 1/2" EXTRA HEAVY HALF COUPLING, 2 1/2" X 2" SS BUSHING, 90° SS STREET ELBOW, 2" SS NIPPLE, AND 2" SS BALL VALVE
(38) METER TEST TAP PER DETAIL 2/D-4
(39) FLANGE INSULATING KIT PER IRWD STD DWG CP-13 AND CP-14 AND INSULATOR TEST STATION PER IRWD STD DWG CP-2
(40) 4" SCH 80 PVC DRAIN PIPE AND FITTINGS

BURIED PIPE AND FITTINGS (CML&C)

(45) 36" STEEL PIPE
(46) 36" 90° STEEL BEND
(47) 30" STEEL PIPE
(48) 30" FLG. STEEL OUTLET PER DETAIL 4/D-3
(49) 30" DEPEND-O-LOK (FXF TYPE 2) (1/4" THK X 12" W)
(50) 36" DISHED HEAD
(51) 36" FLG. STEEL OUTLET PER DETAIL 4/D-3

EXPOSED PIPE AND FITTINGS (CML & PAINTED)

(55) 36" STEEL PIPE
(56) 36" 90° STEEL BEND
(57) 36" X 14" CONCENTRIC STEEL REDUCER
(58) 20" STEEL PIPE
(59) 20" FLG. STEEL OUTLET PER DETAIL 4/D-3
(60) 8" STEEL PIPE
(61) 24" STEEL PIPE
(63) 8" FLG. OUTLET PER DETAIL 4/D-3
(64) 20" BLIND FLANGE WITH FULL FACE GASKET
(65) 24" BLIND FLANGE W/ 2 1/2" TAP
(66) 14" STEEL PIPE
(67) 14" 22.5°± STEEL BEND
(68) 14" 45°± STEEL BEND
(70) 20" X 16" ECCENTRIC STEEL REDUCER (FLAT ON TOP)

MISCELLANEOUS ITEMS

(88) FLOOR DRAIN PER DETAIL 4/D-8
(89) TRENCH DRAIN PER DETAIL 5/D-8
(90) ADJUSTABLE PIPE SUPPORT PER DETAIL 2/D-6
(91) CONCRETE ENCASEMENT PER DETAIL 2/D-3
(92) FIRE EXTINGUISHER
(93) 3'-6" X 3'-6" ROOF HATCH AND PRE-FABRICATED ALUMINUM LADDER WITH LADDER-UP EXTENSION.
(94) HOSE REEL 6/D-7
(95) INDOOR CONCRETE PIPE SUPPORT PER DETAIL 3/D-6
(96) OUTDOOR CONCRETE PIPE SUPPORT PER DETAIL 1/D-6
(98) SUMP PUMP PER DETAIL 7/D-8

NOTES TO CONTRACTOR:

1. CONTRACTOR SHALL VERIFY EXIST. FLANGE BOLT PATTERN. THE NEW FLANGE SHALL MATCH THE OLD FLANGE.
2. ALL PIPING AND SPECIALS SHALL BE STEEL PIPE, CML AND PAINTED ABOVE GROUND AND CML&C BELOW GROUND UNLESS OTHERWISE NOTED.
3. ALL STEEL PIPE JOINTS SHALL BE WELDED PER IRWD STANDARD DWG. W-20.
4. ALL BURIED, EXPOSED, AND WITHIN BUILDING FLANGES SHALL BE JOINED UTILIZING TYPE 316 STAINLESS STEEL NUTS, BOLTS, AND WASHERS.
5. ALL VALVES SHALL BE CLASS 150 UNLESS NOTED OTHERWISE.

(*) THE CONTRACTOR MAY ELECT TO WELD FLANGE IN FIELD TO ACCOMODATE INSTALLATION.

PIPE SCHEDULE		
NOMINAL DIAMETER	STL CYL. MIN. O.D.	MIN. THICKNESS
36"	37.25"	0.25"
30"	31.25"	0.25"
24"	25.25"	0.25"
20"	21.125"	0.25"
14"	15.125"	0.25"
8"	8.625"	STD. WT.

CONCEPTUAL LAYOUT

REV	DESCRIPTION	ENGR	DATE	APPD	DATE

SCALE 3/16" = 1'-0"
DATE SEPT. 2008
FILENAME MEPL01
DESIGNED BY MWT
DRAWN BY LEG
CHECKED BY TLE

REGISTERED PROFESSIONAL ENGINEER THOMAS L. EPPERSON No. 36399 Exp. 06-30-10 STATE OF CALIFORNIA CIVIL

PLANS PREPARED BY:
TETRA TECH
16241 Laguna Canyon Road
Suite 200
Irvine, California 92618
(949) 727-7099
(949) 727-7097 FAX

THOMAS L. EPPERSON RCE 36399 DATE 6/24/08
STEVEN L. MALLOY RCE 31926 DATE

IRVINE RANCH WATER DISTRICT
IRWD INTERCONNECTION TO SOC WATER TRANSMISSION MAINS
SOUTH COUNTY ZONE 1-3 BPS (PHASE B) AND ZONE 3-4 BPS MODIFICATIONS (PHASE C)

SOUTH COUNTY ZONE 1-3 BPS

MECHANICAL PLAN

DRAWING M-1
PROJECT NO. 0906.0269
SHT. NO. 12 OF 60

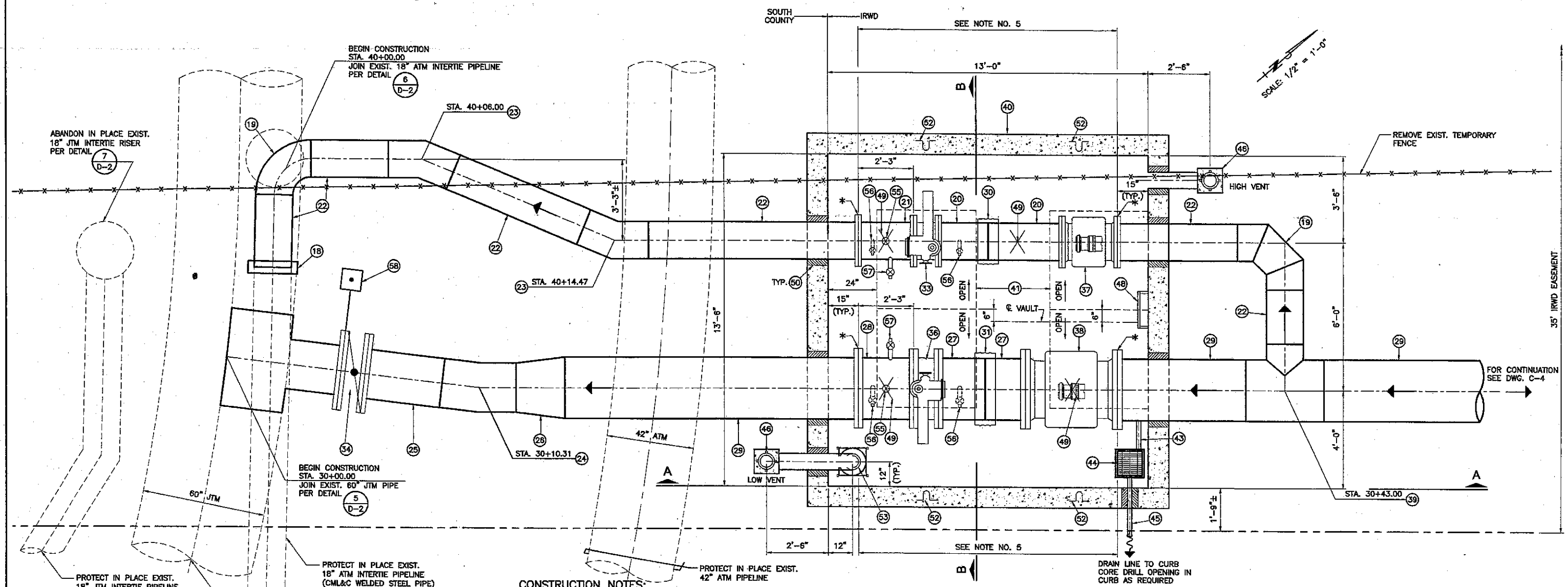
Orange County Water District
Moulton Niguel Water District

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

FINAL DRAFT PRELIMINARY REPORT

(CONNECTIONS TO THE EAST ORANGE COUNTY FEEDER #2)

APPENDIX C
TYPICAL CONNECTION TO EOCF#2



PIPE SCHEDULE		
NOMINAL DIA.	STL. CYL. MIN. O.D.	MIN. THK.
18"	19.3"	0.25"
24"	25.3"	0.25"
30"	31.5"	0.375"

NOTES:

1. ALL EXPOSED FLANGES WITHIN THE VAULT AND BURIED FLANGES SHALL BE JOINED UTILIZING TYPE 316 STAINLESS STEEL NUTS, BOLTS AND WASHERS.
2. THE VAULT FLOOR SHALL BE SLOPED A MINIMUM OF 1/4" PER FOOT TOWARD THE SUMP.
3. VAULT COVER SLAB SHALL BE REMOVEABLE VAULT. MANUFACTURER SHALL PROVIDE SUFFICIENT SIZE AND QUANTITY OF EYEBOLTS/SWIFTLIFTS.
4. ALL PIPING WITHIN THE VAULT SHALL BE PAINTED PER PROJECT SPECIFICATIONS.
5. FOR EARLY OCCUPANCY (FEBRUARY 2007), IF VALVES AND/OR METERS ARE NOT YET AVAILABLE, CONTRACTOR SHALL FURNISH AND INSTALL CML&PAINTED STEEL SPOOL AND COUPLING WITH INSERTION FLOW SENSOR, MONITOR AND BATTERY PACK (ONE PER SPOOL – TWO REQUIRED) AS REQUIRED TO ALLOW USAGE OF FACILITY. ONCE EARLY OCCUPANCY IS COMPLETED, THE CONTRACTOR SHALL REMOVE AND INSTALL VALVES AND METERS AS SHOWN ON PLANS. INSERTION FLOW SENSOR, MONITOR AND BATTERY PACK WILL BECOME PROPERTY OF IRWD.

* THE CONTRACTOR MAY ELECT TO WELD FLANGE IN FIELD TO ACCOMODATE INSTALLATION THROUGH VAULT OPENING.

CONSTRUCTION NOTES:

(18) 18-INCH BUTTSTRAP PER IRWD STD. DWG. W-20
(19) 18-INCH 90 DEG. BEND (CML&C)
(20) 18-INCH CML&PAINTED STEEL PIPE, FLG. X G.E.
(21) 18-INCH CML&PAINTED STEEL PIPE, FLG. X FLG.
(22) 18-INCH CML&C STEEL PIPE
(23) 18-INCH 22.5 DEG. BEND (CML&C)
(24) 24-INCH BEND (CML&C) (COMBINED HORIZ./VERT.)
(25) 24-INCH CML&C STEEL PIPE
(26) 30-INCH X 24-INCH CML&C STEEL CONCENTRIC REDUCER
(27) 30-INCH CML&PAINTED STEEL PIPE, FLG X G.E.
(28) 30-INCH CML&PAINTED STEEL PIPE, FLG. X FLG.
(29) 30-INCH CML&C STEEL PIPE
(30) 18" DEPEND O-LOK COUPLING (FxF) (W=10")
(31) 30" DEPEND O-LOK COUPLING (FxF) (W=10")
(32) NOT USED
(33) 18" BUTTERFLY VALVE WITH ELECTRIC ACTUATOR (CLASS 150) (MODULATING)
(34) 24" BUTTERFLY VALVE WITH VALVE BOX PER IRWD STD. DWG. W-22 (BUTTERFLY VALVE WILL BE PROVIDED BY DISTRICT)
(35) NOT USED
(36) 30" BUTTERFLY VALVE WITH ELECTRIC ACTUATOR (CLASS 150) (MODULATING)
(37) 18" FLANGED MAGNETIC FLOWMETER, ABB
(38) 30" FLANGED MAGNETIC FLOWMETER, ABB
(39) 30-INCH X 18-INCH TEE/OUTLET
(40) 13'x13'-6" PRECAST CONCRETE PANEL VAULT WITH REMOVEABLE COVER SLAB (SEE NOTE NO. 3)
(41) 4'X8' (CLR. OPENING) TROUGH FRAME DOUBLE DOOR ALUMINUM VAULT HATCH WITH ALL STAINLESS STEEL HARDWARE. PROVIDE DIAMOND PLATE ALUMINUM ACCESS DOORS WITH RECESSED PADLOCK HASP (EACH DOOR: 4'x4')
(42) NOT USED
(43) 2" SCH. 80 PVC DRAIN (FROM VAULT COVER TROUGH DRAIN TO VAULT SUMP) PROVIDE PVC DRAIN SUPPORT PER DETAIL 5 M-4
(44) VAULT SUMP PER IRWD STD. DWG. G-6
(45) 2" SCH. 80 PVC DRAIN LINE
(46) 8" AIR VENT ASSEMBLY PER DETAIL 2 M-4
(48) LADDER PER IRWD STD. DWG. G-4
(49) PIPE SUPPORT PER IRWD STD. DWG. W-24
(50) 1" SPONGE RUBBER JOINT AROUND PIPE. DRY PACK NON-SHRINK CONCRETE MORTAR TO SEAL OPENING
(52) HANDLING EYE PER DETAIL 6 M-4
(53) DIRECT DRIVE INLINE FAN (194 CFM @ .1000 SP) WITH MOTOR COVER AND EPOXY COATING
(55) BLIND TRANSMITTER AND PRESSURE GAGE PER SHT. 2 OF IRWD STD. DWG. W-15 EXCEPT MOFIFIED WITH 2" EXTRA HEAVY HALF COUPLING, 2"X1" SS BUSHING, 1" SS NIPPLE AND 1" SS BALL VALVE (F.I.P.T.) IN LIEU OF SERVICE SADDLE AND BALL CORP
(56) DRAIN CONNECTION: 2-½" EXTRA HEAVY HALF COUPLING, 2-½" X 2" SS BUSHING, 90 DEG. SS STREET ELBOW, 2" SS NIPPLE AND 2" SS BALL VALVE
(57) METER TEST TAP PER DETAIL 4 M-4
(58) INSULATING FLANGE AND INSULATOR TEST STATION PER IRWD STD. DWG. CP-2

CONCEPTUAL

SCALE 1/2"=1'-0"
2 1 0 1 2 3 4

REV	DESCRIPTION	ENGR	DATE	APPD	DATE

SCALE 1/2" = 1'-0"
DATE SEPTEMBER 2006
FILENAME MEPL01
DESIGNED BY MWT
DRAWN BY ERG
CHECKED BY TLE

REGISTERED PROFESSIONAL ENGINEER THOMAS L. EPPERSON No. 36399 EXP. 06-30-08 CIVIL STATE OF CALIFORNIA

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(949) 727-7097 FAX

THOMAS L. EPPERSON RCE 36399 DATE 9/27/06
STEVEN L. MALLOY RCE 31926 DATE 9-27-06

IRVINE RANCH WATER DISTRICT
IRWD INTERCONNECTION TO SOC WATER TRANSMISSION MAINS
PHASE A

JTM / ATM CONNECTION
FLOW CONTROL FACILITY MECHANICAL PLAN

DRAWING M-1
PROJECT NO. 2184.0019
SHT. NO. 11 OF 22

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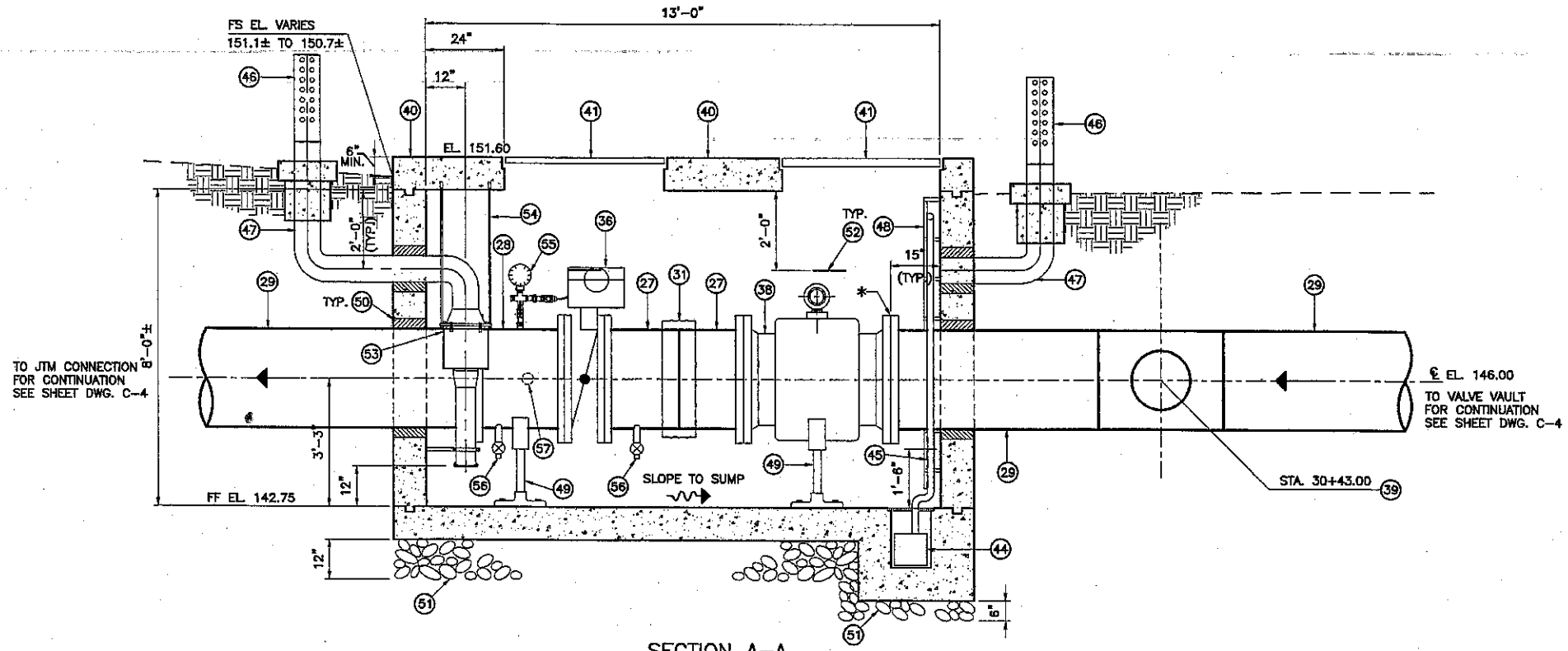
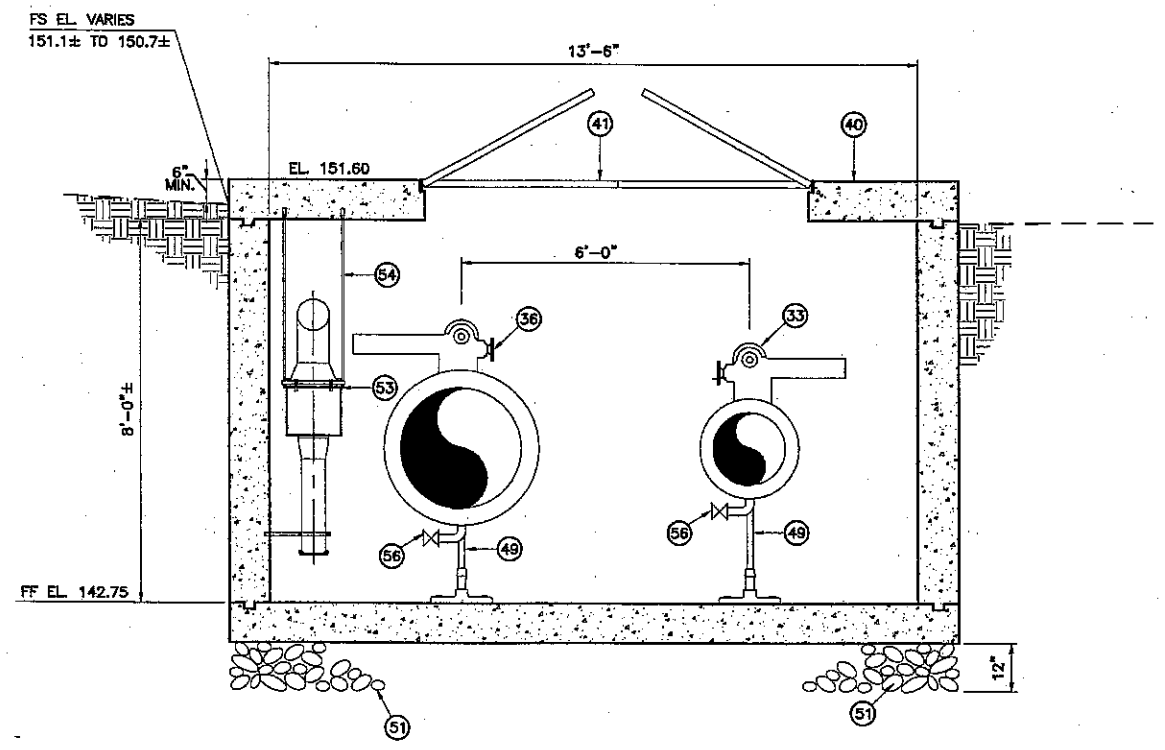


SECTION A-A



SECTION B-B

CONSTRUCTION NOTES:

(20) 18-INCH CML&PAINTED STEEL PIPE, FLG. X G.E.

(27) 30-INCH CML&PAINTED STEEL PIPE, FLG X G.E.

(28) 30-INCH CML&PAINTED STEEL PIPE, FLG X FLG

(29) 30-INCH CML&C STEEL PIPE

(31) 30" DEPEND O-LOK COUPLING (FxF) (W=10")

(33) 18" BUTTERFLY VALVE WITH ELECTRIC ACTUATOR (CLASS 150) (MODULATING)

(36) 30" BUTTERFLY VALVE WITH ELECTRIC ACTUATOR (CLASS 150) (MODULATING)

(38) 30" FLANGED MAGNETIC FLOWMETER, ABB

(39) 30-INCH X 18-INCH TEE/OUTLET

(40) 13'x13'-6" PRECAST CONCRETE PANEL VAULT WITH REMOVEABLE COVER SLAB (SEE NOTE NO. 3)

(41) 4'X8' (CLR. OPENING) TROUGH FRAME DOUBLE DOOR ALUMINUM VAULT HATCH WITH ALL STAINLESS STEEL HARDWARE. PROVIDE DIAMOND PLATE ALUMINUM ACCESS DOORS WITH RECESSED PADLOCK HASP (EACH DOOR: 4'x4')

(42) NOT USED

(44) VAULT SUMP PER IRWD STD. DWG. G-6

(45) 2" SCH. 80 PVC DRAIN LINE

(46) 8" AIR VENT ASSEMBLY PER DETAIL (2/M-4)

(47) 8" DIA. PVC SCH. 80 PIPE

(48) LADDER PER IRWD STD. DWG. G-4

(49) PIPE SUPPORT PER IRWD STD. DWG. W-24

(50) 1" SPONGE RUBBER JOINT AROUND PIPE. DRY PACK NON-SHRINK CONCRETE MORTAR TO SEAL OPENING

(51) 3/4" CRUSHED ROCK

(52) HANDLING EYE PER DETAIL (6/M-4)

(53) DIRECT DRIVE INLINE FAN (194 CFM @ .1000 SP) WITH MOTOR COVER AND EPOXY COATING

(54) VENTILATION FAN SUPPORT PER DETAIL (3/M-4)

(55) BLIND TRANSMITTER AND PRESSURE GAGE PER SHT. 2 OF IRWD STD. DWG. W-15 EXCEPT MOFIFIED WITH 2" EXTRA HEAVY HALF COUPLING, 2"X1" SS BUSHING, 1" SS NIPPLE AND 1" SS BALL VALVE (F.I.P.T.) IN LIEU OF SERVICE SADDLE AND BALL CORP

(56) DRAIN CONNECTION: 2-1/2" EXTRA HEAVY HALF COUP,ING, 2-1/2" X 2" SS BUSHING, 90 DEG. SS STL ELBOW, 2" SS NIPPLE AND 2" SS BALL VALVE

(57) METER TEST TAP PER DETAIL (4/M-4)

NOTES:

1. ALL EXPOSED FLANGES WITHIN THE VAULT AND BURIED FLANGES SHALL BE JOINED UTILIZING TYPE 316 STAINLESS STEEL NUTS, BOLTS AND WASHERS.
2. THE VAULT FLOOR SHALL BE SLOPED A MINIMUM OF 1/4" PER FOOT TOWARD THE SUMP.
3. VAULT COVER SLAB SHALL BE REMOVEABLE VAULT. MANUFACTURER SHALL PROVIDE SUFFICIENT SIZE AND QUANTITY OF EYEBOLTS/SWIFTLIFTS.
4. ALL PIPING WITHIN THE VAULT SHALL BE PAINTED PER PROJECT SPECIFICATIONS.

* THE CONTRACTOR MAY ELECT TO WELD FLANGE IN FIELD TO ACCOMODATE INSTALLATION THROUGH VAULT OPENING.

CONCEPTUAL

SCALE 1/2"=1'-0"
2 1 0 1 2 3 4

REV	DESCRIPTION	ENGR	DATE	APPD	DATE

SCALE 1/2" = 1'-0"
DATE SEPTEMBER 2006
FILENAME MEPL03
DESIGNED BY MWT
DRAWN BY ERG
CHECKED BY TLE

REGISTERED PROFESSIONAL ENGINEER — THOMAS L. EPPERSON — No. 36399 — Exp. 06-30-08 — STATE OF CALIFORNIA

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THOMAS L. EPPERSON RCE 36399 DATE 9/27/06

STEVEN L. MALLOY RCE 31926 DATE 9-27-06

IRVINE RANCH WATER DISTRICT

IRWD INTERCONNECTION TO SOC WATER TRANSMISSION MAINS

PHASE A

JTM / ATM CONNECTION

FLOW CONTROL FACILITY
MECHANICAL SECTIONS

DRAWING M-2
PROJECT NO. 2184.0019
SHT. NO. 12 OF 22

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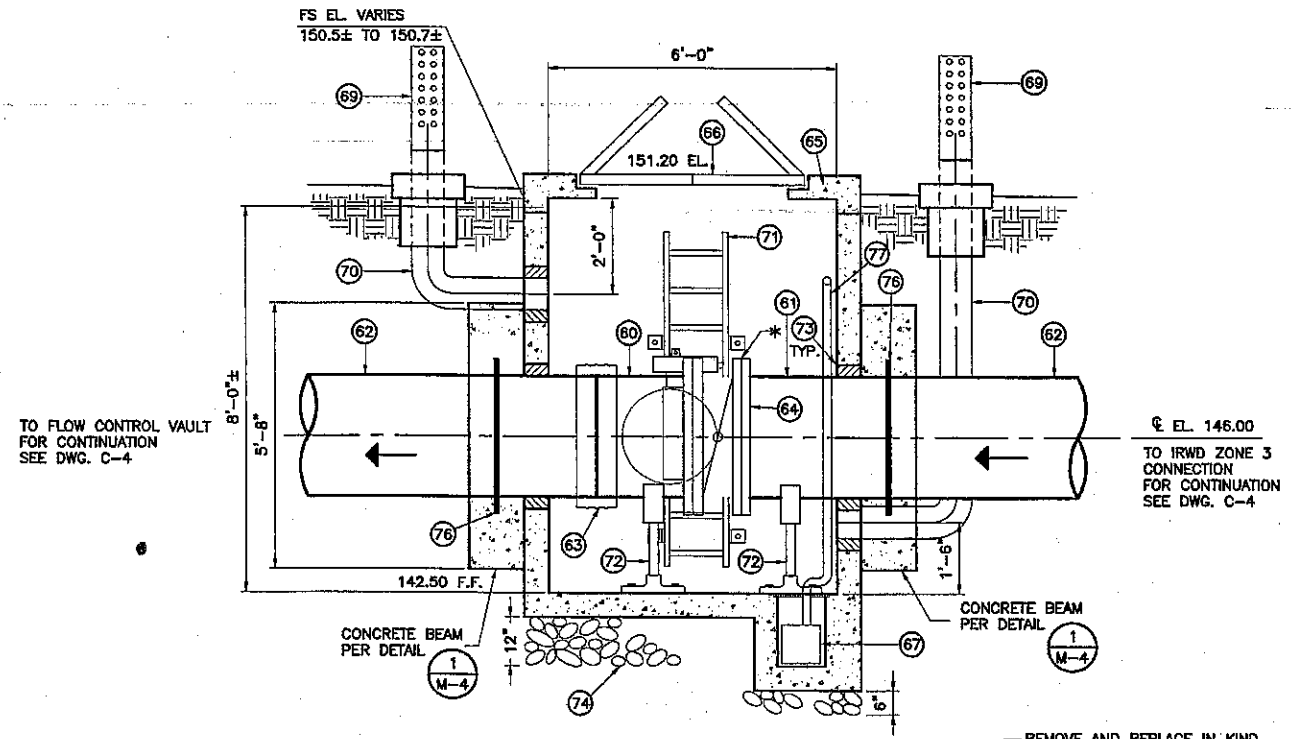


SECTION A–A

SCALE: 1/2" = 1'-0"

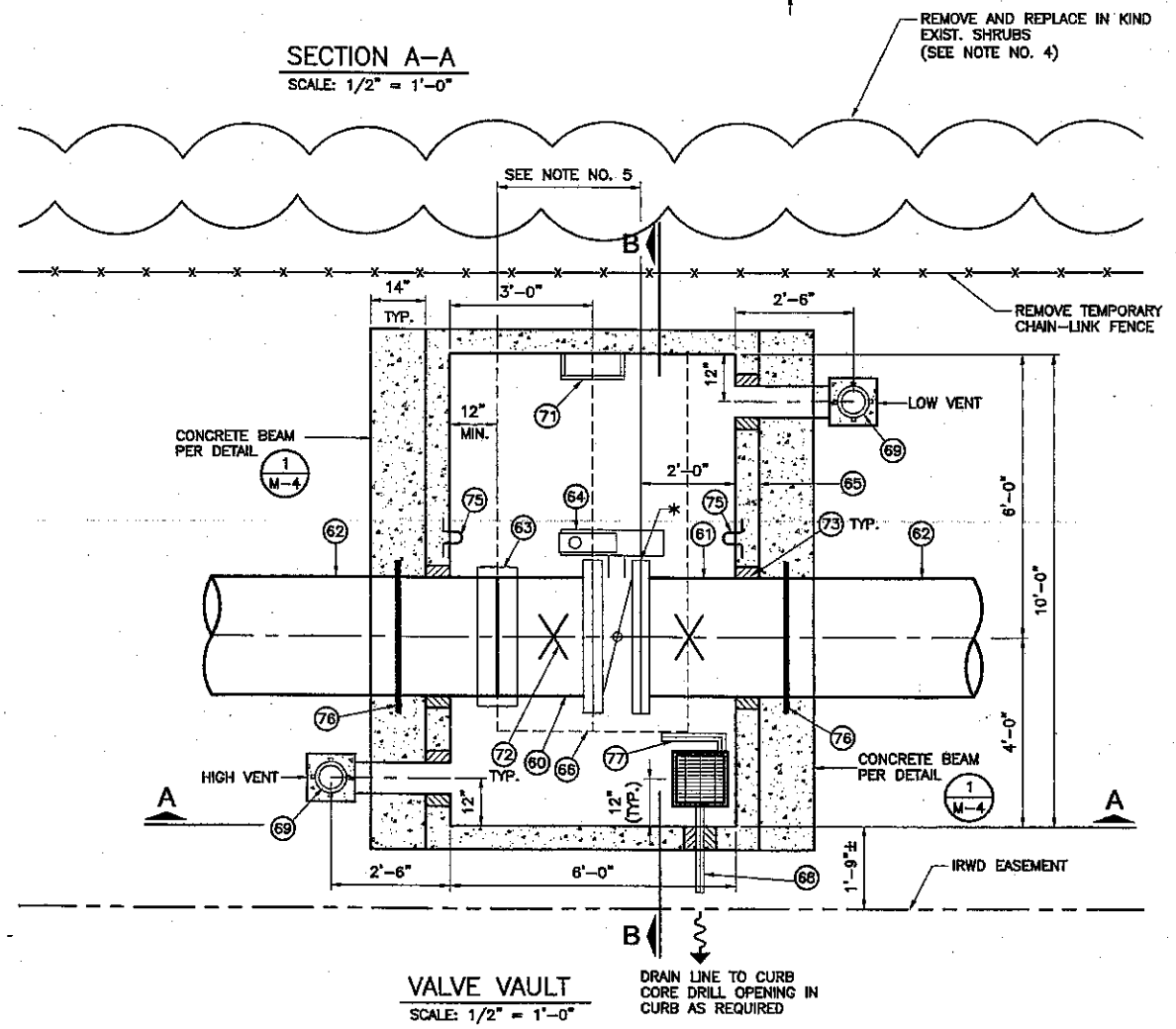
CONSTRUCTION NOTES:

60. 30–INCH CML&PAINTED STEEL PIPE, FLG X G.E.
61. 30–INCH CML&PAINTED STEEL PIPE, FLG. X P.E.
62. 30–INCH CML&C STEEL PIPE
63. 30" DEPEND O–LOK COUPLING (FxF) (W=10")
64. 30" BUTTERFLY VALVE W/ HANDWHEEL (CLASS 150)
65. 6'x 10'x 8'–0" PRECAST CONCRETE VAULT (BATH–TUB TYPE)
66. 4'X8' (CLR. OPENING) TROUGH FRAME DOUBLE DOOR ALUMINUM VAULT HATCH WITH ALL STAINLESS STEEL HARDWARE. PROVIDE DIAMOND PLATE ALUMINUM ACCESS DOORS WITH RECESSED PADLOCK HASP (EACH DOOR: 2'x8')
67. VAULT SUMP PER IRWD STD. DWG. G–6
68. 2" SCH. 80 PVC DRAIN LINE
69. 8" AIR VENT ASSEMBLY PER DETAIL 2 M-4
70. 8" DIA. PVC SCH. 80 PIPE
71. LADDER PER IRWD STD. DWG. G–4
72. PIPE SUPPORT PER IRWD STD. DWG. W–24
73. 1" SPONGE RUBBER JOINT AROUND PIPE. DRY PACK NON–SHRINK CONCRETE MORTAR TO SEAL OPENING
74. 3/4" CRUSHED ROCK
75. HANDLING EYE PER DETAIL 6 M-4
76. ANCHOR RING PER DETAIL 1 M-4
77. 2" SCH. 80 PVC DRAIN (FROM VAULT COVER TROUGH DRAIN TO VAULT SUMP) PROVIDE PVC DRAIN SUPPORT PER DETAIL 5 M-4

NOTES TO CONTRACTOR

1. ALL PIPING WITHIN THE VAULT SHALL BE PAINTED PER PROJECT SPECIFICATIONS.
2. ALL BURIED AND EXPOSED (WITHIN VAULT) FLANGES SHALL BE JOINED UTILIZING TYPE 316 STAINLESS STEEL NUTS, BOLTS AND WASHERS.
3. THE VAULT FLOOR SHAL BE SLOPED A MINIMUM OF ¼" PER FOOT TOWARD THE SUMP.
4. ALL LANDSCAPE AREAS (INCLUDING BUSHES) SHALL BE RESTORED TO ITS ORIGINAL CONDITION.
5. FOR EARLY OCCUPANCY (FEBRUARY 2007); IF VALVE IS NOT YET AVAILABLE, CONTRACTOR SHALL FURNISH AND INSTALL CML&PAINTED STEEL SPOOL AND COUPLING AS REQUIRED TO ALLOW USAGE OF FACILITY. ONCE EARLY OCCUPANCY IS COMPLETED, THE CONTRACTOR SHALL REMOVE AND INSTALL VALVE AS SHOWN ON PLANS.

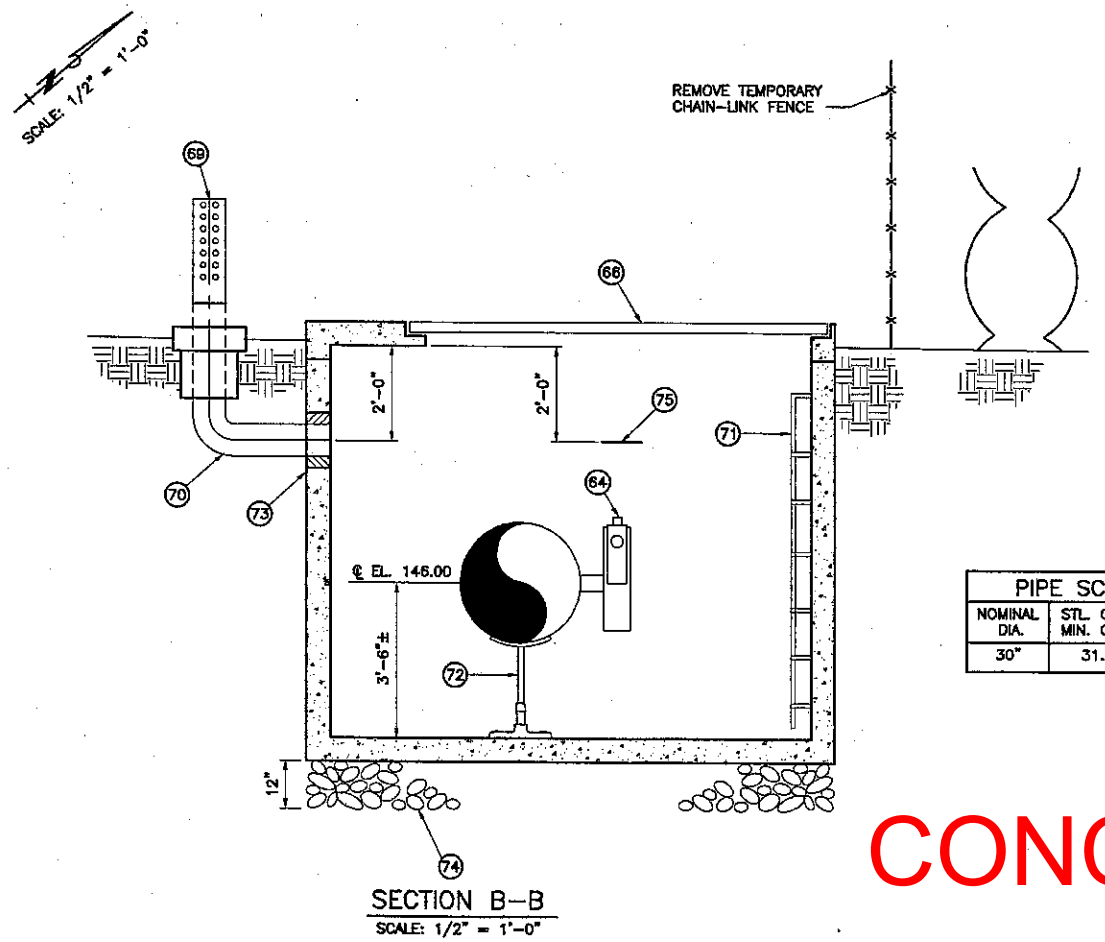
* THE CONTRACTOR MAY ELECT TO WELD FLANGE IN FIELD TO ACCOMODATE INSTALLATION THROUGH VAULT OPENING.



VALVE VAULT

SCALE: 1/2" = 1'-0"

DRAIN LINE TO CURB CORE DRILL OPENING IN CURB AS REQUIRED



SECTION B–B

SCALE: 1/2" = 1'-0"

PIPE SCHEDULE		
NOMINAL DIA.	STL. CYL. MIN. O.D.	MIN. THK.
30"	31.5"	0.375"

CONCEPTUAL

SCALE 1/2"=1'-0"
2 1 0 1 2 3 4

REV	DESCRIPTION	ENGR	DATE	APPD	DATE

SCALE 1/2" = 1'-0"
DATE SEPTEMBER 2006
FILENAME MEPL01
DESIGNED BY MWT
DRAWN BY ERG
CHECKED BY TLE

REGISTERED PROFESSIONAL ENGINEER — THOMAS L. EPPERSON — No. 36399 — Exp. 06-30-08 — CIVIL — STATE OF CALIFORNIA

PLANS PREPARED BY:
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(949) 727–7097 FAX

THOMAS L. EPPERSON RCE 36399 DATE 9/27/06
STEVEN L. MALLOY RCE 31926 DATE 9-27-06

IRVINE RANCH WATER DISTRICT

IRWD INTERCONNECTION TO SOC WATER TRANSMISSION MAINS

PHASE A

JTM / ATM CONNECTION

VALVE VAULT
MECHANICAL PLAN AND CROSS SECTIONS

DRAWING M-3
PROJECT NO. 2184.0019
SHT. NO. 13 OF 22

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Orange County Water District
Moulton Niguel Water District

EVAULATION OF GROUNDWATER CONVEYANCE OPTIONS

FINAL DRAFT PRELIMINARY REPORT

(CONNECTIONS TO THE EAST ORANGE COUNTY FEEDER #2)

APPENDIX D
PRELIMINARY ESTIMATES OF PROBABLE CONSTRUCTION COSTS

City of Santa Ana - East Station Facility

14 cfs Excess Groundwater

Item No.	Description	Quantity	Units	Unit Cost	Item Cost
1	Mobilization/Demobilization/Miscellaneous	1	LS	$ 1,200,000	$ 1,200,000
2	EOCF#2 Pump Station (4 pumps - 400 hp motors) w/Surge Tank	1	LS	$ 3,400,000	$ 3,400,000
3	Reservoir Piping/Connections	1	LS	$ 80,000	$ 80,000
4	East Station Pump Station Upgrade	1	LS	$ 300,000	$ 300,000
5	New Well and Chlorination Treatment (to reservoir)	1	LS	$ 3,600,000	$ 3,600,000
6	24-inch EOCF#2 Water Main	4,300	LF	$ 400	$ 1,720,000
7	24-inch EOCF#2 Water Main (Arterial Street)	1,300	LF	$ 500	$ 650,000
8	Pavement Replacement (Grind and Cap)	160,000	SF	$ 3	$ 480,000
9	Pressure Reducing Facility (above ground) at SA-7 PRS Facility	1	LS	$ 100,000	$ 100,000
10	Piping Connections at SA-7 PRS Facility	1	LS	$ 60,000	$ 60,000
11	Connection to SA 24-inch Piping including 24" Valve on exist. Piping	1	LS	$ 80,000	$ 80,000
12	24-inch Piping and Valve	1	LS	$ 60,000	$ 60,000
13	24-inch Meter Flow Control Vault	1	LS	$ 230,000	$ 230,000
14	Connection to SA-7 Piping including 24" Valve on existing Piping	1	LS	$ 120,000	$ 120,000
15	Electrical and Scada Control Facilities	1	LS	$ 100,000	$ 100,000
16	Redhill and Warner Pavement (Grind and Cap)	40,000	SF	$ 3	$ 120,000
				SUBTOTAL	**$ 12,300,000**
				30% CONTINGENCY	**$ 3,700,000**
				TOTAL	**$ 16,000,000**

City of Santa Ana - Cambridge Facility

10 cfs Excess Groundwater

Item No.	Description	Quantity	Units	Unit Cost	Item Cost
1	Mobilization/Demobilization/Miscellaneous	1	LS	$ 1,100,000	$ 1,100,000
2	EOCF#2 Pump Station (4 pumps - 250 hp motors) w/Surge Tank	1	LS	$ 3,000,000	$ 3,000,000
3	Reservoir Piping/Connections	1	LS	$ 120,000	$ 120,000
4	New Well 22 Replacement and Chlorination Treatment (to reservoir)	1	LS	$ 3,600,000	$ 3,600,000
5	18-inch EOCF#2 Water Main	3,900	LF	$ 360	$ 1,404,000
6	18-inch EOCF#2 Water Main (Arterial Street)	2,200	LF	$ 450	$ 990,000
7	Pavement Replacement (Grind and Cap)	200,000	SF	$ 3	$ 600,000
8	Pressure Reducing Facility	1	LS	$ 200,000	$ 200,000
9	18-inch Meter Flow Control Vault	1	LS	$ 200,000	$ 200,000
10	Connection to SA-6 Piping including two Valves	1	LS	$ 186,000	$ 186,000
11	Electrical and Scada Control Facilities	1	LS	$ 100,000	$ 100,000
				SUBTOTAL	**$ 11,500,000**
				30% CONTINGENCY	**$ 3,500,000**
				TOTAL	**$ 15,000,000**

City of Orange - City Yard
12 cfs Excess Groundwater

Item No.	Description	Quantity	Units	Unit Cost	Item Cost
1	Mobilization/Demobilization/Miscellaneous	1	LS	$ 1,310,000	$ 1,310,000
2	EOCF#2 PS (4 pumps - 250 hp motors) w/ 2 Surge Tanks	1	LS	$ 3,000,000	$ 3,000,000
3	New Well with Chlorination Treatment	1	LS	$ 3,400,000	$ 3,400,000
4	Reservoir Piping/Almond Ave Connections	1	LS	$ 110,000	$ 110,000
5	18-inch EOCF#2 Water Main	2,440	LF	$ 360	$ 878,400
6	18-inch EOCF#2 Water Main (Arterial Street)	1,500	LF	$ 480	$ 720,000
7	18-inch Bore & Jack of Santiago Creek	400	LF	$ 2,000	$ 800,000
8	Pavement Replacement (Grind and Cap)	160,000	SF	$ 3	$ 480,000
9	Pressure Reducing Facility	1	LS	$ 189,600	$ 189,600
10	18-inch Meter Flow Control Vault	1	LS	$ 200,000	$ 200,000
11	Connection to OC-42 Piping including two Valves	1	LS	$ 200,000	$ 200,000
12	Electrical and Scada Control Facilities	1	LS	$ 100,000	$ 100,000
13	12-inch Distribution System Improvements (Lincoln St)	700	LF	$ 280	$ 196,000
14	Connections at Almond and Chapman	2	EA	$ 50,000	$ 100,000
15	12-inch Distribution Improvements - Phased (Chapman)	800	LF	$ 420	$ 336,000
16	12-inch Bore & Jack on Chapman	600	LF	$ 1,800	$ 1,080,000
				SUBTOTAL	**$ 13,100,000**
				30% CONTINGENCY	**$ 3,900,000**
				TOTAL	**$ 17,000,000**

City of Orange - Batavia Plant

7 cfs Excess Groundwater

Item No.	Description	Quantity	Units	Unit Cost	Item Cost
1	Mobilization/Demobilization/Miscellaneous	1	LS	$ 1,300,000	$ 1,300,000
2	Demolition of Existing Steel Tank	1	LS	$ 400,000	$ 400,000
3	Demolition of Existing Pump Station	1	LS	$ 200,000	$ 200,000
4	Abandon/Demolish Existing Well No. 1	1	LS	$ 200,000	$ 200,000
5	EOCF#2 PS (3 pumps - 200 hp motors) w/ 2 Surge Tanks	1	LS	$ 2,800,000	$ 2,800,000
6	New Well with Chlorination Treatment	1	LS	$ 3,400,000	$ 3,400,000
7	Piping Connections (Batavia)	1	LS	$ 52,000	$ 52,000
8	16-inch EOCF#2 Water Main	8,400	LF	$ 320	$ 2,688,000
9	16-inch EOCF#2 Bore & Jack (culvert/railroad/Tustin)	400	LF	$ 2,000	$ 800,000
10	Pavement Replacement (Grind and Cap)	200,000	SF	$ 3	$ 600,000
11	Pressure Reducing Facility	1	LS	$ 180,000	$ 180,000
12	16-inch Meter Flow Control Vault	1	LS	$ 200,000	$ 200,000
13	Connection to OC-40 Piping including two Valves	1	LS	$ 180,000	$ 180,000
14	Electrical and Scada Control Facilities	1	LS	$ 100,000	$ 100,000
				SUBTOTAL	**$ 13,100,000**
				30% CONTINGENCY	**$ 3,900,000**
				TOTAL	**$ 17,000,000**

Tustin - Walnut Well Site

3 to 5 cfs Excess Groundwater

Item No.	Description	Quantity	Units	Unit Cost	Item Cost
1	Mobilization/Demobilization/Miscellaneous	1	LS	$ 1,000,000	$ 1,000,000
2	Demolish/Abandon Walnut Well	1	LS	$ 60,000	$ 60,000
3	EOCF#2 Pump Station (3 pumps - 200 hp motors)	1	LS	$ 2,600,000	$ 2,600,000
4	Piping Connection within Walnut	1	LS	$ 40,000	$ 40,000
5	12-inch EOCF#2 Water Main	3,300	LF	$ 300	$ 990,000
6	Pavement Replacement (Grind and Cap)	80,000	LS	$ 3	$ 240,000
7	Pressure Reducing Facility	1	LS	$ 150,000	$ 150,000
8	12-inch Meter Flow Control Vault	1	LS	$ 150,000	$ 150,000
9	Connection to OC-43 Piping including two Valves	1	LS	$ 100,000	$ 100,000
10	Electrical and Scada Control Facilities	1	LS	$ 100,000	$ 100,000
12	OC-43 Connection and Meter Vault Upgrades **	1	LS	$ 770,000	$ 770,000
13	New Well **	1	LS	$ 3,600,000	$ 3,600,000
14	Upgrade RO Treatment Facilities **	1	LS	$ 500,000	$ 1,000,000
				SUBTOTAL	**$ 10,800,000**
				30% CONTINGENCY	**$ 3,200,000**
	** Cost is place holder until further evaluation is performed				
				TOTAL	**$ 14,000,000**

Review of Existing Water Storage Programs: Technical Report

DRAFT FINAL Prepared for

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18700 Ward Street
Fountain Valley, CA

By

WestWater Research
4747 N. 7th Street, Suite 412
Phoenix, AZ

January 8, 2021

Table of Contents

Executive Summary

Orange County Water District (OCWD) and Moulton Niguel Water District (MNWD) are considering developing a short-term pilot storage program enabling MNWD to store approximately 5,000 acre-feet (AF) in the Orange County Groundwater Basin. The potential OCWD-MNWD storage program will provide water supply reliability benefits to MNWD. OCWD will earn revenue to offset future Replenishment Assessment increases. In addition, the pilot storage program will enable the parties to test the feasibility of the storage program concept. The purpose of this report is to provide OCWD and MNWD with the market information needed to support negotiation of compensation terms for the potential pilot storage program.

Potential OCWD-MNWD Program

OCWD and MNWD are contemplating a relatively small short-term (5-10 years) pilot storage program. The potential program would enable MNWD to store in the Orange County Groundwater Basin approximately 5,000 AF of imported water purchased from the Metropolitan Water District of Southern California. The storage would rely on existing available recharge capacity, and should not impact the operations of OCWD or the Producers. Arranging and paying for recovery of stored water would be MNWD's responsibility. The potential pilot program would enable OCWD and MNWD to test the concept of storage in the Orange County Groundwater Basin for South Orange County (SOC) water agencies, and help to establish the necessary institutional arrangements for such storage.

Literature Review

Prior studies inventorying existing water storage programs and/or analyzing water storage program compensation terms in consistent units are assembled, reviewed, and summarized. The body of existing literature is limited. To the extent possible, methodologies established in previous studies for analyzing compensation terms are applied in this study to support compensation terms for the potential OCWD-MNWD program. In particular, the annual lifecycle present value (PV) per AF approach is identified as applicable to the analysis.

Water Storage Program Market Assessment

Water storage programs are emerging throughout California in response to water supply variability, changing/growing water demands, and challenges associated with developing new surface reservoirs. Storage program developers and owners are increasingly seeking to generate revenue by entering into storage agreements with partners. Program objectives, operations, and storage agreement terms are unique to each storage program. Both long-term and short-term water storage agreements have been completed for a wide range of capacities. Some agreements provide first priority access to dedicated storage and recovery capacity, while others offer lower priority capacity access. Compensation for storage is paid in the form of both water-sharing and financial consideration. Despite differences among existing storage programs, the following general patterns in storage program compensation are observed:

- Storage Program Duration: Longer-term programs typically attract higher compensation levels relative to shorter-term programs. Longer-term programs often provide first priority access to dedicated capacity, while many shorter-term programs offer storage on a lower priority basis.

- Storage Program Volume: Like many infrastructure projects, there are scale economies associated with water storage programs, i.e. unit costs are lower for larger programs.
- Program Location: Compensation for storage programs located within Metropolitan's service area tends to be higher than for storage programs located in other areas of the state. This premium reflects the high value of water storage and water resources in Southern California, including Orange County.
- Program Water Use: In general, urban water users contracting for storage program capacity pay a premium relative to storage for agricultural uses. While partially attributable to program location, this premium also reflects the high value of urban water supply certainty/reliability.

Factors that do not appear to systematically impact storage program compensation were storage program purpose (i.e. dry year vs. emergency storage); program operations (i.e. direct pump-back vs. exchange); and compensation type (i.e. financial consideration vs. water sharing). Many existing programs feature multiple purposes, operational capabilities, and compensation types. The other factors listed above are determined to have a greater influence on compensation.

Summary of Selected Storage Programs

Seven existing groundwater storage programs are identified as most similar to the potential OCWD-MNWD pilot program. Like the potential OCWD-MNWD program, each of these seven programs is relatively short-term, offers both dry-year and emergency water reliability benefits, stores water for urban agencies, and provides lower priority access to available capacity. Among these seven programs, compensation expressed in annual lifecycle PV ranges from $160/AF to $307/AF, and averages approximately $210/AF. These programs provide an indication of the compensation for the potential OCWD-MNWD program that can be supported by existing programs.

Compensation Methodology and Analysis

Four approaches are applied to develop supportable compensation terms for the potential OCWD-MNWD program. These approaches and their estimated compensation amounts are listed below:

- Cost Reimbursement: $195/AF - $213/AF.
- Present Value Lifecycle Cost: $44/AF - $188/AF.
- Forgone Cost Savings: $226/AF.
- Replacement Cost: $578/AF.

Summary and Conclusions

The compensation analysis indicates minimum compensation of $226/AF, and a maximum compensation of $578/AF. As a result, supportable compensation for the potential OCWD-MNWD program ranges from $226/AF to $578/AF. This compensation could be paid in the form of an up-front fee per acre-foot stored and/or sharing of stored water. The compensation to OCWD does not include any additional costs that MNWD will incur from storage losses, recovery of stored water, delivery of stored water, or other program expenses.

Introduction

Background and Purpose

Orange County Water District (OCWD) and Moulton Niguel Water District (MNWD) are considering developing a short-term pilot storage program enabling MNWD to store approximately 5,000 acre-feet (AF) in the Orange County Groundwater Basin. The potential OCWD-MNWD storage program would provide MNWD with near-term water supply reliability benefits in exchange for compensation to OCWD. In addition, the pilot storage program will test the feasibility of a long-term storage program.

The purpose of this report is to provide OCWD and MNWD with the market information needed to support negotiation of compensation terms for the potential pilot storage program. The report presents a comprehensive, fact-based review of existing water storage programs, including an analysis of compensation and operational terms of existing programs. Based on compensation terms in existing storage programs and other factors pertinent to the local market, the report describes and applies the available methodologies for developing supportable compensation terms for the potential OCWD-MNWD storage program. The analysis is used to develop a recommended range of compensation.

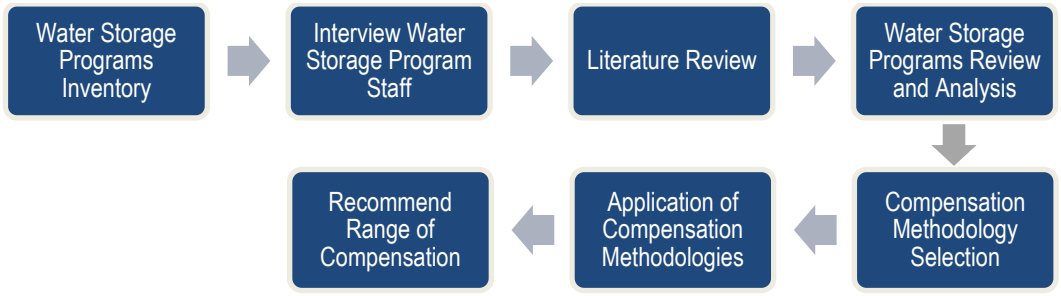
Study Approach

The study approach is outlined below and illustrated in Figure 1:

1. **Water Storage Programs Inventory:** WestWater's online database of California water storage programs was updated to reflect the most current and comprehensive information on existing storage programs. The water storage program database serves as the source of data for the analysis presented in this report.
2. **Water Storage Program Staff Interviews:** WestWater conducted interviews with key staff from agencies operating existing water storage programs. These interviews were instrumental in assembling information and data regarding the water storage program market.
3. **Literature Review:** Available literature on California water storage programs and their compensation terms was assembled and reviewed. The literature review is summarized in this report.
4. **Water Storage Programs Review and Analysis:** Existing water storage programs were reviewed and analyzed to identify the factors influencing storage compensation terms, and the extent to which those factors impact compensation. To perform the analysis, compensation terms across the diverse storage programs were expressed in annual lifecycle present value (PV) per AF as a consistent unit of comparison.
5. **Compensation Methodology Selection:** Available approaches for establishing compensation terms for the potential OCWD-MNWD program were identified based upon the literature review, interviews with existing water storage program staff, and review of existing program agreements.

6. **Application of Compensation Methodologies:** The selected compensation methodologies and available market information were applied to estimate ranges of supportable compensation for the potential OCWD-MNWD storage program.
7. **Recommend Range of Compensation:** The results of the various compensation methodologies were reconciled to develop a final recommended range of compensation.

Figure 1: Study Approach



Technical Report Organization

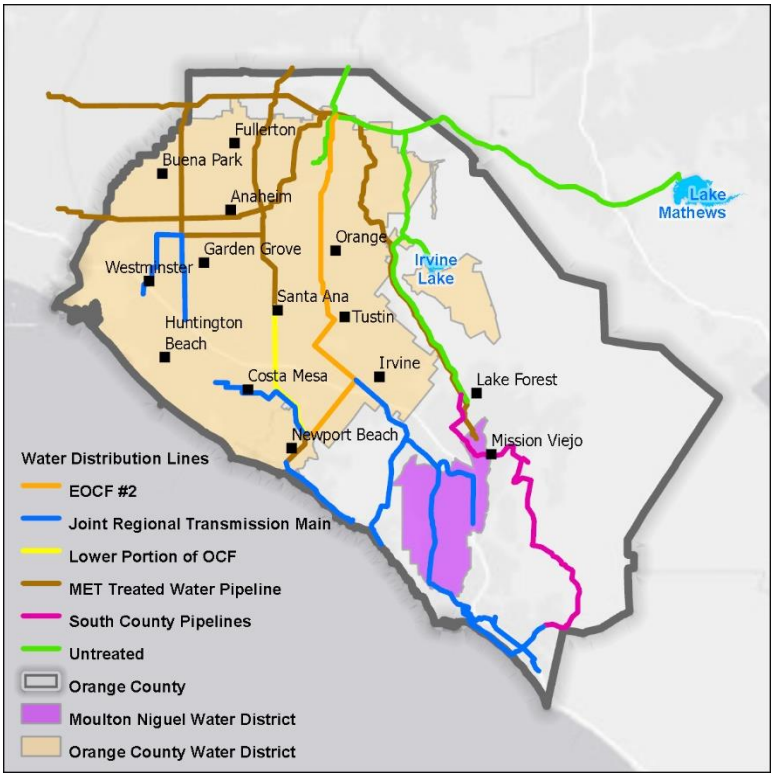
This technical report is organized as follows:

1. **Potential OCWD-MNWD Water Storage Program:** An overview of the potential OCWD-MNWD water storage program is provided. The potential storage program operations are summarized, and the potential program's objectives and benefits are described. Previous collaborative efforts among OCWD and South Orange County (SOC) water agencies to improve water supply reliability are reviewed. In addition, OCWD's existing water storage and reliability programs are reviewed.
2. **Literature Review:** A summary of prior studies on water storage programs is provided in literature review format. The literature review focuses on studies reviewing existing water storage programs and attempting to apply a consistent methodology to analyze or compare compensation terms.
3. **Water Storage Programs Market Assessment:** This section provides an overview and analysis of the water storage program market in California. Various storage program agreements are summarized. The section concludes with an analysis of compensation determinants using annual lifecycle PV per AF as a unit of comparison for compensation terms.
4. **Summary of Selected Storage Programs:** A set of storage programs considered most applicable to the potential OCWD-MNWD is selected and summarized.
5. **Compensation Methodology and Analysis:** The available approaches for developing supportable compensation terms for the potential OCWD-MNWD storage program are described. Each approach is applied to estimate a range of supportable compensation for the potential OCWD-MNWD program.
6. **Summary and Conclusions:** The results of the storage program compensation analysis methodologies are summarized.

Potential OCWD-MNWD Water Storage Program

OCWD and MNWD are evaluating a potential water storage program whereby MNWD would store imported water purchased from the Metropolitan Water District of Southern California (Metropolitan) in the Orange County Groundwater Basin. The stored water would be recovered and delivered to MNWD for use during drought periods and/or emergencies. Initially, OCWD and MNWD are contemplating a short-term pilot program enabling storage and recovery of a relatively small volume of water. If implemented, the relatively small pilot program is intended to have negligible impact on OCWD operations or Orange County Groundwater Basin Producers. Should the potential pilot program succeed, the parties may consider extending the program duration, volume, and/or participation to include other South Orange County (SOC) water agencies. This section describes the potential OCWD-MNWD storage program objectives, background/context, and operations. In addition, existing OCWD water storage and emergency supply programs are summarized. Figure 2 provides a map of OCWD, MNWD, and existing conveyance infrastructure.

Figure 2: OCWD and MNWD Service Areas



Overview of Program Participants

If implemented, the potential pilot program would include OCWD and MNWD. The storage program may be expanded to include other SOC parties if the pilot succeeds. OCWD operates the Orange County Groundwater Basin to protect and increase the basin's yield in a cost-effective manner. The nineteen major

Groundwater Producers include cities, water districts, and water companies that rely on the Orange County Groundwater Basin as the primary source of water supply for serving approximately 2.4 million residents living in North and Central Orange County. OCWD manages the groundwater basin, and expands the basin's annual yield by maximizing the amount of water recharged into the basin, developing new sources of water for recharge, and optimizing OCWD's facilities.

MNWD is a retail water agency delivering drinking water, recycled water, and wastewater services to more than 170,000 customers. MNWD's service area incudes the SOC communities of Laguna Niguel, Aliso Viejo, Mission Viejo, Laguna Hills, Dana Point, and San Juan Capistrano. Treated water is purchased from Metropolitan to meet MNWD's drinking water needs. In addition, MNWD is developing recycled water and water storage programs to improve supply reliability, and reduce reliance on purchased imported water.

Storage Program Objectives and Benefits

The potential OCWD-MNWD water storage program is intended to test the concept of storing imported water purchased from Metropolitan in the Orange County Groundwater Basin. For MNWD, storage in the Orange County Groundwater Basin may represent one cost effective approach to improving water supply reliability. Improved water supply reliability is needed to address both drought and emergency situations in which deliveries from Metropolitan may be limited or unavailable. If the pilot storage program proves to be operationally and cost effective, other SOC water agencies may be able to pursue similar programs to realize water supply reliability benefits.

The potential storage program benefits OCWD by generating revenue to offset future expected Replenishment Assessment increases.[1] As a result of the short term and small volume of the potential storage program, OCWD can earn this revenue without disrupting existing operations.

Storage Program Background and Context

Collaborative efforts among OCWD and SOC water agencies to improve SOC water supply reliability have been ongoing for many years. In 2006, OCWD approved an Emergency Services Agreement with the Municipal Water District of Orange County (MWDOC), Irvine Ranch Water District (IRWD), and multiple SOC water agencies. The Emergency Services Agreement calls for IRWD to provide up to 3,000 AF over 30 days to SOC water agencies during emergency events. IRWD's annual groundwater production must still comply with OCWD's annual Basin Production Percentage (BPP) and Basin Equity Assessment (BEA) calculations. The amount of water IRWD can make available to SOC water agencies during emergencies is diminishing over time as water demands within IRWD increase. The initial term of the Emergency Services Agreement expires in 2031.

In August 2017, the OCWD Board of Directors broadened the District's Water Resources Policy to allow for consideration of water storage and exchange programs with SOC water agencies. Such programs are intended to allow storage of relatively small amounts of water in the Orange County Groundwater Basin which

[1] Orange County Groundwater Basin producers pay Replenishment Assessments to OCWD for each acre-foot pumped from the Basin. OCWD uses Replenishment Assessment revenues to fund its operations.

would have little impact (if any) on OCWD operations. OCWD would receive compensation from the programs which could be used to help offset future expected Replenishment Assessment increases.

In 2018 and 2019, OCWD and MNWD developed an Interagency Agreement to study a potential pilot water storage program. The process of developing the agreement included extensive analysis to (1) assess OCWD's storage needs basin upon current and expected future conditions, and (2) address issues raised by the Orange County Groundwater Basin producers. Following completion of these analyses, OCWD and MNWD entered into the agreement in early 2019. The two complementary studies to be completed under the agreement are this study, and an evaluation of conveyance options for delivery of water from OCWD to MNWD.

Potential OCWD-MNWD Storage Program Operations

The details of the potential OCWD-MNWD water storage program have not yet been finalized. However, general parameters of the potential program presented to the OCWD Board of Directors include:

1. **Storage Program Parties:** MNWD would store imported water purchased from Metropolitan in the Orange County Groundwater Basin. OCWD would create a storage account for MNWD, and any direct recharge of untreated water by OCWD for MNWD would use available capacity in OCWD infrastructure.
2. **Storage Program Objectives:** In general, the potential storage program is intended as a pilot program that would test the concept of storing imported water in the Orange County Groundwater Basin to improve water supply reliability for Orange County water agencies. Specific objectives of the individual parties are:
    a. MNWD: Develop a cost-effective approach to improving water supply reliability during drought periods and emergencies.
    b. OCWD: Generate revenue to reduce expected future Replenishment Assessment increases.
3. **Storage Program Water Sources:** The source of water for storage would be imported water purchased from Metropolitan.
4. **Storage Program Volumes:** Total storage of up to approximately 5,000 AF. This represents a relatively small volume of water that OCWD can accommodate using existing available recharge capacity.
5. **Recharge and Recovery:** Untreated water purchased by MNWD could be delivered to OCWD for direct recharge at OCWD's existing recharge basins in Anaheim. Alternatively, treated water purchased by MNWD could be delivered to Orange County Groundwater Basin producers in-lieu of groundwater pumping (in-lieu recharge). OCWD would create and maintain a storage account for MNWD. Recovering and delivering stored water to MNWD would require a significant investment by MNWD in recovery well and conveyance infrastructure.
6. **Losses:** Storage losses have not yet been determined, and could serve as one form of compensation to OCWD. The source of water for storage is imported water purchased from Metropolitan. Because this purchased imported water is relatively expensive, any losses could substantially increase the overall costs of the proposed program.

7. **Storage Program Duration:** Initially, a short-term (5-10 years) pilot storage program is anticipated. If successful, the program may be expanded, extended, and/or made available to other SOC water agencies.

Existing OCWD Programs

OCWD has a history of partnering with other agencies to provide water reliability benefits. Existing water storage or reliability programs implemented by OCWD are summarized as follows:

Metropolitan Conjunctive Use Storage Program (CUP)

Completed in 2003, the 25 -year CUP agreement allows for Metropolitan to store up to 66,000 AF of water in the Orange County Groundwater Basin. Up to 16,500 AF can be stored annually, and up 22,000 AF can be recovered annually. OCWD received approximately $32 million from Metropolitan to fund new recovery well, seawater barrier injection well, and conveyance infrastructure. Metropolitan pays OCWD an annual administrative fee, which OCWD estimates to have a present value of $1.5 million. In addition, OCWD receives payments from the participating Groundwater Producers (City of Santa Ana, Golden State Water Company, City of Anaheim, City of Garden Grove, City of Westminster, City of Buena Park, and Yorba Linda Water District) when Metropolitan stores or recovers water. OCWD estimates the present value of these payments from Groundwater Producers to be $20 million, depending on the storage methods used:

- In-Lieu Recharge: If the Metropolitan water is stored by in-lieu recharge, OCWD receives the Groundwater Producers' avoided energy cost to pump groundwater at the time the water is being stored (currently $97/AF).
- Direct Recharge: If the Metropolitan water is stored by direct recharge, OCWD receives the Metropolitan treatment surcharge when the water is extracted by the Groundwater Producers (currently $319/AF). Direct recharge by OCWD treats the water naturally by infiltration through the groundwater basin.

South County Phase 1 Emergency Service Program Agreement

As previously described, OCWD entered into an agreement in 2006 which allows IRWD to deliver up to 3,000 AF over 30 days to SOC agencies during emergencies. The initial term of the agreement is 25 years, and IRWD has delivered emergency supplies under the agreement five times. During years in which emergency water is delivered, IRWD remains subject to the Orange County Groundwater Basin BPP and BEA, and water delivered to SOC agencies is characterized as imported water. The amount of water IRWD is able to deliver to SOC agencies is diminishing over time as IRWD's service area water demands grow. Any potential new program between OCWD and MNWD would be coordinated with this agreement. OCWD receives no compensation from this program.

Metropolitan Cyclic Storage

Cyclic storage agreements enable Metropolitan to pre-deliver imported water for storage in its service area during wet periods when surplus imported supplies are available. Customers receiving this water pay for the water at a later date. In some cases, Metropolitan provides credits or incentives to customers which offset the costs of pre-delivered water.

OCWD entered into a 10-year Cyclic Storage Agreement with Metropolitan and MWDOC in 2017. The agreement allows OCWD to receive excess imported water from Metropolitan and to pay for the water at a later date. When paying for the water, OCWD pays the applicable untreated Metropolitan rate, which is $755/AF as of January 1, 2020. The water can be delivered untreated and directly recharged at OCWD's facilities in Anaheim. Alternatively, the water can be delivered as treated water which the Groundwater Producers use in-lieu of pumping.

In 2017, OCWD took 77,000 AF of cyclic storage water from Metropolitan. Of this amount, 73,000 AF was treated water recharged in-lieu, and 4,000 AF was untreated water recharged directly. OCWD had 10 years to repay Metropolitan for this water but has already done so to avoid future Metropolitan rate increases.

Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)

SARCCUP is a new storage program being developed by OCWD in cooperation with the San Bernardino Valley Municipal Water District (Valley Water), Eastern Municipal Water District (EMWD), Inland Empire Utilities Agency (IEUA), and Western Municipal Water District (WMWD). SARCCUP is partially funded by a $55 million Proposition 84 grant. One of multiple project benefits is groundwater storage that will enhance drought and emergency water supplies. OCWD will store 36,000 AF to 45,000 AF in the Orange County Groundwater Basin for use during periods when Metropolitan allocates limited imported water (Metropolitan Allocations). Water recovered from SARCCUP during Metropolitan Allocations could be considered "extraordinary," i.e. additive to available local and Metropolitan supplies.

Literature Review

This section summarizes and reviews pertinent prior studies in California. The literature review focuses on studies reviewing existing water storage programs and attempting to apply a consistent methodology to analyze or compare compensation terms. Studies identified in the literature review are listed below and ordered chronologically from newest to oldest.

1. "2018 Orange County Water Reliability Study." Prepared for Municipal Water District of Orange County by CDM Smith, Inc. February 1, 2019.
2. "Financial Feasibility Assessment of Developing Enterprise Water Bank Capacity at the Far West Site." Prepared for the Antelope Valley-East Kern Water Agency by WestWater Research and Montgomery & Associates. April 12, 2017.
3. "California Groundwater Bank Research." Prepared by The Inland Empire Utilities Agency.
4. "Antelope Valley Water Bank: Water Banking Feasibility Evaluation." Prepared by Western Development and Storage. February 2005.
5. "Analysis of Water Banks in the Western United States." Washington State Department of Ecology and WestWater Research, 2004.
6. "Draft Report – CLWA Water Supply Reliability Plan." Prepared for Castaic Lake Water Agency by Kennedy/Jenks Consultants, 2003.
7. "Designing Successful Groundwater Banking Programs in the Central Valley: Lessons from Experience." The Natural Heritage Institute, 2001.
8. "Feasibility Study of a Maximal Program of Groundwater Banking" National Heritage Institute, 1998.

2018 Orange County Water Reliability Study

The 2018 Orange County Water Reliability Study (study) was conducted by CDM Smith, Inc. on behalf of MWDOC. The objectives of the study were to examine MWDOC's projected water demand through 2050 under four planning scenarios (including variable climatic conditions and alternative water supply costs), and to evaluate potential water supply projects based on their cost effectiveness and ability to meet MWDOC's water demands under each planning scenario. Included in the potential water supply projects were water storage programs and other water supply projects including ocean desalination and an emergency water interconnection extension for system outages. The potential projects included:

1. Poseidon Huntington Beach Ocean Desalination Project (supply)
2. Doheny Ocean Desalination Project (supply)
3. San Juan Watershed Project (stormwater capture and storage)
4. Cadiz Water Bank (supply)
5. Strand Ranch Water Bank (storage)
6. SOC Emergency Interconnection Expansion (emergency supply)

Each of the potential projects was evaluated on a consistent basis under the four planning scenarios using two reliability metrics – system reliability (benefits of the potential project under unplanned outages) and supply reliability (ability of the potential project to meet projected water demand).

The potential water supply projects were evaluated according to their ability to provide system and supply reliability benefits compared to an alternative water supply option – directly purchasing treated water from Metropolitan. Both of the evaluations considered the present value (PV) of project costs (including all capital, O&M, and other costs) in comparison to avoided Metropolitan water purchases through 2050. The system reliability metric was calculated as follows (in PV): Avoided Metropolitan water purchases minus project costs divided by the project capacity. The calculation indicated the net cost per unit of emergency capacity. The supply reliability metric measured the avoided annual Metropolitan water purchases divided by the project costs over the life of the project, providing a cost-benefit ratio for all projects (in PV). The avoided annual Metropolitan water purchases represent the water supply (volumetric) benefits of the alternative project in each year of the project's life (i.e. water supply benefits are accounted for in the years in which they are expected to occur). This approach expresses benefits in terms of annualized dollars per AF.

Generally, the system reliability benefits from the potential projects exceeded the cost of buying water from Metropolitan, even under the most severe climate change scenario. Several of the evaluated projects including all three water storage programs provided supply reliability benefits with positive cost-benefits under the most severe climate scenario (i.e. the total costs of the proposed water storage program in dollars per AF of PV were lower than acquiring water from Metropolitan). For example, the total unit costs of the projects (for recovered water) were projected to be $1,952/AF and $1,521 for the Strand Ranch Water Bank and the San Juan Watershed Project, respectively, in the year in which assumed recovery would begin. Notably, treated water from Metropolitan at the allocation surcharge rate is expected to cost $2,723/AF during the initial year of assumed recovery (2025).

Financial Feasibility Assessment of Developing Enterprise Water Bank Capacity at the Far West Site

The Financial Feasibility Assessment of Developing Enterprise Water Bank Capacity at the Far West Site (assessment) was prepared by WestWater Research and Montgomery & Associates on behalf of the Antelope Valley-East Kern Water Agency (AVEK). The assessment evaluated the financial feasibility of developing an Enterprise Water Bank (EWB) for AVEK. Goals of the EWB were to improve water supply reliability and generate financial benefits for AVEK. The assessment evaluated the potential revenues from the EWB by evaluating the supply and demand for water banking capacity, and demonstrating that the full EWB capacity could be utilized at costs favorable to competing water storage programs or water markets (e.g. the spot transfer market). The assessment included a financial model forecasting the net returns (in PV) of the EWB over a 25-year analysis period under four potential revenue scenarios (spot market transfers, multi-year transfers, long-term groundwater banking agreements, and short-term groundwater banking agreements). To each potential revenue scenario, nine climate scenarios were applied and a range of forecasted net returns was generated. Long-term banking agreements generally had the highest forecasted net returns, and lower risk relative to alternative structures. The lifecycle approach recognized all costs of the life of the project on an annualized basis in dollars per AF of annual recovery.

To develop compensation terms for long-term water banking agreements at the EWB, existing and proposed water storage agreements were reviewed, as well as the costs of potential supply alternatives. The selected compensation structure included an up-front payment based on a proportionate share of capital costs plus 10%; annual O&M and management costs; and a recovery fee of $100/AF (no recharge fee) plus actual energy costs. O&M, management, and recovery fees would escalate annually based on the Consumer Price Index (CPI). The water storage program partner would pay additional costs such as delivery charges. The

compensation structure is consistent with other long-term banking agreements that provide dedicated capacity, and the pricing was based on a review of those agreements.

Groundwater Bank Research for the Chino Basin Water Bank

The California Groundwater Bank Research is a comparative matrix (matrix) summarizing 25 existing and proposed water storage programs. Inland Empire Utilities Agency (IEUA) developed the matrix as a tool for comparing water storage programs. The matrix provides the general characteristics of each water storage program (e.g. location, type of recharge, type of recovery), the storage program's capacity (storage, recharge, and recovery), costs, known participants, and governance (ownership, structure, investments, etc.). A general takeaway from the matrix is that water storage program costs were largely unknown at the time of the study. For instance, cost metrics (including storage, recharge, or recovery costs in dollars per AF) were provided for only 7 of the 25 water storage programs evaluated. Leave-behind and other water loss factors were more readily available for the programs addressed in the matrix. The matrix is useful for identifying water storage programs and associated collaborators, but contains limited information on cost, demonstrating that obtaining cost data for water storage programs can be challenging. Further, the matrix does not attempt to compare costs across different programs on a comparable basis. In general, the matrix provides information on the leave-behind cost to the reservoir, which ranged from 10% to 50% across the projects reviewed, and reports on the all-in cost per AF of recovery for one storage project, which totaled $864/AF in 2013.

Antelope Valley Water Bank: Water Banking Feasibility Evaluation

The Antelope Valley Water Bank: Water Banking Feasibility Evaluation (evaluation) was prepared by Western Development and Storage (WDS) in 2006 for interested parties in the Antelope Valley Water Bank (AVWB). The evaluation provided background and support for developing the AVWB including an assessment of its location, permitting, and costs. To support AVWB development, its costs were compared to those of other water storage programs on a comparable basis (PV in dollars per AF of annual recovery capacity).

The water storage program comparison included 11 storage programs, and considered total capital expenditures and total operating expenditures (including recharge fees, recovery fees, and other fees) over the life of the project on a per unit basis (dollars per AF of annual recovery capacity). The storage programs reviewed included:

1. AVEK Water Bank
2. Chino Basin - Metropolitan
3. Semitropic Expansion
4. Proposed Castaic Lake Water Bank
5. Fresno Irrigation District Waldron Pond
6. Semitropic Existing Water Bank
7. Kern Delta - Metropolitan
8. West Coast and Central Basin
9. Terminus Dam
10. Kaweah Delta
11. Fine Gold Creek Offstream Storage

The comparison excluded permitting costs and assumed the most conservative value when a cost was unknown (e.g. a recharge fee of zero if no cost was known). The AVWB assumptions include the PV of anticipated capital costs (including debt service) and operating costs plus an additional 20% contingency for

unknown expenses. The AVWB was found to be the lowest cost of the evaluated storage programs (based on anticipated project costs). The evaluation provided the upfront cost in dollars per AF of annual recovery (i.e. it considered the costs of the maximum potential recovery volume in a single year relative to the costs of the project, and did not consider the volume of water likely to be recovered in each year over the life of the project). The cost per AF of annual recovery capacity ranged from as low as $811/AF to as high as $11,976/AF, with costs at the high end representing large-scale infrastructure projects (such as reservoirs) not necessarily reflective of groundwater banking programs.

Analysis of Water Banks in the Western United States

Analysis of Water Banks in the Western United States (analysis) was developed by The Washington State Department of Ecology and WestWater Research in 2004. The analysis was intended to provide a comprehensive overview of water storage programs across the Western United States including a synopsis of known storage methods, market structures, contract types, and recent market activity. The analysis also reviewed water storage policy and activity across twelve western states, and summarized individual water storage programs from these states including the water cost in annualized dollars per AF. The water cost in annualized dollars per AF was generally provided as a range of costs based on the known costs of the water in recent years.

Castaic Lake Water Agency Water Supply Reliability Plan – 2003 Draft

The CLWA Water Supply Reliability Plan (plan) was prepared by Kennedy/Jenks Consultants on behalf of Castaic Lake Water Agency (CLWA). The plan was intended to summarize CLWA's water demand and potential water supply options (including water storage programs). The water storage component of the plan summarized six potential water storage opportunities, and attempted to compare the costs of each opportunity in consistent terms. The six potential water storage opportunities included:

1. Cawelo In-Lieu Water Banking Program
2. Semitropic Water Banking and Exchange Program
3. Newhall Land and Farming's Assets in Semitropic
4. Vidler Water Company's Assets in Semitropic
5. Chino Basin Storage and Recovery Program
6. Las Posas Basin ASR Project

Each opportunity was described including the type of project (e.g. in-lieu, surface recharge, etc.) the total estimated cost of the project, and the total estimated available storage, recharge, and recovery capacity. Additional financial parameters were established (or estimated) to provide CLWA with a tool for evaluating the projects on a comparable basis (in dollars per AF in PV). These parameters included the buy-in cost of the facilities, recharge fee, recovery fee, fixed O&M costs, leave behind loss, and energy/power costs. Assumed or actual escalation rates were provided. Additional costs/risks were also provided (such as costs for water treatment if withdrawn water is poor quality). As a final comparative measure, the plan estimated the annual lifecycle PV cost per AF for each of the storage programs based on the PV of all storage program costs divided by the projected volume (AF) recovered over the program lifecycle.

A few notable conclusions can be drawn from the study. First, the upfront costs of the facilities and/or the recharge and recovery fees were generally designed to cover the capital costs (including any debt service) plus some percentage (the percentage representing profit and/or risk mitigation for the storage program developer). Second, other costs such as energy costs typically cover only the actual costs, and other costs

are generally escalated to the CPI annually. Third, the CLWA plan was the first study that compared costs across multiple water storage programs in consistent annual lifecycle PV per AF terms. In 2003 when the analysis was conducted, annual lifecycle PV per AF costs for water storage programs were estimated to range from $218/AF to $297/AF.

Designing Successful Groundwater Banking Programs in the Central Valley: Lessons from Experience

Designing Successful Groundwater Banking Programs in the Central Valley: Lesson from Experience (study) was developed by The National Heritage Institute (NHI). The study reviewed water storage programs in California and endeavored to identify the features of successful water storage programs including how successful storage programs managed risk. Risk factors considered were hydrogeologic, water quality, financial, legal, and political. The study includes case studies of seven storage programs. For each of the seven storage programs, NHI provided the estimated cost of the water in dollars per AF in an attempt to evaluate project costs on a comparable basis. A challenge to the approach is that in some cases water costs were actual payable costs in active water storage programs and others were projected costs for future programs. It is unclear how the projected water costs for future storage programs were estimated, and the study provided no indication costs were normalized to consistent PV terms. For some of the active storage programs, participating partners paid different prices for water depending on their relationship to the project (including initial investment), the type of water brought in, and other factors. Given the above described factors, it is challenging to compare the costs for the water on an equivalent basis using the methods of this study. It is even more difficult to ascertain the level of compensation the storage program received.

Feasibility Study of a Maximal Program of Groundwater Banking

Feasibility Study of a Maximal Program of Groundwater Banking (study) was developed by NHI in 1998 in an effort to develop a suite of water storage opportunities for policymakers. The study investigated potential storage programs on their hydrologic potential, legality, and operational and economic potential. In addition, the study also compiled information on the total storage and annual operating capacity for approximately 30 existing water storage programs. Furthermore, unit costs (in dollars per AF) for storing water at existing water storage facilities in California were compiled, making the study a very early adapter of this comparative measure. Costs per acre foot of water storage were estimated for the 1994-1995 water years for the existing water storage programs reviewed. However, the unit costs are challenging to interpret because some costs included recharge or recovery fees alone, while others included both recharge and recovery fees.

Summary and Findings of the Literature Review

The available literature summarizing approaches for establishing compensation terms for water storage programs is relatively sparse. However, the combined body of literature reviewed provides a starting point for establishing compensation terms for water storage programs. The following conclusions on the development of compensation terms are the result of this review.

1) Water storage program compensation is complex, situation-specific, and can include many components. Some components of compensation in previous programs are water leave-behind, capital fees, O&M fees, recharge fees, recovery fees, energy reimbursement, and water treatment costs.
2) Comparing the wide range of water storage compensation in consistent terms is challenging. Compensation benefits may come at different times (e.g. up-front buy-in versus an annual recovery

fee), and other benefits like leave-behind losses are difficult to directly value making comparison difficult.

3) Comparing the compensation benefits of leave-behind losses is particularly challenging. In some examples, the leave-behind benefit was a set volume for the entire program (e.g. 20,000 AF), and in others it was proportional to the volume of water stored (which could be variable and/or unknown over the life of the project). The timing of the benefit potentially varies based on when the water delivery occurs and the accounting method used (i.e. does the benefit occur when the water is delivered, or when the storage facility sells or uses the water, etc.). Additionally, the valuation of the benefit is challenging. For example, the water could be valued at the cost of acquiring alternative supplies (via SWP contract, for example), by comparable market prices, or by the actual cost of the water delivered to the recharge facility.
4) Program costs can escalate over time; thus, all costs should be normalized to PV dollars to address general inflation.
5) Two potentially relevant methods for comparing annualized compensation benefits in consistent terms were identified:
    a. Annual lifecycle PV per AF: This method expresses all water storage program costs in annualized PV per AF of water recovered over the life of the project. The method is useful because all costs are brought to PV, including past or future projects, making the projects comparable on like-terms. In addition, providing the project costs on a per AF basis allows water storage programs to be compared across different scales.
    b. NPV Cost-Benefit Ratio: This method compares water storage program benefits in NPV per AF to the costs of acquiring an alternative supply in NPV per AF of recovery throughout the life of the project. The method is useful for evaluating one or more projects in comparison to a known alternative such as buying water on the spot-market or from another water district.
6) Comparing compensation across a variety of hydrologic outlooks is critical for understanding the full range of potential compensation benefits. Recharge (including any leave behind benefits) and recovery are dependent on hydrologic conditions, and compensation for many water storage programs is based on recharge and recovery volumes. In addition, calculating NPV requires assumptions regarding future recharge and recovery operations, which will be determined by hydrology. Ultimately, it is challenging to estimate future climate dynamics and perhaps appropriate appraisal of water storage programs involves making consistent operational assumptions and selecting consistent forecasts across programs.

Water Storage Programs Market Assessment

This section analyzes the water storage program market in California. Groundwater storage and water banking programs are the primary focus of the analysis as the program under consideration by MNWD and OCWD involves groundwater storage. In addition, several Orange County surface water storage programs are addressed, as they provide additional context regarding the local market. The size and extent of the market for water storage programs is addressed, as well as the types of entities participating in water storage programs, the objectives of various water storage programs, structures of storage program agreements, and program compensation terms. This market information is intended to provide fact-based support and context for development of compensation terms for the potential OCWD-MNWD program.

Water Storage Market Overview

In California, water supply reliability, flexibility in timing of use, and concern about outages and other emergencies or interruptions are driving the development of water storage programs across the state. Water storage programs create a reserved supply of water that participants can recover during droughts, emergencies, system outages, or other periods of heightened demand. Soon after the expansion of water markets in the early 1990s, many local agencies began looking to storage programs to improve water supply reliability during dry years through conjunctive use and groundwater banking. WestWater maintains a water storage program database, which includes extensive information on diverse storage programs throughout the state. Storage program information such as capacities, capital costs, program partners, and operational date are included in the database, as well as environmental documents, and participation agreements. As exemplified in the WestWater data, the market for water storage programs in California is active and expanding, with 79 storage programs known to be in operation totaling approximately 350,000,000 AF of storage capacity. In addition, there are 45 storage programs in development or proposed. Approximately one-quarter of all operational programs are in the Metropolitan service area, and approximately one-third are located in California's Central Valley. Other water storage programs are found in the Antelope Valley, Mojave Desert, Central Coast, and San Francisco Bay regions. These regions are shown along with SWP and Central Valley Project (CVP) service areas and conveyance infrastructure in Figure 3.

Some agencies develop storage programs as partnerships with other agencies or water users ("program customers"), who compensate the storage program owner for use of the capacity. Approximately 45% of known storage programs are developed solely for use by the program owner. Of the storage programs with capacity for additional partners, more than half are located in California's Central Valley, where agricultural water districts are seeking storage program partners to access unused banking capacity. In Southern California, a majority of storage programs are fully subscribed, meaning the entirety of storage program capacity has been allocated. Actual locations of water storage programs are shown in in Figure 4.

Figure 3: California Water Storage Program Regions

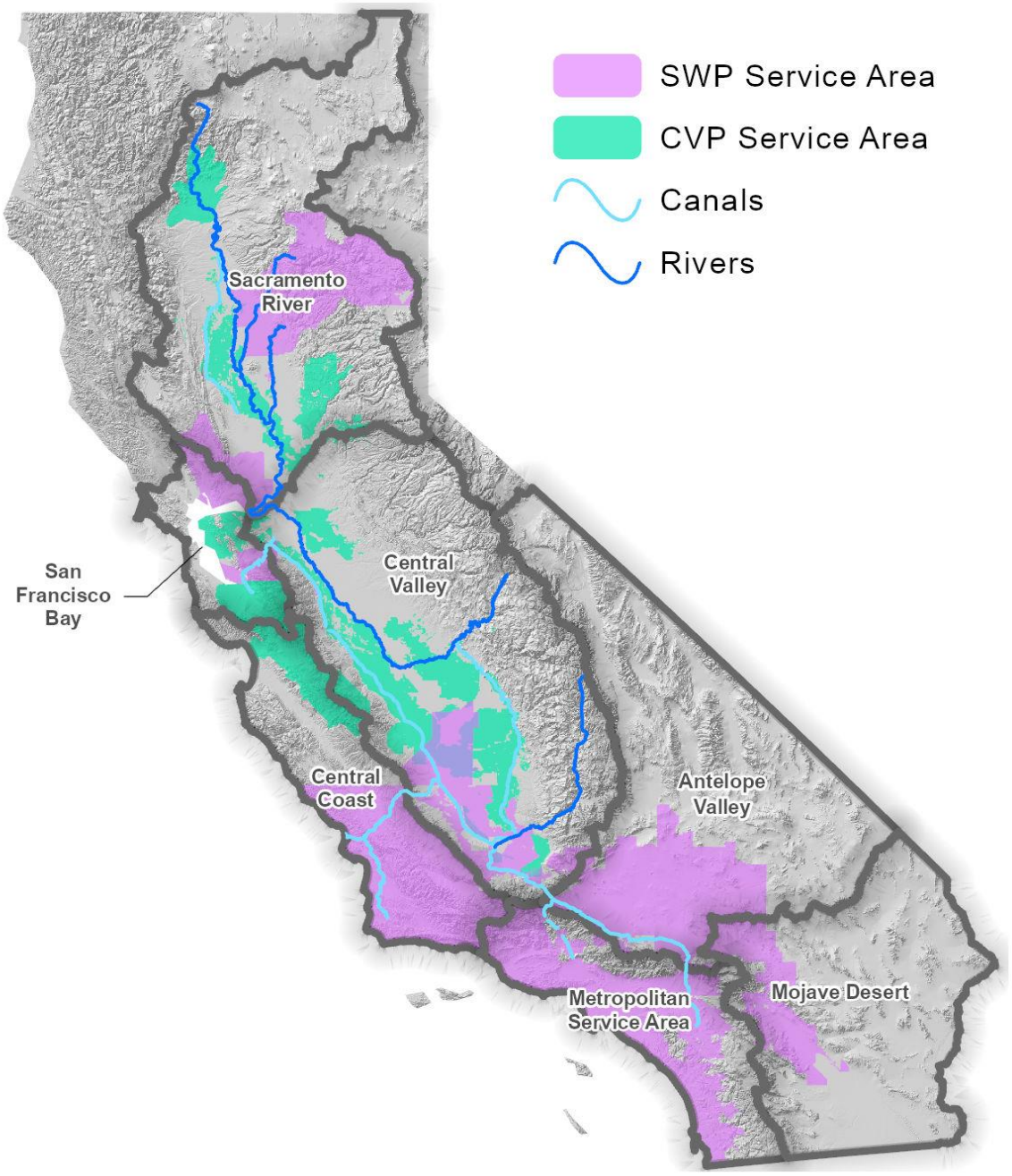
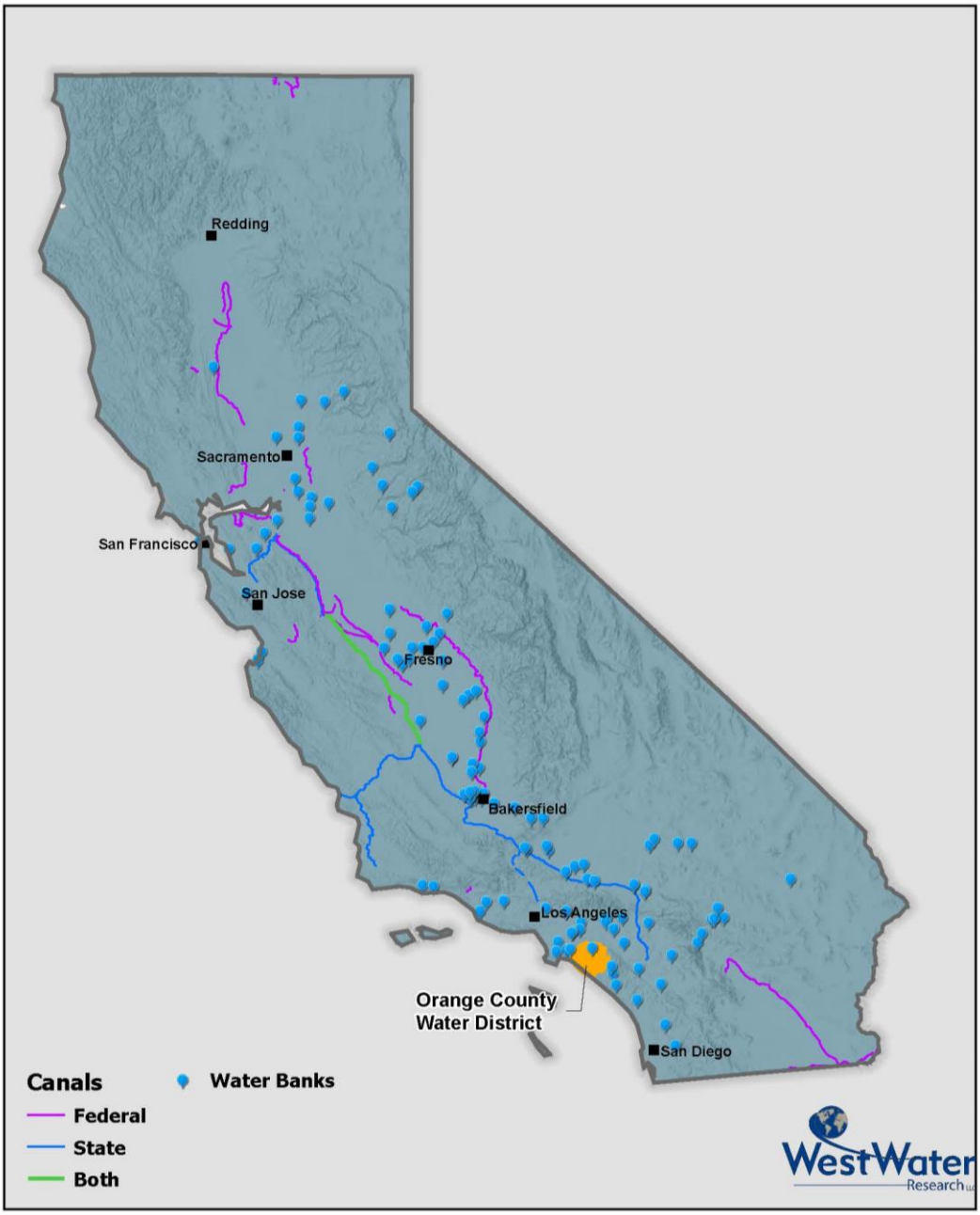


Figure 4: Locations of California Water Storage Programs

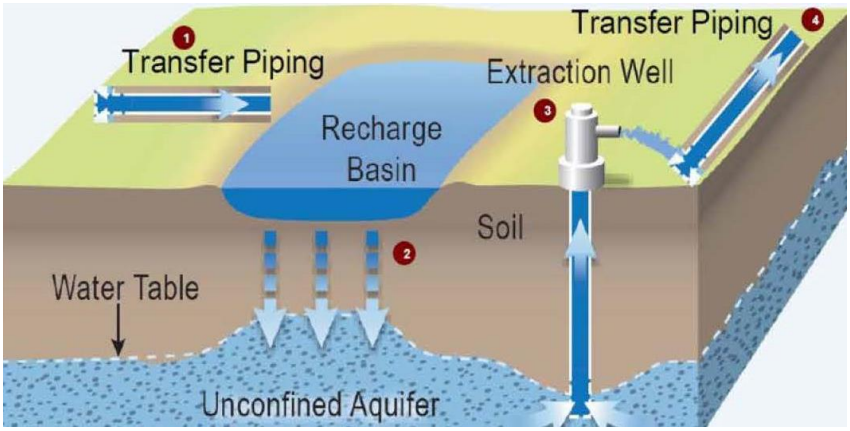


Summary of Storage Program Operations

Groundwater banking is a common water storage program structure and is the type of storage program being considered by OCWD and MNWD. Groundwater banking programs provide a mechanism for injecting or percolating surplus surface water underground into an aquifer, and subsequently recovering stored water when needed during dry years, emergencies, or other situations. Program capacity for total storage, annual recharge, and annual recovery is allocated among participants in exchange for compensation to the program owner. Figure 5 illustrates the operation of a representative groundwater bank, where water is recharged into

the underground aquifer and recovered via extraction wells. The operational means of water storage programs are described in the following sections.

Figure 5: Groundwater Banking Operation



Recharge: Direct vs. In-Lieu

Recharge may occur by direct or in-lieu means. Direct recharge can occur through spreading basins or injection wells. Where soil is more permeable, large spreading basins are used to percolate water directly into the aquifer. Where soil is less permeable, injection wells are used to inject water in the aquifer. Nearly half of all water storage programs have an in-lieu recharge component. In-lieu recharge is performed by groundwater users taking delivery of surface water instead of pumping groundwater.

Recovery: Direct vs. Exchange

Stored water can be recovered from underground either directly or by exchange. Direct recovery involves extracting the water from storage using wells for subsequent delivery to a participant. Water may also be recovered by an exchange for a different source of water other than what the participant has stored, proportionately reducing the amount of water that participant has in a storage account. Exchanges are common in programs that lack the infrastructure to provide direct return of stored water, but may be challenging in dry years when surface water allocations are reduced.

Total Storage Capacity

Total storage capacity available to water storage program participants depends upon the physical capability of the aquifer being used for storage. Administratively, total storage is often allocated as a multiple of recharge/recovery capacity. For example, several programs have a 3:1 ratio of total storage to annual recovery, and other programs may have higher or lower ratios. The capacity ratio is intended to allow multiple entities to participate in the storage program by capping the total amount of water a participant can have in storage at any one time. California has considerable aquifer capacity to accommodate water storage programs, with suitable aquifers in many populations and farming centers. In many aquifers, years of overdraft have made substantial storage space available. Total storage capacity across known individual programs ranges widely from as small as a few hundred AF to over one million AF.

Leave-Behind Losses

Leave-behind losses are typically assessed as one-time amounts ranging from 10% to 50% to provide benefits for the entity that is storing water on behalf of other parties, and to avoid negative impacts to the aquifer. In

some cases, annual losses are assessed to water remaining in storage. Higher leave-behind losses provide greater benefits to storage program owners and can be a form of compensation to the bank owner, as the banked water would not otherwise be available to the groundwater basin. Improved groundwater elevations can help reduce pumping costs for landowners and mitigate the undesirable effects of aquifer overdraft.

Water Storage Program Objectives

Water storage programs are designed to achieve a variety of water management objectives, including:

a) Dry-year reliability.
b) Emergency storage.
c) Improve groundwater elevations or promote safe yield.
d) Operational flexibility.
e) Address seasonal variation in supply/demand.

These objectives are described in the following sections.

Dry-Year Reliability

Water storage programs provide dry-year reliability by converting relatively inexpensive wet-year water to a valuable dry-year supply. Many storage programs in the Central Valley have been designed with this objective. Some storage programs serve only in-basin water users, while others involved large capital investments on infrastructure to deliver dry-year return water to out-of-basin participants. Metropolitan has funded the development of banking programs in the Central Valley for the purpose of storing surplus wet-year water and having a first priority right to call upon that supply during times of scarcity. Storage programs that provide dry-year reliability often have up-front capital investment costs based on priority of access to facilities, recharge and recovery fees, and/or annual reservation fees.

Emergency Storage

Emergency storage programs provide a backup water supply during system outages or imported water supply shutdowns. These storage programs have been implemented in SOC to help water agencies meet the 7 day planned outage requirement of Metropolitan and MWDOC, as well as meet demands in emergency outages. Reservoirs may be used for emergency storage programs, in which case a specified amount of water remains in storage or is consistently replenished to ensure supply reliability. In addition, emergency supplies may be recovered through groundwater banking programs. Emergency storage is not intended for use during extended periods, such as during a drought. Rather, these storage programs are designed for use during short-term system outages or shutdowns.

Improve Groundwater Elevations or Promote Safe Yield

Water storage programs can provide significant benefits to the storing entity as a result of additional water being replenished in the local groundwater basin. In some cases, small retail water agencies and agricultural water districts partner with large wholesale water suppliers to fund the costs of developing groundwater banking facilities. Storage program owners benefit by paying minimal up-front costs for infrastructure, and operating storage accounts for banking partners that increase local groundwater elevations. Some water storage programs are used solely by the owner and have no outside banking partners, in which case landowners directly benefit by having sustainable groundwater levels and lower pumping costs.

Operational Flexibility

Owners of water storage programs may receive financial compensation for maintaining participant storage accounts and storage facilities. This compensation increases operational flexibility for owners due to having additional revenue to lower customer costs and provide higher-quality services. In addition, participants achieve operational flexibility by creating a recoverable water supply that would not have otherwise been available, allowing them to avoid the high costs of obtaining dry-year or emergency supplies on the open market.

Address Seasonal Variation in Supply/Demand

Supply and demand vary within a given year corresponding to the growing season and peak irrigation months. Some water storage programs are designed specifically to address the imbalance of supply and demand with years. These storage programs provide a valuable source of water during summer months, and store relatively inexpensive surplus water during the off-season.

Water Storage Program Participation

The sectors and entities developing and/or participating in storage programs are as follows:

a. Wholesale water agencies.
b. Retail water agencies.
c. Cities and counties.
d. United State Bureau of Reclamation.
e. Water authorities (groundwater basin managers, flood control and water conservation districts, etc.) and watermasters.
f. Agricultural water districts.
g. Private sector (industrial, land development, etc).

Figures 6 and 7 present participation in known water storage programs by owner and customer, respectively. As shown, water storage program participation is diverse and evenly divided between agricultural water districts, water authorities, and wholesale and retail water agencies. The wide variety of participants suggests that water storage programs are effective at meeting diverse water supply needs. Retail water agencies, wholesale water agencies, and agricultural water districts each account for approximately one-quarter of participation by known storage program owner. On the customer side, retail water agencies account for 29% of participants, while wholesale water agencies and agricultural water districts account for 18% and 17%, respectively. Water authorities and watermasters comprise 14% of known program ownership, and 5% of known program customers. Other participants include cities, counties, the federal government, and the private sector.

Figure 6: Water Storage Program Participation by Owner

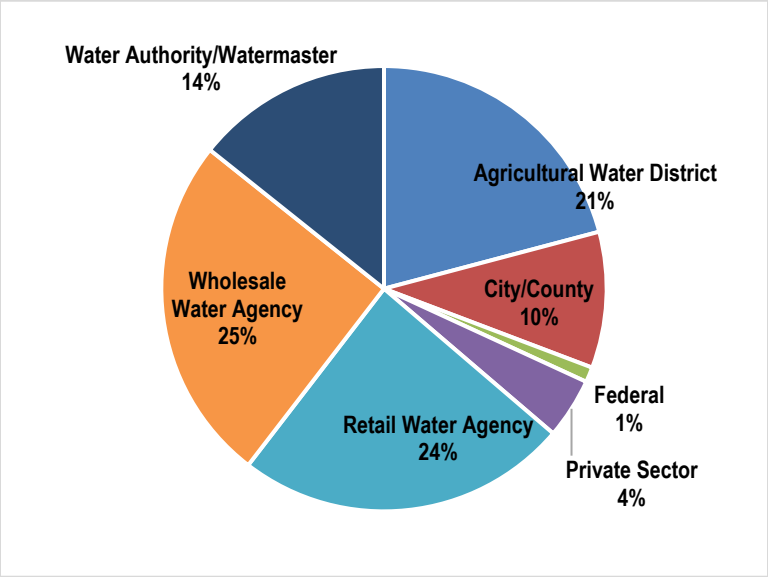
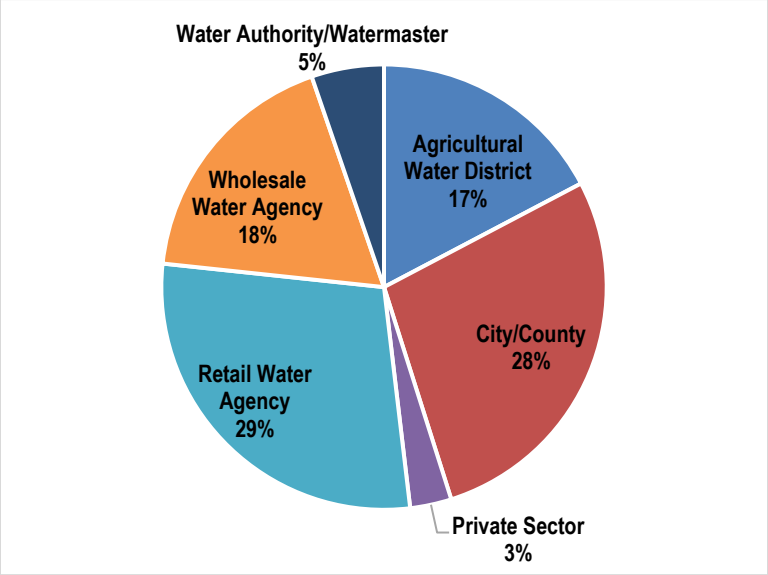


Figure 7: Water Storage Program Participation by Customer



Figures 8 and 9 display water storage program owners and customers by location. As shown, a majority of program owners and customers are located in Metropolitan's Service Area and the Central Valley. Rising urban water demand in southern California has driven development of water storage programs. Wholesale water agencies such as OCWD comprise nearly half of program ownership and approximately one-quarter of program customers. Agricultural production in the Central Valley has also been a key driver of storage program development. Nearly all agricultural water users that participate in water storage programs are located in the Central Valley.

Figure 8: Water Storage Program Owners by Location

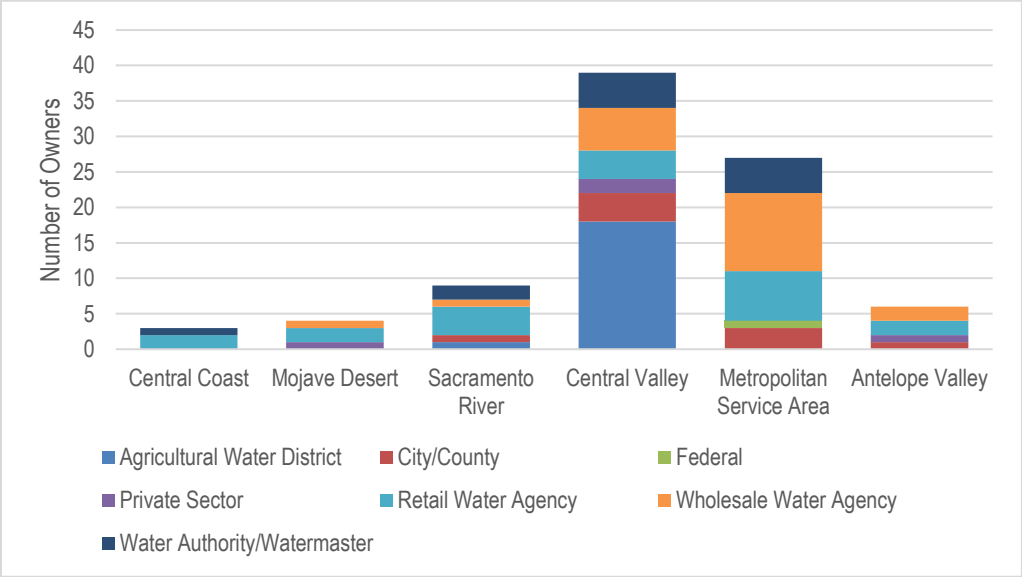
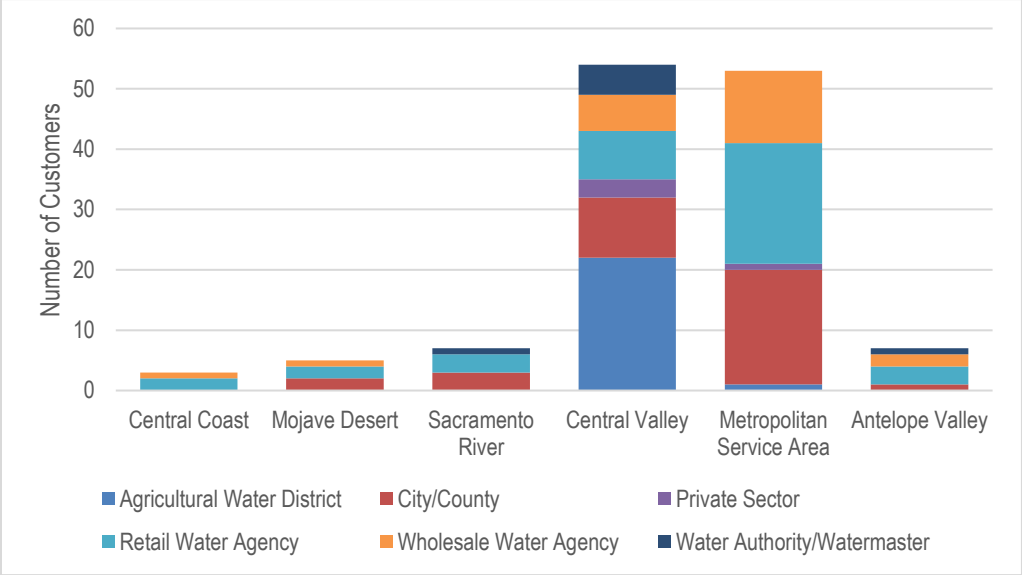


Figure 9: Water Storage Program Customers by Location



Long-Term Groundwater Banking Agreements

This section summarizes long-term groundwater banking agreements outside Metropolitan's service area. The summary is limited to include only market-based storage programs featuring compensation terms that resulted from commercial negotiations. Compensation can include financial and/or non-financial (i.e. sharing of stored water) terms. Other programs such as those developed only for the owner's use (no outside customers) or providing reimbursement of actual costs are not addressed here. Long-term groundwater banking agreements allow participants to store and recover water as needed for a term of 15 or more years.

Compensation terms for long-term groundwater banking are often based on reimbursement of capital and O&M costs, plus a premium to the storage program owner. In exchange for reimbursement and premium payments, long-term groundwater banking agreements typically provide dedicated first priority capacity. Usage fees to recharge and recover water are a standard component of long-term banking agreements. Leave-behind losses are usually assessed, which can be a form of compensation to the program owner in addition to (or instead of) usage fees.

Long-term groundwater banking agreements are not directly applicable to setting compensation for the potential OCWD-MNWD storage program. The potential OCWD-MNWD storage program is short-term (5-10 years) with a relatively small volume (5,000 AF). Unlike long-term groundwater banking agreements, the potential OCWD-MNWD storage program does not provide MNWD with first priority access to dedicated capacity over an extended period. As a result, compensation in the potential OCWD-MNWD storage program is likely to differ from the compensation terms observed in long-term groundwater banking agreements. However, the potential OCWD-MNWD storage program would test the feasibility of a long-term storage program. If the OCWD-MNWD program is extended/expanded in the future, then long-term agreements may be more relevant for establishing compensation terms. Long-term groundwater banking agreements are a common storage program structure and comprise a large share of market activity. Since they are important part of the market, they are summarized here.

Programs Outside Metropolitan Service Area

Table 1 provides detail regarding long-term groundwater banking programs outside the Metropolitan service area. All costs have been adjusted to 2019 dollars. As shown, upfront capital costs range from $1,053/AF to $2,564/AF of recovery capacity. Usage fees range widely from $0 to $89/AF for recharge and from $32 to $186/AF for recovery. In general, participants in long-term groundwater banking agreements compensate the storage program owner through payment of usage fees and upfront capital contributions. Leave-behind losses are kept to a minimum of 10% in most programs because compensation is financial, with some exceptions including the 2019 agreement between IRWD and AVEK which provides compensation in the form of water sharing.

Table 1: Long-Term Groundwater Banking Agreements Outside Metropolitan Service Area (All Costs in 2019 Dollars)

Owner	Customers	Storage Capacity (AF)	Annual Recharge (AF/year)	Annual Recovery (AF/year)	Upfront Capital Cost ($/AF Recovery)	Recharge Usage Fee ($/AF)	Recovery Usage Fee ($/AF)*	Annual O&M ($/AF Recovery)	Leave-Behind Loss	Term
Semitropic – Original Water Bank	Metropolitan, Santa Clara Valley Water District, Alameda County Water District, Zone 7 Water Agency, Vidler Water Co.	1,000,000	90,000	90,500	$2,564	$87	$87	$70	10%	1995-2035
Kern Water Bank	Undisclosed Energy Facility	40,000	15,000	5,000	$1,192	$37	$186	$12**	10%	2000-2035
Cawelo Water District	Zone 7 Water Agency	120,000	10,000	10,000	$2,460	$89	$32	$0	50%	2006-2035
Kern Delta Water District	Metropolitan	250,000	50,000	50,000	$1,053	$68	$54	$10	11%	2004-2035
Semitropic – Stored Water Recovery Unit	Castaic Lake Water Agency, City of Tracy, Montecito Water District, San Diego County, Rosamond, Growers	350,000	200,000	200,000	$1,330-$1,855	$13-$55	$50-$93	$15	10%	2008-2035
Willow Springs Water Bank	San Diego County Water Authority	25,000	5,000	5,000	$1,823	$85	$85	$28	10%	2008-2035
AVEK	Metropolitan	280,000	70,000	70,000	$1,871	$0	$100	$19**	10%	2019-2056
IRWD	AVEK	10,000	20,000	3,333	$0	$0	$0	$0	57.5%	2019-2035

*Plus reimbursement of actual energy costs

**Reimbursement of actual costs – estimated based on 1% of capital costs

Storage Programs Within Metropolitan Service Area

Metropolitan has developed several local conjunctive use programs (CUPs). Conjunctive use refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of abundance. Under conjunctive use agreements, this stored water is available for use during periods of low surface water supplies as a way of augmenting seasonal and multi-year shortages. Metropolitan's CUPs are summarized as follows.

Metropolitan CUP Agreements

In 2000, Metropolitan pursued an agreement with DWR to administer $45,000,000 of Proposition 13 funds for the development of conjunctive use and cyclic storage programs in Metropolitan's service area. Metropolitan paired the state funds with $35,000,000 of Metropolitan capital funds to develop nine programs that provide for storage of up to 212,000 AF, and dry-year or emergency recovery of up to 70,000 AF per year. The storage programs each have 25-year terms. The agreements allow Metropolitan to recover up to 33% of the maximum storage capacity in a given year and recharge up to 25% of the maximum storage capacity in a single year. The partnering member agencies are responsible for construction and operation and maintenance of facilities. Metropolitan has no ownership interest in program facilities, and pays program O&M, power, and an annual administrative fee equal to a ratio of $100,000 per 25,000 AF of annual recovery capacity to the program partners. Agreements each have 25-year terms and are summarized in Table 2.

Table 2: Summary of Metropolitan Local Conjunctive Use Programs

Project	Year	Storage Capacity (AF)	Annual Recharge (AF/year)	Annual Recovery (AF/year)	Capital Cost ($/AF Recovery)
City of Long Beach CUP	2002	13,000	3,250	4,333	$1,505
Live Oak Basin CUP	2002	3,000	750	1,000	$4,781
Foothill Area Groundwater Storage Project	2003	9,000	2,250	3,000	$800
Orange County CUP	2003	66,000	16,500	22,000	$1,874
Chino Basin Program	2003	100,000	25,000	33,000	$1,177
Long Beach CUP: Lakewood Expansion	2005	3,600	900	1,200	$3,476
City of Compton CUP	2005	2,300	575	763	$4,285
Upper Claremont Heights CUP	2005	3,000	750	1,000	$3,612
Elsinore Groundwater Storage Program	2006	12,000	3,000	4,000	$3,144

All costs adjusted to July 2019 dollars using the CPI. Capital costs and capacities are based on the amounts identified in program descriptions presented to the Metropolitan Board of Directors for Board action.

Short-Term Groundwater Banking Agreements

Short-term groundwater banking agreements are defined in this analysis as programs with a term of 15 years or less. These agreements are commonly used to enable storage program participation on a lower priority basis. Typically, development of new facilities is not needed as facilities are already constructed and operational. Participants avoid paying upfront capital costs and are granted lower priority access to project capacity. Short-term agreements may be developed to test the feasibility of potential long-term storage programs. Short-term agreements also include cyclic storage programs, which allow pre-delivery of imported

water for recharge into groundwater basins in excess of an agency's planned and budgeted deliveries. The water is then purchased at a later time when the agency has a need for such deliveries. In general, participants in short-term groundwater banking programs pay usage fees, but do not pay capital costs. Water sharing is a common form of compensation for short-term banking agreements in lieu of financial consideration.

The potential OCWD-MNWD storage program is a short-term groundwater storage arrangement. Therefore, short-term storage programs discussed in this section may be applicable for developing compensation terms. The following sections describe short-term groundwater banking agreements with financial compensation as well as water sharing compensation.

Agreements with Financial Compensation

Short-term groundwater banking agreements with financial compensation generally provide lower priority access to banking facilities. Customers in these agreements often pay usage fees, but are not required to pay capital fees as the customers are not receiving dedicated capacity. Examples of such agreements are summarized in Table 3. As shown, usage fees range widely from $0 to $100/AF for recharge and $0 to $410/AF for recovery. Some short-term groundwater banking agreements provide the owner with compensation in the form of 50% water sharing in addition to financial consideration.

Table 3: Short-Term Groundwater Banking Agreements with Financial Compensation (All Costs in 2019 Dollars)

Owner	Customers	Storage Capacity (AF)	Annual Recharge (AF/year)	Annual Recovery (AF/year)	Upfront Capital Cost ($/AF Recovery)	Recharge Usage Fee ($/AF)	Recovery Usage Fee ($/AF)	O&M, Energy ($/AF Recovery)	Storage ($/AF Recovery)	Leave-Behind Loss	Water Sharing	Term
Semitropic Water Storage District – Stored Water Recovery Unit	Homer	50,000	As available	As available	$0	$34	$34	$3	$3	10%	0%	2011-2021
North Kern Water Storage District	Madera Valley	20,000	As available	5,000	$0	$34	$34	$0	$6	10%	0%	2011-2020
North Kern Water Storage District	West Kern Water District	28,000	14,000	14,000	$0	$0	$179	$6	$0	0%	50%	2006-2011
North San Joaquin Water Conservation & East Bay Municipal Utilities District	East Bay Municipal Utilities District	1,000	1,000	500	Actual costs	$100	$0	Actual costs	$0	0%	50%	2018-2022
IRWD – Potential MWDOC Agreement	MWDOC	5,000	N/A	5,000	$1	$0	$410	$123	$25	0%	0%	2019-2026
Semitropic Water Storage District – Stored Water Recovery Unit	Palmdale Water District	10,000	As available	5,000	$0	$0	$0	Actual Costs	$6	10%	50%	2011-2021
Buena Vista Water Storage District	Kern County Water Agency Members	11,000	Not applicable	1,667	$0	$0	$110	$0	$0	5%	50%	2017-2023
Kern Delta Water District	San Bernardino Valley Municipal Water District	30,000	Not applicable	5,000	$0	$46	$54	Actual costs	$0	11%	0%	2011-2025

Agreements with Water Sharing Compensation

Under storage programs water sharing compensation, participants deliver surplus water to a water bank, and the storing entity agrees to return a portion of the water to the participant at a later date. Compensation to the storing entity is made in the form of water left behind from the exchange with no money changing hands. IRWD has developed a number of water sharing agreements with various entities, which are described in the following section.

IRWD – Multiple Counterparties

IRWD has developed Strand Ranch water storage facilities in partnership with Buena Vista Water Storage District (BVWSD) and Rosedale-Rio Bravo Water Storage District (Rosedale). Water is sourced in part through unbalanced exchanges with short-term storage program participants. Typically, customers compensate IRWD for banking capacity by sharing 50% of stored water.

IRWD has entered into a variety of SWP water exchange agreements as part of its Strand Ranch water banking projects. Under the agreements, participants deliver surplus SWP water supplies to IRWD for storage. IRWD is required to return one-half of the stored water to the participants in the future. Participants are not assessed usage fees, but pay the actual costs associated with recharge and recovery. Key terms of the agreements are presented in Table 4.

Table 4: IRWD SWP Agreements with Multiple Counterparties

Counterparty	Term (years)	Total Recharge Water (AF)	Annual Return Water (AF per year)	Total Return Water (AF)	Exchange Ratio
AVEK	2011-2016	5,000	833	2,500	2:1
Carpinteria Valley Water District	2011-2016	1,500	250	750	2:1
Central Coast Water Authority	2017-2022	10,000	1,667	5,000	2:1
Central Coast Water Authority*	2019-2024	700	117	350	2:1

*2019 programs are pending final agreements.

Other Programs Reviewed

Other programs reviewed include emergency storage and emergency water service programs, as well as seasonal storage programs. While these storage programs do not involve groundwater banking and are therefore not applicable to the potential OCWD-MNWD storage program, they are reviewed because they are located within the Orange County market. Emergency storage agreements are intended to provide water supplies during system outages or declared emergencies in the imported water system. This type of water storage program is common in SOC, where water agencies are required to develop plans to meet customer demands for a 7-day period in the event of a Metropolitan outage.

Santa Margarita Water District – Upper Chiquita Reservoir

Upper Chiquita Reservoir is a long-term emergency water storage program developed by SMWD in 2011. The storage program provides immediate response when water from Metropolitan is unavailable. Program participants include the City of San Clemente, the City of San Juan Capistrano, MNWD, and South Coast

Water District. Program participants have co-equal priority to their share of project capacity, which total 750 AF. The shares are:

- Santa Margarita Water District: 41.96% Capacity Right (314.7 AF)
- Moulton Niguel Water District: 34.11% Capacity Right (255.8 AF)
- City of San Clemente: 11.17% Capacity Right (83.8 AF)
- City of San Juan Capistrano: 6.67% Capacity Right (50 AF)
- South Coast Water District: 6.09% Capacity Right (45.7 AF)

Participants funded capital costs according to their capacity right percentages. Total capital costs were $54,675,171. In addition, participants pay annual fixed and variable costs associated with O&M of the reservoir. Fixed cost items are allocated among parties based on their capacity right percentages. Variable costs are allocated among participants based on the volume of water delivered to each participant in any given year.

El Toro Water District - R-6 Reservoir

The R-6 Reservoir was initially designed to provide a backup water supply to El Toro Water District (ETWD) during times when imported water supplies from Metropolitan are unavailable. This is considered an emergency use. SMWD and MNWD have also acquired capacity in R-6 under long-term agreements, which they use under emergency conditions. ETWD currently uses R-6 as a daily water supply, but keeps the reservoir full with imported water from Metropolitan. R-6 was constructed by ETWD in 1967 with a capacity of 715 AF, and was expanded in 2002 to 845 AF. Agreements with SMWD and MNWD to acquire capacity in the reservoir were signed in 2000.

Total capital costs were approximately $10,000,000 to expand the reservoir. SMWD purchased 358 AF of capacity in the reservoir for $11,200,000. MNWD purchased a 40 AF share for $1,950,000. Upfront capital costs and ongoing O&M costs are paid by participants in proportion to their share of reservoir capacity. Participants pay variable treatment costs and the going Metropolitan water rate when they discharge water from the reservoir.

South County Phase 1 Emergency Service Program Agreement

In 2006, multiple SOC water agencies entered into a 25-year agreement with IRWD and OCWD to receive water from the IRWD system with subsequent conveyance into the distribution system serving SOC. The program was developed to deal with short-term emergency water system outages, or planned shutdown scenarios in which imported supplies normally delivered into SOC are curtailed, eliminated, or unavailable for up to 30 days. The Emergency Service Program was implemented by constructing importation pipelines between IRWD and the distribution system serving SOC. The maximum conveyance of water is not to exceed 50 cubic feet per second (cfs) of water for more than 30 days per incident, for a maximum of 3,000 AF per incident. The water delivered through the IRWD interconnection can be a combination of Metropolitan-imported water or locally produced water from IRWD that will be exchanged with imported water.

The production of groundwater by IRWD under this program is exchanged with imported Metropolitan water for billing purposes to the SOC Agencies, and is deemed to be a delivery of Metropolitan water. The SOC Agencies are given a flow-rate reservation in the IRWD distribution system, up to the flow rates during the applicable months and five-calendar year intervals set forth in the agreement, to obtain imported water or groundwater exchanged with imported water.

The SOC Agencies paid a reservation fee to IRWD for the flow-rate reservation, which totaled $4,410,000. The costs to complete the IRWD interconnection projects were approximately $17,800,000, and IRWD invoiced the SOC Agencies for their respective shares of the project work. Capacity rights percentages allocated to the SOC Agencies were utilized to allocate project costs. IRWD operates and maintains the interconnection projects. For any facility operated for both SOC Agency use and IRWD use, the O&M cost is allocated between SOC Agency use and IRWD use in proportion to the respective cumulative volumetric measurements of the two uses, provided the SOC Agency portion of the O&M cost is allocated among the agencies pursuant to their capacity percentages and the amount of water they receive.

Santa Margarita Water District – Trampas Reservoir

SMWD is developing the Trampas Reservoir as a seasonal storage reservoir to address the seasonality of recycled water demands for irrigation. Under this storage program, water not needed in the winter is stored for irrigation use in the summer. The total storage volume is 5,000 AF and the program is being developed with a 50-year term. SMWD is accepting participants who also need seasonal recycled water storage, however no agreements have been completed to date. Potential participants include City of San Clemente, City of San Juan Capistrano, and South Coast Water District.

Estimated capital costs range from $86,000,000 to $145,000,000. Participant costs will depend on end use and timing of buy-in, and will be allocated on a pro-rata basis to recover actual project construction and development costs.

Analysis of Compensation Determinants

The purpose of this section is to analyze patterns in existing groundwater storage program compensation to understand (1) the factors influencing compensation terms, and (2) the extent to which those factors impact compensation. To perform this analysis, compensation terms across diverse groundwater storage programs must be expressed in comparable terms. Following the literature, annual lifecycle PV per AF was selected as the unit of comparison. Annual lifecycle PV per AF was calculated in 2019 dollars for each program. Groundwater storage program prices were found to increase over time at approximately the rate of inflation. Since storage program costs rise with general inflation levels, it is important to compare costs in current-year (2019) dollars. Uniform assumptions were developed regarding program operations:

- Recharge-recovery cycling was assumed to occur every 3 years unless otherwise specified in the program agreement(s). That is, during the first program year, the full annual recharge amount was assumed to be stored. During every third program year, the full allowable recovery amount was assumed to be withdrawn from storage until the storage balance decreased to zero. In the year following reduction of the storage balance to zero, the full annual recharge amount was again assumed to be stored. This pattern repeated for the full program term. In the final program year, any water remaining in storage was assumed to be recovered.
- Costs were assumed to escalate at an annual rate of 3%, consistent with the assumption applied in the 2018 Orange County Water Reliability Study.
- Capital costs (if any) were financed over a time period equal to the duration of the program (rounded down to 5-year increments) not to exceed 30 years at a 4% interest rate.

- A discount rate of 4% was applied to calculate annualized present values, consistent with the assumption used in the 2018 Orange County Water Reliability Study.
- Water losses were assigned a cost by multiplying the volume of losses in acre-feet by estimated variable water delivery charges in dollars per acre-foot.
- For programs providing water sharing, the cost of water sharing was quantified by multiplying the average spot market transfer price during the year of storage to the volume of losses.
- To estimate annual lifecycle PV in dollars per AF, the present value of all customer costs over the life of the program was divided by the total assumed recovered water volume. This methodology for calculating annual lifecycle PV per AF is based on the approach used by Metropolitan for analyzing the costs of its CUP agreements and other storage programs.

Using these assumptions, annual lifecycle PV per AF was estimated for each of the 29 groundwater storage programs summarized above in Tables 1, 2, 3, and 4. The analysis includes the groundwater storage programs identified in WestWater's review that provide compensation to the program owner. Table 5 presents the range of annual lifecycle PV per AF as well as the range in recovery capacities observed across the 29 groundwater storage programs. As shown, the annual lifecycle PV of storage programs ranges widely from $160/AF to $878/AF, and averages $394/AF. The scale of existing storage programs also varies. Table 5 also illustrates variation in scale in terms of AF of recovery capacity. Across existing programs, capacities range widely from 99 AF to 200,000 AF of annual recovery, and average 18,778 AF of annual recovery.

Table 5: Annual Lifecycle PV and Recovery Capacity of Groundwater Storage Programs

	Lifecycle PV ($/AF)	Capacity (AF Recovery)
Average	$394	18,778
Median	$307	4,333
Min	$160	99
Max	$878	200,000
StDev	$219	41,177
Count	29	29

Factors Impacting Storage Program Compensation

Key factors that were found to influence storage program annual lifecycle PV per AF are:

a) Storage program duration
b) Storage program volume
c) Location (outside Metropolitan service area vs. within Metropolitan service area)
d) Participation (urban vs agricultural).

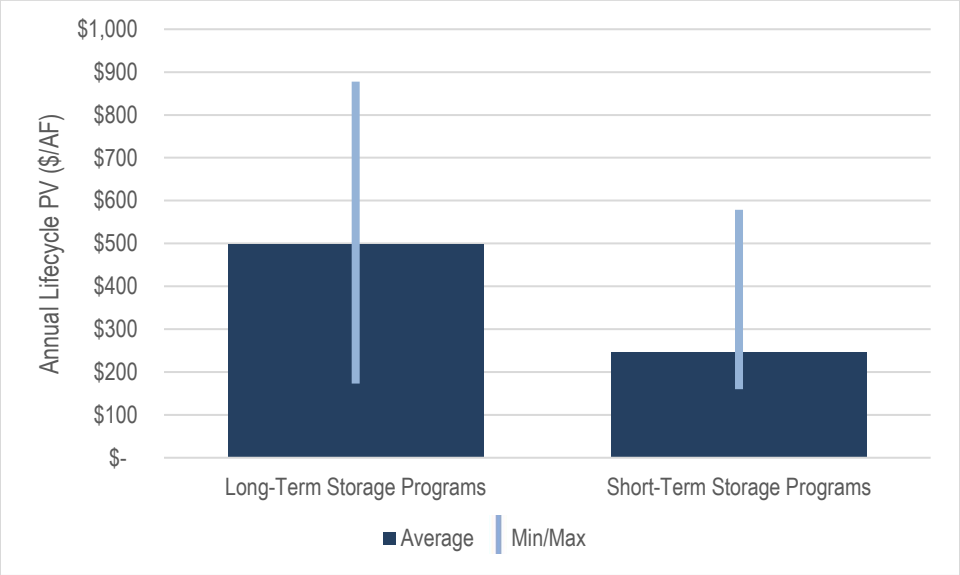
These factors should be considered when developing compensation terms for the potential OCWD-MNWD water storage program. The extent to which each factor influences annual lifecycle PV per AF is described as follows:

Storage Program Duration

Long-term (15+ years) storage programs typically correspond with higher payments to the storage program owner compared to short-term storage programs. Figure 10 shows the average, minimum, and maximum

annual lifecycle PV in dollars per AF for long-term and short-term storage programs. As shown, annual lifecycle PV for long-term storage programs ranges from $173 to $878/AF, and averages $498/AF. For short-term storage programs, annual lifecycle PV ranges from $160 to $578/AF, and averages $247/AF. Long-term programs tend to command a premium because they provide dedicated access to first priority capacity, whereas short-term programs generally offer lower priority access to surplus capacity that may be available.

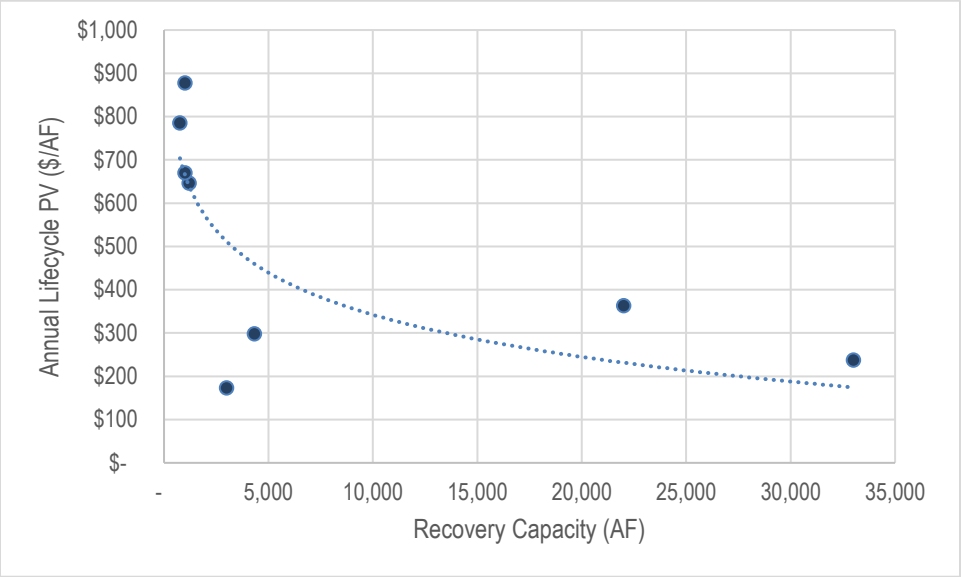
Figure 10: Long-Term vs. Short-Term Storage Program Compensation



Storage Program Volume

Larger storage programs tend to have lower unit costs. Capital costs per AF can decrease as the size of a program increases due to economies of scale, and compensation is often based in part on capital costs. For example, recovery capacities in Metropolitan's CUPs in Orange County have a negative correlation with annual lifecycle PV per AF. As shown in Figure 11, recovery capacities in the Metropolitan CUPs range from 763 AF to 33,000 AF, and annual lifecycle PVs range from $173 to $878/AF, with higher capacities generally corresponding to lower annual lifecycle PV per AF.

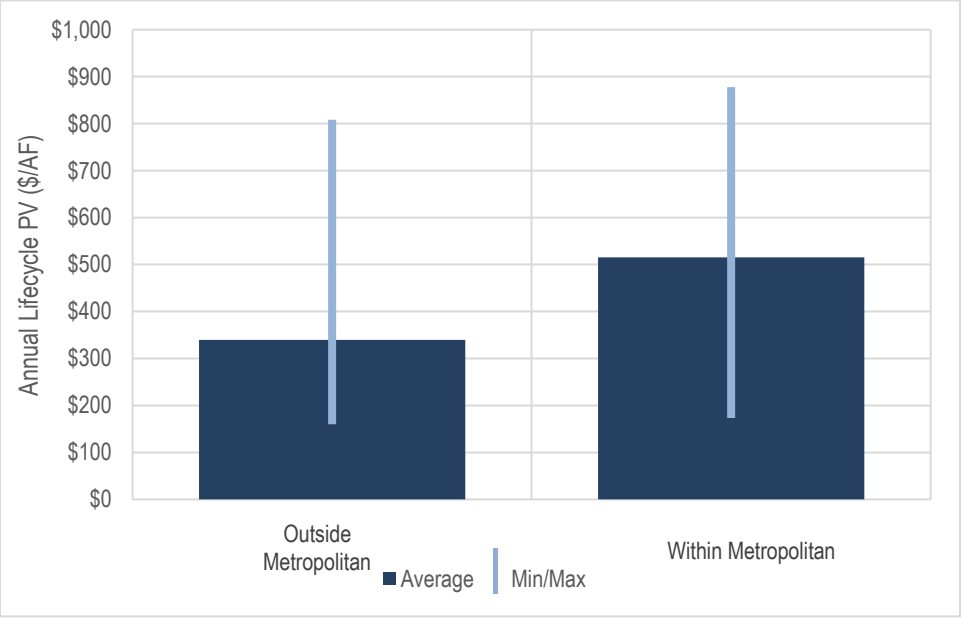
Figure 11. Scale Economies in Metropolitan CUP Programs



Program Location

A majority of water storage programs are located within Metropolitan's service area or in the Central Valley, which is outside of Metropolitan's service area. Other storage programs are found in the Antelope Valley, Mojave Desert, San Francisco Bay, Sacramento River, and Central Coast regions. Figure 12 compares the annual lifecycle PV per AF of storage programs based on location. As shown, storage programs located outside the Metropolitan service area have lower costs, with annual lifecycle PVs that range from $160/AF to $808/AF, and average $340/AF. In comparison, annual lifecycle PVs for storage programs within the Metropolitan service area range from $173/AF to $878/AF and average $515/AF, consistent with localized market conditions and the premium value of water storage in Metropolitan's boundaries.

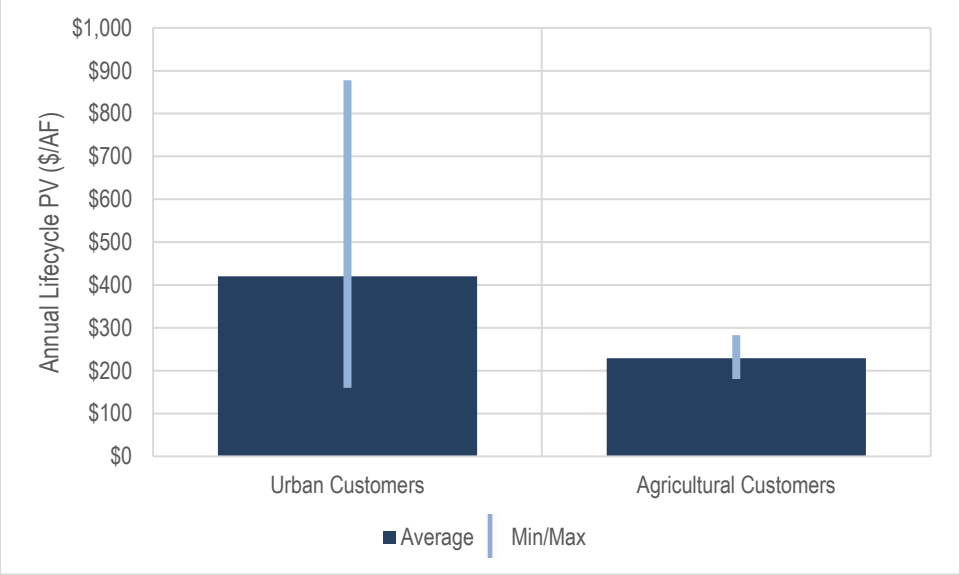
Figure 12: Storage Program Compensation Outside Metropolitan Service Area vs. Within Metropolitan Service Area



Program Participation

Systematic differences in water storage program compensation between wholesale and retail water agencies were not observed. Many storage program participants provide both wholesale and retail service, and some programs have both wholesale and retail participants that pay the same prices. However, compensation differences were found broadly across urban and agricultural program participants, with urban water agencies paying more for storage programs, as shown in Figure 13. The annual lifecycle PV of storage programs with urban participants ranges widely from $160/AF to $878/AF, and averages $420/AF. The annual lifecycle PV of storage programs with agricultural customers ranges from $180/AF to $282/AF, and averages $229/AF.

Figure 13: Storage Program Compensation - Urban Customers vs. Agricultural Customers



Factors Not Relevant to Storage Program Compensation

Based on the analysis, characteristics of existing storage programs that were not identified as impacting annual lifecycle PV per AF were:

a) Storage program purpose (dry year vs. emergency storage)
b) Program operations (direct pump-back vs. exchange)
c) Compensation Type (financial consideration vs. water sharing).

Storage Program Purpose (Dry Year vs. Emergency Storage)

Many existing storage programs are intended for both emergency and dry year use. Thus, a systematic difference in compensation for these different purposes could not be identified. In the context of the reviewed storage programs, "emergency use" is considered to be accessing stored water during potential outages at California Aqueduct pumping plants. For example, Southern California water agencies can access water stored in the Antelope Valley should the Edmonston Pumping Plant temporarily stop operating.

Program Operations (Direct Pump-Back vs. Exchange)

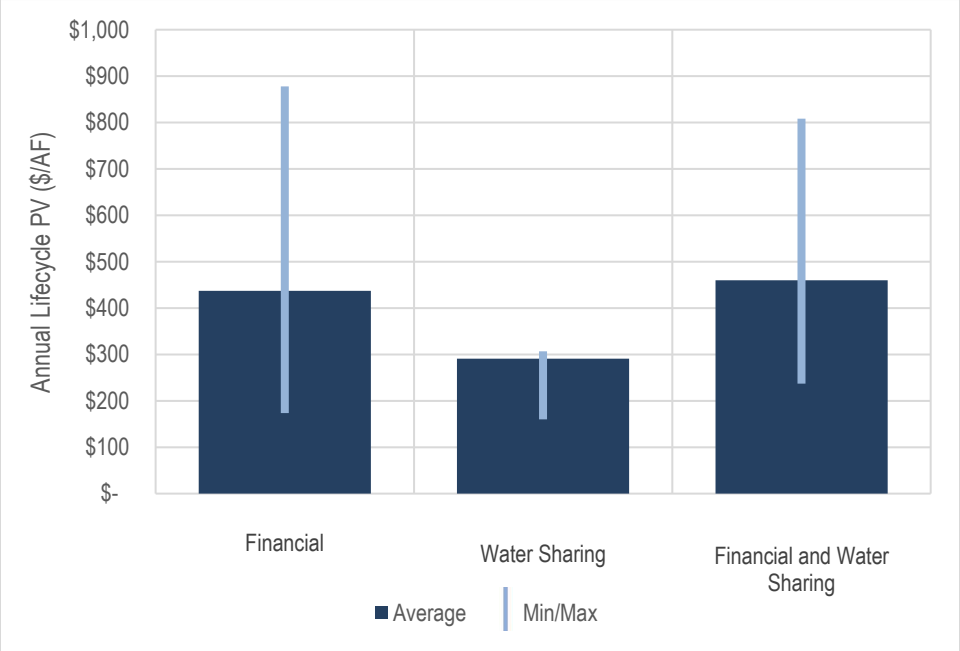
Storage programs returning water by direct pump-back were hypothesized to attract premium compensation relative to programs returning water by exchange. Direct pump-back can require substantial additional capital

investment, and provides reliability benefits. However, many existing programs can return water by both direct pump-back and exchange. As a result, differences in pricing based on these operations were not observed.

Compensation Type (Financial Consideration vs. Water Sharing)

No systematic differences in unit price between programs with financial compensation vs. water sharing were identified. Any price differences in programs with financial compensation vs. water sharing compensation are due to other factors, such as program duration or capacity access. Figure 14 compares annual lifecycle PV per AF for storage programs with financial compensation, water sharing, or both. As shown, annual lifecycle PV for storage programs with financial compensation ranges from $173/AF to $878/AF, and averages $437/AF. Annual lifecycle PV for storage programs with water sharing ranges from $160/AF to $307/AF, and averages $291/AF. While priced lower, most of these programs are short-term with lower priority capacity access, which explains the lower compensation. For programs with both financial compensation and water sharing, the annual lifecycle PV ranges from $237/AF to $808/AF, and averages $460/AF.

Figure 14: Financial vs Water Sharing Storage Program Compensation



Summary of Selected Storage Programs

From the existing water storage programs reviewed in the previous section, a smaller set of storage programs considered most applicable to the potential OCWD-MNWD storage program is selected and summarized. The selection criteria are:

- **Groundwater Storage:** The selected storage programs are limited to those utilizing groundwater storage. If pursued, the potential OCWD-MNWD storage program would be a groundwater storage agreement. Surface storage programs often involve different infrastructure, operations, and objectives. As a result, compensation terms in surface storage programs are less useful for pricing a potential OCWD-MNWD program.
- **Storage Program Objectives:** The objective of the potential OCWD-MNWD storage program is to improve water supply reliability for MNWD during both drought periods and emergencies. Thus, existing programs providing dry-year reliability and/or emergency supply benefits are included.
- **Compensation to Owner:** Some existing storage programs have not provided compensation to the program owner and were developed to accomplish other objectives not involving compensation. The selection of existing storage programs is limited to those providing compensation to the storage program owner, in the form of cash and/or sharing of stored water.
- **Storage Program Customers:** As previously described, diverse types of water users participate in water storage programs. The selection of storage programs is limited to those in which urban water users (both wholesale and retail agencies) are participating as customers. Since MNWD is a retail agency and would be the customer in a potential OCWD-MNWD agreement, storage programs with retail agency customers are weighted most heavily in the analysis. However, due to the relatively small set of existing programs meeting the selection criteria, storage programs providing storage for wholesale agencies are also considered.
- **Term:** Water storage program compensation can vary according to the duration or term of the program. Longer-term storage programs often feature relatively large up-front capital payments, reimbursement of operating costs, and usage fees. Shorter-term storage programs typically involve lower or no capital payments, with compensation to the owner structured as usage fees, operating cost reimbursement, and/or sharing of stored water. As a result of the systematic differences in compensation structure between long-term and short-term storage programs, only short-term (15 years or less) storage programs are selected for consistency with the term of the potential OCWD-MNWD storage program.
- **Capacity Access:** The potential OCWD-MNWD storage program would rely on excess storage capacity made available by OCWD and would not disrupt current operations of OCWD or the Groundwater Producers. Therefore, existing storage programs providing access to storage capacity on an as-available basis are selected. These storage programs tend to be priced differently from storage programs offering first priority access to dedicated capacity. In addition, the potential OCWD-MNWD storage program is relatively small (5,000 AF of storage and annual recovery). Thus, the selection is limited to smaller storage programs providing 5,000 AF or less of annual recovery.

- **Direct and In-Lieu Recharge:** A potential OCWD-MNWD storage program could recharge water through both direct or in-lieu operations. Thus, existing storage programs using direct and/or in-lieu recharge are included in the selection.
- **Location:** Existing storage programs benefitting water agencies located within Metropolitan's service area are most applicable to establishing compensation terms for a potential OCWD-MNWD storage program. Such storage programs are weighted more heavily in the analysis. Storage programs benefitting other urban areas of California are also considered to supplement the limited number of existing storage programs meeting the selection criteria.

Based on these criteria, seven storage programs are selected. These storage programs are summarized in Table 6. A map of the selected programs is provided in Appendix A. The compensation terms of these storage programs are considered useful for establishing compensation terms in the potential OCWD-MNWD program due to the programs' similarities. Currently, the potential OCWD-MNWD storage program is a short-term pilot. Should the storage program be extended and/or expanded in the future, other existing storage programs such as those summarized in Tables 1 and 2 may be more applicable for establishing compensation terms in a longer-term program.

As Table 6 shows, the selected storage programs provide both financial and water sharing compensation to the program owner. To enable comparison of storage program compensation in consistent terms, annual lifecycle PV for each program is presented in 2019 dollars per AF. Annual lifecycle PV per AF was calculated based on the assumptions described in the previous section of this report. Across the selected programs, annual lifecycle PV ranges from $160/AF to $307/AF, and averages approximately $210/AF. These values provide an indication of the compensation for a potential OCWD-MNWD storage program that can be supported by existing storage program agreements.

Table 6: Selected Existing Water Storage Programs Summary Matrix

						Program Operations			Program Capacity (AF)				Program Compensation**						
	Customer	Initial Year	Term (Years)	Water Source(s)	Program Purpose	Conveyance	Recharge	Recovery/ Return	Total Storage	Annual Recovery	Capacity Access	Storage Losses (%)	Up-Front ($/AF)	O&M, Energy ($/AF)	Recharge ($/AF)	Storage ($/AF)	Recovery ($/AF)	Water Sharing (%)	Lifecycle PV ($/AF)
IRWD	CCWA	2017	6	SWP	Drought	CA Aqueduct	Direct	Exchange	10,000	1,400	As available	15%	$0	Actual costs	$0	$0	$0	50%	$240
IRWD	CCWA*	2019	6	SWP	Drought	CA Aqueduct	Direct	Exchange	700	117	As available	15%	$0	Actual costs	$0	$0	$0	50%	$307
IRWD	Carpinteria	2011	6	SWP	Drought	CA Aqueduct	Direct	Exchange	1,500	213	As available	15%	$0	Actual costs	$0	$0	$0	50%	$160
IRWD	AVEK	2011	6	SWP	Drought	CA Aqueduct	Direct	Direct, Exchange	5,000	708	As available	15%	$0	Actual costs	$0	$0	$0	50%	$160
NSJWCD	EBMUD	2018	5	Local surface	Drought	Mokelumne Aqueduct	In-lieu	Direct	1,000	500	As available	5%***	Actual costs	$0	$100	$0	$0	50%	$237
Semitropic	Palmdale	2011	11	SWP	Drought, Emergency	CA Aqueduct	Direct, In-lieu	Direct, Exchange	10,000	5,000	As available	10%	$0	Actual costs	$0	$6	$0	50%	$180
Kern Delta	San Bernardino	2011	15	SWP	Drought, Emergency	CA Aqueduct	Direct	Direct	30,000	5,000	As available	11%	$0	Actual Costs	$46	$0	$54	0%	$181

*Proposed agreement – not yet completed at the time of this report

**All costs adjusted to 2019 dollars using the Consumer Price Index. Up-Front, O&M, and Energy costs expressed in dollars per AF of recovery capacity

***Annual losses – storage losses for other programs are one-time.

Compensation Methodology and Analysis

This section describes the available methodologies or approaches for developing supportable compensation terms for the potential OCWD-MNWD storage program. The various approaches are then applied to develop ranges of compensation. This section concludes by reconciling the results of each approach and selecting a recommended range of compensation. For consistency, all compensation terms are expressed in annual lifecycle PV per AF. This compensation potentially could be provided to OCWD in the form of financial consideration and/or water sharing. The analysis assumes that MNWD will store in the Orange County Groundwater Basin by direct recharge at OCWD's recharge facilities.

Compensation Methodology

Based on the available literature, pricing conventions observed in existing water storage programs, and local Orange County market conditions, the following approaches are applied for establishing compensation terms in the potential OCWD-MNWD program:

1. Cost Reimbursement: A number of existing storage programs (in particular long-term programs) have established compensation terms based on capital and O&M cost reimbursement, plus a premium to the program owner. This approach is most applicable to pricing long-term water storage programs granting dedicated first priority capacity to the customer. In these storage programs, customers reimburse the owner for capacity dedicated to that customer, plus a premium for program development and ongoing ownership/operations services. The premium also compensates the storage program owner for the opportunity cost of dedicating the capacity to a specific customer, rather than the owner using the capacity itself or allocating the capacity to a different customer. As a result, the approach could be relied upon if the potential OCWD-MNWD storage program were extended to a long-term arrangement with dedicated capacity. The approach is also relevant for determining appropriate compensation for MNWD's use of OCWD's relatively limited direct recharge capacity in the context of a short-term storage program. Available data on the capital costs, O&M costs, and capacity of OCWD's direct recharge and seawater barrier facilities are used to determine the pro-rata costs of the portion of the capacity that MNWD would use under the potential storage program.

2. Lifecycle Present Value Cost: This approach involves forecasting costs incurred by storage program participants over the duration of a program and applying a discount rate to calculate the present value of anticipated costs. The lifecycle PV is expressed in per-unit terms, typically dollars per AF of recovered water. While useful for comparing storage program costs in consistent terms, this approach requires detailed assumptions regarding future program operations and an appropriate discount rate. The lifecycle PV costs estimated for existing storage programs selected as applicable to the potential OCWD-MNWD storage program are used to develop a supportable range of lifecycle PV costs for the OCWD-MNWD storage program.

3. Forgone Cost Savings: As a result of MNWD storing water in the OCWD groundwater basin, the Groundwater Producers will forgo cost savings associated with purchasing untreated water from Metropolitan rather than treated water. These lost savings establish a floor regarding what OCWD should charge MNWD to store water in the groundwater basin.

4. Replacement Cost Approach: This approach establishes compensation based on the expenses associated with the least-cost alternative to the potential storage program. The least-cost alternative must provide similar benefits to the potential storage program, i.e. dry-year or emergency reliability, at a like scale. Typically, the replacement cost represents the maximum that a storage program participant would be willing to pay.

Compensation Analysis

Each approach described above is applied to estimate a range of supportable compensation for the potential OCWD-MNWD water storage program. Estimated compensation ranges differ across the various approaches. The subsequent section reconciles these different compensation ranges to develop a range determined to be most applicable to the potential OCWD-MNWD storage program.

Cost Reimbursement

The potential OCWD-MNWD water storage program involves storage in the Orange County Groundwater Basin of up to 5,000 AF of imported water purchased from Metropolitan by MNWD. This analysis assumes that OCWD will directly recharge untreated water for MNWD at OCWD's Anaheim facilities. Aside from recharge capacity and the seawater barrier protecting stored water from saltwater intrusion, all other infrastructure required for program implementation (i.e. recovery wells and conveyance) would be funded by MNWD.

Estimating the pro-rata costs (capital and O&M) of the portion of OCWD's infrastructure capacity that MNWD might use represents one approach for establishing compensation terms for the potential program. Infrastructure investments made by OCWD that would support groundwater storage on behalf of MNWD include (1) direct recharge capacity, and (2) the seawater barrier protecting stored water from saltwater intrusion. A premium above cost reimbursement may be appropriate to compensate OCWD for ongoing facilities ownership and operations. This cost reimbursement approach is consistent with the methodologies used by some existing water storage programs for developing compensation terms. However, one limitation is that the cost reimbursement approach is most commonly used for pricing long-term water storage agreements that provide first priority access to dedicated capacity. The potential OCWD-MNWD storage program is a short-term arrangement utilizing available capacity. As a result, reimbursing OCWD for the pro-rata capital and O&M costs of its recharge facilities and seawater intrusion barrier may not be preferred approach unless the program is modified to provide MNWD with long-term dedicated recharge capacity.

The components of compensation based on cost reimbursement are:

1. **Capital Costs:** Total of $490.5 million for OCWD's estimated 250,000 AF of total annual recharge capacity. This is equivalent to an annualized unit value of $113/AF when amortized over 30 years at a 4% interest rate. The capital costs are itemized below:

a. Recharge Facilities: $223.5 million.[2]
b. Groundwater Replenishment System (GWRS): $167 million based on approximately 35% of OCWD's $482 million capital investment in the original GWRS. Around 35% of GWRS water is injected annually along the coastline to prevent seawater intrusion.
c. Water Factory (WF) 21, and 25 Injection Wells: $100 million.[3]

2. **Annual O&M Costs:** Total of $16 million, or $64/AF for OCWD's 250,000 AF of total annual recharge capacity. Annual O&M costs are itemized below.
   a. Recharge Facilities: $4 million.[4]
   b. GWRS: $12 million based on approximately 35% of the original GWRS' $35 million total annual operating budget.[5]
3. **Owner Premium:** Based on existing programs, a premium of 10%-20% above cost reimbursement may be appropriate to provide additional compensation for OCWD's ongoing program ownership and operational obligations.

Table 7 summarizes the outcome of the cost reimbursement analysis. As shown, the cost reimbursement approach supports a payment of $195/AF to $213/AF to OCWD for each acre-foot stored. These costs are economically equivalent to annual lifecycle PV per AF costs since they would be paid upfront at the time of water storage. The cost reimbursement approach does not support additional payments at the time of recovery since MNWD would be responsible for funding its own recovery and conveyance infrastructure.

Table 7: Cost Reimbursement Approach Summary

	Total Cost	Unit Cost ($/AF)
Recharge Basins Capital	$223,500,000	$52
GWRS Capital	$167,000,000	$39
WF 21 and Injection Wells Capital	$100,000,000	$23
Capital Costs Subtotal	*$490,500,000*	*$113*
Recharge Basins Annual O&M	$4,000,000	$16
GWRS Annual O&M	$12,000,000	$48
Annual O&M Subtotal	*$16,000,000*	*$64*
Owner Premium (10-20%)		*$18 - $35*
TOTAL COST REIMBURSEMENT		**$195 - $213**

Note: Unit costs are expressed in annualized dollars per acre-foot assuming 250,000 AF of total annual recharge capacity, a 4% interest rate, and 30-year amortization.

[2] Personal communication with Chris Olsen, Director of Engineering, OCWD. September 18, 2019.
[3] Personal communication with John Kennedy, Executive Director of Engineering and Water Resources, OCWD. January 22, 2020.
[4] Personal communication with Chris Olsen, Director of Engineering, OCWD. September 18, 2019.
[5] Personal communication with John Kennedy, Executive Director of Engineering and Water Resources, OCWD. January 22, 2020.

Lifecycle Present Value Cost

As presented previously in Table 6, annual lifecycle PV costs per AF were calculated for the existing water storage programs selected as applicable to the potential OCWD-MNWD storage program. To calculate annual lifecycle PV per AF costs, the following uniform assumptions were applied:

- All costs were adjusted to 2019 dollars using the Consumer Price Index.
- Recharge-recovery cycling was assumed to occur every 3 years unless otherwise specified in the program agreement(s). That is, during the first program year, the full annual recharge amount was assumed to be stored. During every third program year, the full allowable recovery amount was assumed to be withdrawn from storage until the storage balance decreased to zero. In the year following reduction of the storage balance to zero, the full annual recharge amount was again assumed to be stored. This pattern repeated for the full program term. In the final program year, any water remaining in storage was assumed to be recovered.
- Costs were assumed to escalate at an annual rate of 3%, consistent with the assumption applied in the 2018 Orange County Water Reliability Study.
- Capital costs (if any) were financed over a time period equal to the duration of the program (rounded down to 5-year increments) not to exceed 30 years at a 4% interest rate.
- A discount rate of 4% was applied to calculate present values, consistent with the assumption applied in the 2018 Orange County Water Reliability Study.
- Water losses were assigned a cost by multiplying the volume of losses in acre-feet by estimated variable water delivery charges in dollars per acre-foot. While water losses have not yet been determined for the OCWD-MNWD program, this analysis assumes that annual storage losses of 1% are incurred. The costs of water losses can be relatively high for storage programs located in areas where delivering water to the program incurs significant energy or wheeling charges. Orange County is one such area where any water losses result in significant costs to the storing party.
- For programs providing water sharing as compensation, the cost of water sharing was quantified by multiplying the average spot market transfer price during the year of storage to the volume of water assigned to the program owner. This approach is intended to reflect the opportunity cost associated with storing the water rather than marketing the water through transfers.

The purpose of expressing costs in annual lifecycle PV per AF amounts is to normalize compensation terms across diverse programs. Normalizing compensation terms to a uniform unit enables comparison of the programs to one another, and to the potential OCWD-MNWD storage program. This approach is based on the methodology applied by Metropolitan for evaluating water storage program costs.

As previously described, the annual lifecycle PV costs among the selected existing water storage programs range from $160/AF to $307/AF, and average approximately $210/AF. Among these existing water storage programs, EBMUD's DREAM Project may be most similar to the potential OCWD-MNWD program, and has an annual lifecycle PV of $237/AF. While located in a different area of the state, EBMUD's storage program is a short-term pilot, and may lead to a larger and longer-term program if successful. The potential OCWD-MNWD storage program is also a short-term pilot. Further, EBMUD is paying to develop the necessary storage program infrastructure, as well as compensating NSJWCD for storage capacity. Similarly, MNWD would fund the recovery and conveyance infrastructure needed to enable program operations, along with compensating OCWD.

A lifecycle PV analysis was conducted for the potential OCWD-MNWD storage program. The analysis is intended to estimate the program compensation that would provide an annual lifecycle PV equivalent to $160/AF to $307/AF, the range of annual lifecycle PV costs observed among selected existing programs. The assumptions listed above were applied for consistency with the cost estimates for selected existing programs. Recovery energy, O&M, and disinfection costs were assumed to be $97/AF. Based on these assumptions, the compensation that would result in annual lifecycle PV costs for the potential OCWD-MNWD storage program equivalent to the selected existing programs is estimated to range from $44/AF to $188/AF. Appendix B presents the detailed calculations supporting these annual lifecycle PV estimates. The relatively wide range reflects the diversity among storage programs, and differences in localized market conditions. The upper end of this range is likely to be most applicable to the potential OCWD-MNWD storage program. As previously described, storage programs within the Metropolitan service area (including Orange County) tend to be priced higher than programs in other regions of California.

Forgone Cost Savings

OCWD annually budgets for the purchase and recharge of 65,000 AF per year of untreated imported water from Metropolitan. The current cost of this water is $755/AF. The actual amount purchased each year varies depending upon hydrology and captured flows from the Santa Ana River.

By annually recharging this water into the groundwater basin, and allowing an equivalent amount of additional groundwater pumping, the Groundwater Producers avoid paying for treated Metropolitan full service water which currently costs $1,078/AF. The Metropolitan treatment surcharge is currently $323/AF. The Groundwater Producers do incur about $97/AF in energy, O&M, and disinfection costs for water pumped out of the ground. However, there is a significant overall savings to the service territory which is estimated at $226/AF ($323/AF – $97/AF). Therefore if 65,000 AF of untreated water is purchased on average, the annual savings to the service territory is $14.7 million (65,000 AF x $226/AF).

OCWD has a limited amount of recharge basins that can be used for this operation and works to maximize Metropolitan untreated full-service water purchases for the benefit of the Groundwater Producers. Any untreated Metropolitan water purchased, recharged and stored in the groundwater basin for MNWD would reduce the amount of water that can be recharged for the Groundwater Producers benefit. For example, if 5,000 AF of untreated water is purchased for MNWD in any given year, then the Groundwater Producers would not realize savings of approximately $1.13 million (5,000 AF x $226/AF) that particular year. These lost savings establish a floor for the cost that OCWD should charge MNWD for direct recharge.

Replacement Cost Approach

The Replacement Cost approach establishes compensation based on the cost of the least expensive alternative to the potential storage program. The least-cost alternative must provide similar benefits to the potential storage program, i.e. dry-year or emergency reliability, at a like scale and over a similar time frame. The replacement cost represents the maximum that a storage program participant would be willing to pay.

The cost of alternatives to a potential OCWD-MNWD storage program can be estimated based on other dry-year and emergency water reliability programs developed for the benefit of Orange County. Several such programs exist or are in development. The applicability of each storage program to setting compensation for the potential MNWD-OCWD arrangement is discussed as follows:

- Santa Margarita Water District – Upper Chiquita Reservoir: Upper Chiquita Reservoir is a long-term emergency water storage program developed by Santa Margarita Water District (SMWD) in 2011. The storage program provides immediate response when water from Metropolitan is unavailable. Program participants include the City of San Clemente, the City of San Juan Capistrano, MNWD, and South Coast Water District. Storage program participants have co-equal priority to their share of project capacity, which total 750 AF. Participants funded capital costs according to their capacity right percentages. Based on the assumptions listed above in the Present Value Lifecycle Cost analysis, the lifecycle PV cost of the Upper Chiquita Reservoir program is more than $8,800/AF. This storage program is not representative of the costs of alternatives to the potential short-term OCWD-MNWD program because (1) it is a long-term agreement, (2) it is not a groundwater storage program, and (3) additional capacity does not appear to be available as an alternative to storing in the Orange County Groundwater Basin.

- El Toro Water District – R-6 Reservoir: The R-6 Reservoir is a long-term storage program initially designed to provide a backup water supply to El Toro Water District (ETWD) during times when imported water supplies from Metropolitan are unavailable. SMWD and MNWD have also acquired capacity in R-6, which they use under emergency conditions. R-6 was constructed by ETWD in 1967 with a capacity of 715 AF, and was expanded in 2002 to 845 AF. Agreements with SMWD and MNWD to acquire capacity in the reservoir were signed in 2000. Using the assumptions presented above, the lifecycle PV costs of this program are approximately $3,800/AF to $5,900/AF. This storage program is not representative of the costs of alternatives to the potential short-term OCWD-MNWD program because (1) it is a long-term agreement, (2) it is not a groundwater storage program, and (3) additional capacity does not appear to be available as an alternative to storing in the Orange County Groundwater Basin.

- South County Phase 1 Emergency Service Program Agreement: In 2006, multiple SOC water agencies entered into a 25-year agreement with IRWD and OCWD to receive water from the IRWD system with subsequent conveyance into the distribution system serving SOC. The storage program was developed to address short-term emergency water system outages. OCWD receives no compensation under this agreement. The storage program is not considered an alternative to the potential OCWD-MNWD program because IRWD's ability to provide emergency supplies is diminishing as its customer demand grows. This decrease in emergency water availability from IRWD is one motivation for the proposed OCWD-MNWD program. Further, the Emergency Service Program Agreement is long-term, inconsistent with the short-term pilot proposed by OCWD and MNWD.

- Doheny Ocean Desalination Project (Doheny Desal): South Coast Water District is currently developing the Doheny Desal Project. The project is intended to provide long-term water reliability benefits to SOC. Initially, the facility is planned to have annual capacity of 5,321 AF, with potential future expansions increasing capacity to nearly 16,000 AF. The annualized unit costs of the project are estimated to be $1,622/AF.[6] The Doheny Desal Project is a long-term program providing firm

[6] 2018 Orange County Water Reliability Study. Prepared for MWDOC by CDM Smith. February 1, 2019.

deliveries of desalinated water, and thus is not a direct alternative to the potential short-term OCWD-MNWD groundwater storage program.

- IRWD-MWDOC Proposed Water Reliability Pilot Program: IRWD has developed the Strand and Stockdale Integrated Water Banking Projects. IRWD is proposing a plan whereby a specific amount of Extraordinary Supply can be reserved or optioned for use during a Metropolitan allocation. This proposal would provide dry-year and emergency water supply benefits to Orange County water agencies. In the context of this program, the term "emergency water supply benefits" refers to a Metropolitan allocation or outage, not to a local emergency. Currently, IRWD and MWDOC are negotiating a short-term pilot program whereby MWDOC would reserve 5,000 AF banked in IRWD's facilities. MWDOC would have the right to call for delivery of this water during Metropolitan allocations. Payments to IRWD consist of a one-time, upfront payment of $1/AF to establish the program; an annual reservation payment of $25/AF; and a strike price of $510/AF should MWDOC exercise its option to call for water delivery. The annual lifecycle PV of this proposed program is estimated to be $578/AF.

Of these programs, only the IRWD-MWDOC Proposed Water Reliability Pilot Program can be considered a direct alternative to the potential OCWD-MNWD program. MNWD may be able to enter into a similar agreement with IRWD rather than storing in the Orange County Groundwater Basin. Both programs are groundwater storage programs providing an identical volume of water for dry-year and/or emergency supply purposes for a short-term duration. The proposed IRWD-MWDOC program's annual lifecycle PV of $578/AF provides the best available indication of the cost of alternatives to the potential OCWD-MNWD program. Thus, $578/AF represents an upper bound on supportable compensation for the potential OCWD-MNWD program.

Summary and Reconciliation of Analysis Approaches

Table 8 summarizes the results of the storage program compensation analysis methodologies applied in this section. As shown, the various approaches support a relatively wide range of compensation for the potential OCWD-MNWD storage program, from $44/AF to $578/AF. As previously described, the Forgone Cost Savings approach establishes minimum compensation of $226/AF. The Replacement Cost Approach indicates maximum compensation of $578/AF. As a result, the recommended range of compensation for the potential OCWD-MNWD storage program is $226/AF to $578/AF. This recommended range is high relative to some existing programs, but is consistent with the high value of groundwater storage within Orange County and the Metropolitan service area. As observed across numerous existing water storage programs, compensation could be paid in the form of financial consideration and/or water sharing.

Table 8: Summary of Compensation Analysis*

Analysis Approach	Minimum ($/AF)	Maximum ($/AF)
Cost Reimbursement	$195	$213
Lifecycle Present Value Cost	$44	$188
Forgone Cost Savings	$226	$226
Replacement Cost	$578	$578
Recommended Range	**$226**	**$578**

*Compensation amounts are expressed in annual lifecycle PV per AF, or an up-front payment per acre-foot stored (assuming no losses).

Summary and Conclusions

This report presented a review of existing water storage programs. The terms of existing water storage programs along with other pertinent information were applied to develop a range of supportable compensation for the potential OCWD-MNWD water storage program. This section summarizes the key findings of the analysis, and presents conclusions based upon those key findings.

Potential OCWD-MNWD Program

OCWD and MNWD are contemplating a relatively small short-term (5-10 years) pilot storage program. The potential program would enable MNWD to store approximately 5,000 AF of imported water purchased from Metropolitan in the Orange County Groundwater Basin. The storage would rely on existing available recharge capacity, and would not impact the operations of OCWD or the Producers. Arranging and paying for recovery of stored water would be MNWD's responsibility. The potential pilot program would enable OCWD and MNWD to test the concept of storage in the Orange County Groundwater Basin for SOC water agencies, and help to establish the necessary institutional arrangements for such storage. Investing in development of new infrastructure for a small, short-term pilot program could be financially difficult. It would be preferable to use existing infrastructure for the potential pilot program. If the pilot is successful, capital investment may be appropriate and necessary for enabling expansion of a storage program.

Literature Review

Prior studies inventorying existing water storage programs and/or analyzing water storage program compensation terms in consistent units were assembled, reviewed, and summarized. The body of existing literature is limited. To the extent possible, methodologies established in previous studies for analyzing compensation terms were applied in this study to support compensation terms for the potential OCWD-MNWD program. In particular, the annual lifecycle PV per AF approach was identified as applicable to the analysis.

Water Storage Program Market Assessment

Water storage programs are emerging throughout California in response to water supply variability, changing/growing water demands, and challenges associated with developing new surface reservoirs. Storage program developers and owners are increasingly seeking to generate revenue by entering into storage agreements with partners. Program objectives, operations, storage agreement terms are unique to each storage program. Both long-term and short-term agreements have been completed for a wide range of capacities. Some agreements provide first priority access to dedicated storage and recovery capacity, while others offer lower priority access to capacity. Compensation for storage is paid in the form of both water-sharing and financial consideration. Despite differences among existing storage programs, the following general patterns in storage program compensation were observed:

- Storage Program Duration: Longer-term programs typically attract higher compensation levels relative to shorter-term programs. Longer-term programs often provide first priority access to dedicated capacity, while many shorter-term programs offer storage on a lower priority basis.
- Storage Program Volume: Like many infrastructure projects, there are scale economies associated with water storage programs, i.e. unit costs are lower for larger programs.

- Program Location: Compensation for storage programs located within Metropolitan's service area tends to be higher than for storage programs located in other areas of the state. This premium reflects the high value of water storage and water resources in Southern California, including Orange County.
- Program Water Use: In general, urban water users contracting for storage program capacity pay a premium relative to storage for agricultural uses. While partially attributable to program location, this premium also reflects the high value of urban water supply certainty/reliability.

Factors that did not appear to systematically impact storage program compensation were storage program purpose (i.e. dry year vs. emergency storage); program operations (i.e. direct pump-back vs. exchange); and compensation type (i.e. financial consideration vs. water sharing). Many existing programs feature multiple purposes, operational capabilities, and compensation types. The other factors listed above were determined to have a greater influence on compensation.

Summary of Selected Storage Programs

Seven existing groundwater storage programs were identified as most similar to the potential OCWD-MNWD pilot program. Like the potential OCWD-MNWD program, each of these seven programs is relatively short-term, offers both dry-year and emergency water reliability benefits, stores water for urban agencies, and provides lower priority access to available capacity. Among these seven programs, compensation expressed in annual lifecycle PV ranges from $160/AF to $307/AF, and averages approximately $210/AF. These programs provide an indication of the compensation for the potential OCWD-MNWD program that can be supported by existing programs.

Compensation Methodology and Analysis

Four approaches were applied to develop supportable compensation terms for the potential OCWD-MNWD program. These approach and their estimated compensation amounts are listed below:

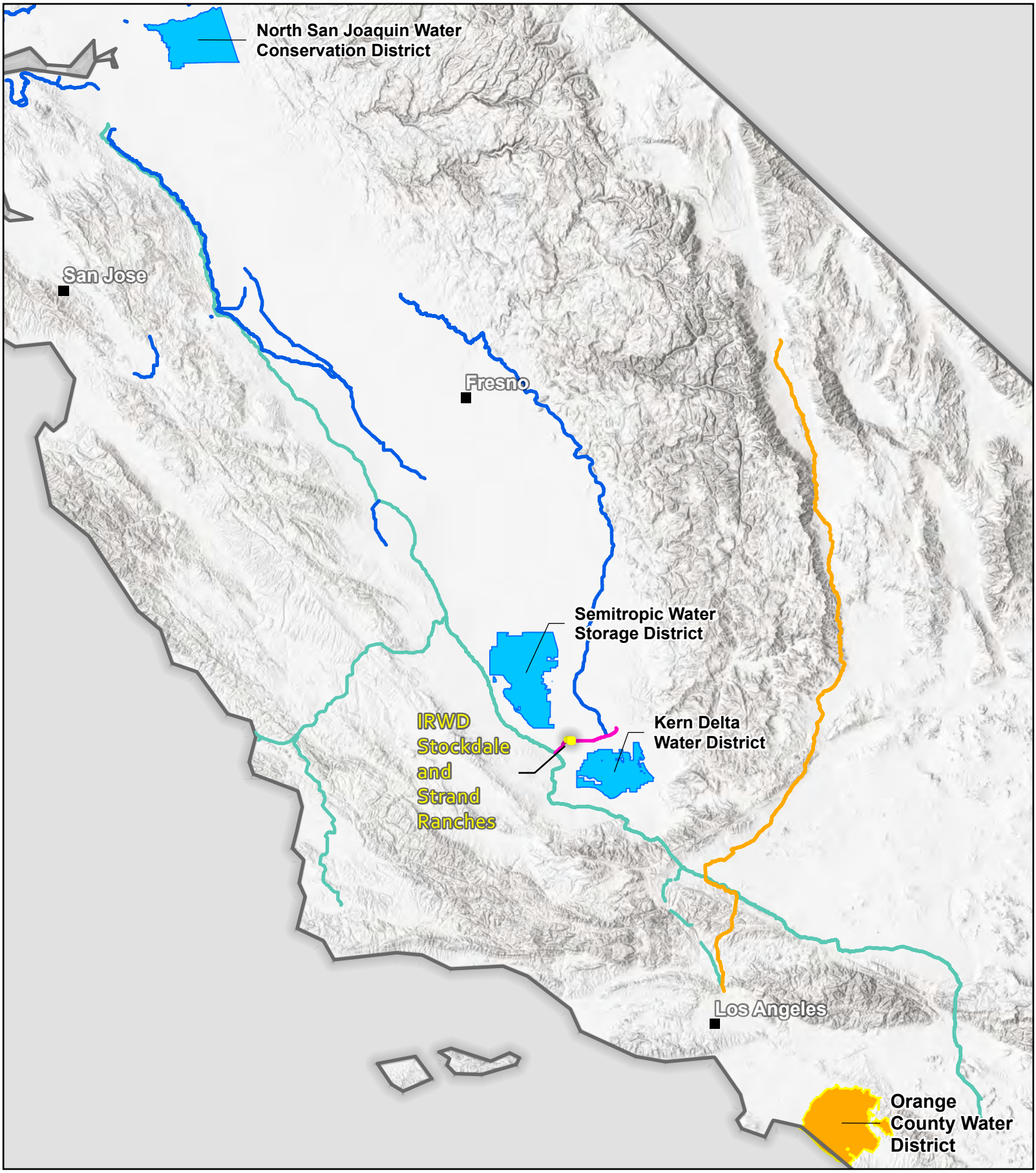
- Cost Reimbursement: $195/AF - $213/AF.
- Present Value Lifecycle Cost: $44/AF - $188/AF.
- Forgone Cost Savings: $226/AF.
- Replacement Cost: $578/AF.

Compensation Recommendations

The Forgone Cost Savings approach indicates minimum compensation of $226/AF. The Replacement Cost approach supports maximum compensation of $578/AF. As a result, supportable compensation for the potential OCWD-MNWD program ranges from $226/AF to $578/AF. This compensation could be paid in the form of an up-front fee per acre-foot stored and/or sharing of stored water.

Appendix A: Map of Selected Water Storage Programs

Selected Water Storage Programs



Appendix B: OCWD-MNWD Program Lifecycle PV Analysis

Potential OCWD-MNWD Water Storage Program Compensation Analysis Tool

Prepared by WestWater Research

*Values in this table may be modified by the user

ASSUMPTIONS		
Category	Parameter	Value
Term (Max 50 Years)	Program Start Year	2020
	Program End Year	2024
Capacity	Annual Recharge (AF)	5,000
	Annual Recovery (AF)	2,500
	Total Storage (AF)	5,000
	Recovery Frequency (Years)	3
	Annual Storage Losses	1%
	Water Compensation (%)	0%
Initial Year Costs	Water Delivery ($/AF)	$ 731
	Capital Costs (Total)	$ -
	Recharge ($/AF)	$ 44
	Recovery ($/AF)	$ -
	Recovery Energy ($/AF)	$ 97
	Annual O&M (Total)	$ -
Financing	Capital Costs Term	5
	Capital Costs Interest Rate	4%
	Annual Cost Escalation	3%
	Discount Rate	4%

*Values in this table update automatically

RESULTS		
Identifier	Parameter	Value
(1)	PV Total Costs	$ 776,359
(2)	Total Yield	4,853
(1/2)	**PV Unit Cost ($/AF)**	**$ 160**

Abbreviations: PV = Present Value
AF = Acre-Feet
O&M = Operations and Maintenance

*Values in the below table update automatically based on the assumptions specified above, and should not be edited manually

Year	Recharge (AF)	Recovery (AF)	Annual Storage Losses (AF)	Compensation Losses (AF)	Year-End Storage Balance (AF)	Capital Costs ($)	Recharge ($)	Recovery ($)	Recovery Energy ($)	O&M ($)	Losses ($)	Water Compensation ($)	Total Costs ($)	PV Total Costs ($)
2020	5,000	-	(50)	-	4,950	$ -	$ 226,600	$ -	$ -	$ -	$ 37,647	$ -	$ 264,247	$ 254,083
2021	-	-	(50)	-	4,901	$ -	$ -	$ -	$ -	$ -	$ 38,388	$ -	$ 38,388	$ 35,492
2022	-	(2,500)	(24)	-	2,376	$ -	$ -	$ -	$ 264,986	$ -	$ 19,175	$ -	$ 284,161	$ 252,618
2023	-	-	(24)	-	2,353	$ -	$ -	$ -	$ -	$ -	$ 19,553	$ -	$ 19,553	$ 16,714
2024	-	(2,353)	-	-	-	$ -	$ -	$ -	$ 264,564	$ -	$ -	$ -	$ 264,564	$ 217,452
TOTAL	**5,000**	**(4,853)**	**(147)**	**-**		**$ -**	**$ 226,600**	**$ -**	**$ 529,550**	**$ -**	**$ 114,762**	**$ -**	**$ 870,912**	**$ 776,359**

Potential OCWD-MNWD Water Storage Program Compensation Analysis Tool

Prepared by WestWater Research

*Values in this table may be modified by the user

ASSUMPTIONS		
Category	Parameter	Value
Term (Max 50 Years)	Program Start Year	2020
	Program End Year	2024
Capacity	Annual Recharge (AF)	5,000
	Annual Recovery (AF)	2,500
	Total Storage (AF)	5,000
	Recovery Frequency (Years)	3
	Annual Storage Losses	1%
	Water Compensation (%)	0%
Initial Year Costs	Water Delivery ($/AF)	$ 731
	Capital Costs (Total)	$ -
	Recharge ($/AF)	$ 188
	Recovery ($/AF)	$ -
	Recovery Energy ($/AF)	$ 97
	Annual O&M (Total)	$ -
Financing	Capital Costs Term	5
	Capital Costs Interest Rate	4%
	Annual Cost Escalation	3%
	Discount Rate	4%

*Values in this table update automatically

RESULTS		
Identifier	Parameter	Value
(1)	PV Total Costs	$ 1,489,436
(2)	Total Yield	4,853
(1/2)	**PV Unit Cost ($/AF)**	**$ 307**

Abbreviations: PV = Present Value
AF = Acre-Feet
O&M = Operations and Maintenance

*Values in the below table update automatically based on the assumptions specified above, and should not be edited manually

Year	Recharge (AF)	Recovery (AF)	Annual Storage Losses (AF)	Compensation Losses (AF)	Year-End Storage Balance (AF)	Capital Costs ($)	Recharge ($)	Recovery ($)	Recovery Energy ($)	O&M ($)	Losses ($)	Water Compensation ($)	Total Costs ($)	PV Total Costs ($)
2020	5,000	-	(50)	-	4,950	$ -	$ 968,200	$ -	$ -	$ -	$ 37,647	$ -	$ 1,005,847	$ 967,160
2021	-	-	(50)	-	4,901	$ -	$ -	$ -	$ -	$ -	$ 38,388	$ -	$ 38,388	$ 35,492
2022	-	(2,500)	(24)	-	2,376	$ -	$ -	$ -	$ 264,986	$ -	$ 19,175	$ -	$ 284,161	$ 252,618
2023	-	-	(24)	-	2,353	$ -	$ -	$ -	$ -	$ -	$ 19,553	$ -	$ 19,553	$ 16,714
2024	-	(2,353)	-	-	-	$ -	$ -	$ -	$ 264,564	$ -	$ -	$ -	$ 264,564	$ 217,452
TOTAL	**5,000**	**(4,853)**	**(147)**	**-**		**$ -**	**$ 968,200**	**$ -**	**$ 529,550**	**$ -**	**$ 114,762**	**$ -**	**$ 1,612,512**	**$ 1,489,436**

The County of Orange Report

Prepared for the MWDOC P&O Committee

February 23, 2021
by Lewis Consulting Group

Dueling Polls - Governor Newsom Won't/Might Be Recalled

As proponents of recalling Governor Gavin Newsom are inching ever closer to qualifying the recall effort, two different polls have varying conclusions on how that might fare at the ballot box.

Berkeley IGS Poll [Institute of Governmental Studies] taken January 23-29 with a sample size of 10,000 registered voters and a margin of error +/- 2%.

Trend of voter opinions of Gavin Newsom's job performance as Governor (among California registered voters)

	Late-January 2021 %	September 2020 %	June 2019 %
Approve	**46**	64	57
Approve strongly	**14**	25	15
Approve somewhat	**32**	39	42
Disapprove	**48**	36	42
Disapprove somewhat	**17**	13	17
Disapprove strongly	**31**	23	25
No opinion	**6**	<0.5%	1

Public Policy Institute of California poll [PPIC] taken January 21-31 with a sample of 1,703 adults and a margin of error of +/- 3.3%.

Which one issue facing California today do you think is the most important for the governor and state legislature to work on in 2021?

- 43% COVID-19, coronavirus
- 13% jobs, economy
- 5% homelessness
- 4% housing costs, availability

4% immigration, illegal immigration
3% education, schools, teachers
3% government in general, problems with elected officials, political parties
3% health care, health insurance
3% state budget, deficit, state spending
3% environment, pollution, global warming
11% other
5% don't know

Do you approve or disapprove of the way that Gavin Newsom is handling his job as governor of California?

54% approve
36% disapprove
10% don't know

Would you say that California is in an economic recession, or not?

72% yes
32% yes, serious recession
28% yes, moderate recession
10% yes, mild recession
2% yes, don't know
23% no, not in an economic recession
6% don't know

When it becomes available to you, will you definitely get the coronavirus vaccine, probably get it, probably not get it, or definitely not get it?

43% definitely get the vaccine
25% probably get the vaccine
11% probably not get the vaccine
13% definitely not get the vaccine
5% already got the vaccine
2% don't know

Do you think that climate change is a major threat, a minor threat, or not a threat to the well-being of the United States?

60% major threat
21% minor threat
16% not a threat
3% don't know

The February LAFCO meeting was one of the shortest meetings is memory, lasting 30 minutes. It marked the first meeting for Yorba Linda Mayor Peggy Huang, a new City Commissioner.

During the meeting, there was some free flowing discussions regarding legislative attempts to allow for the dismemberment of small water agencies without LAFCO approval. There was also discussion about San Diego Water's attempt to utilize the LAFCO process to rein in the Metropolitan Water District.

The most important agenda item was the 2nd Quarter Comprehensive Report, however it was a non-discussed consent calendar item. One of the highlighted items is a more robust communication plan utilizing social media platforms, web-based resources and an improved agency media kit.

A review of OCLAFCO's budget was also included. The total approved budget for fiscal year 2020/2021 is $1,257,510. The vast majority of LAFCO's revenue, $1,124,500 comes from funding agencies apportionments. The balance comes from fees, interest income and the additional drawing down of reserves. The largest expenditures are salaries and hourly employees $547,220 along with benefits and insurance $327,880.

Update

The February 9, 2021 meeting of the Board of Supervisors did not differ from the types of meetings held the last several months. The meeting featured an agenda again devoid of controversy, as there were no split votes.

The meeting again was highlighted by the County's ongoing response to COVID-19. Although there are still many complaints regarding the County's website Othena, it appears that most of the early trouble is behind it. As of now, there are over 600,000 people signed up through Othena. Now the bigger problem is receiving sufficient vaccines to keep the vaccination pods running at full capacity. The State also keeps a

more comprehensive list of those vaccinated, but Supervisor Bartlett noted when they have transferred the data, it does not include zip codes.

In recognition of the fact that 75% of the Orange County deaths are among those 65 and older, the County has been heavily promoting vaccines for those in this age category. Currently, 100,000 seniors have been vaccinated. Going forward, the County will utilize the following vaccination locations:

2 large PODS - Disneyland and Soka University
2 medium PODS - Santa Ana College and Christ Cathedral
5 mobile PODS - concentrating on the under served communities, especially Santa Ana and Anaheim

So far, somewhere between 10%-13% of Orange Countians have been vaccinated.

Critical Supervisor's Redistricting Plans Adopted This Year

Numerous ambitious politicians and both political parties will be engaged and closely watching the act of cartography this year.

Republicans head into the redistricting process with three GOP Board members and possibly four, depending on the outcome of the March 9 Supervisor Second District Special Election.

If Republicans steer the process (not a given), they will need to make a critical partisan decision. Do they try to limit Democrats to one Board seat or do they try to ensure a 3-2 partisan split for the next decade? With Orange County turning bluer and bluer, attempting to limit Democrats to one seat might inadvertently lead to three.

TIMETABLE FOR ORANGE COUNTY SUPERVISORIAL REDISTRICTING

FEBRUARY 23, 2021	BOARD CONSIDERS REDISTRICTING PROCESS PLAN DATA
UNDETERMINED	STATE RELEASES POPULATION
APRIL- NOVEMBER 2021	FOUR PUBLIC WORKSHOPS OCCUR
SEPTEMBER 2021	PUBLIC PLANS SUBMISSION
OCTOBER 5, 2021	DRAFT MAPS AT PUBLIC MEETING
NOVEMBER 16, 2021	2nd READING OF ORDINANCES / MAPS
DECEMBER 16, 2021	PLANS GO INTO EFFECT

Democrat Katrina Foley Appears to Have Edge

The critical March 9th election to fill the vacancy in the 2nd Supervisorial District is approaching fast; and for now Democrats not only have the advantage of less splintered voters, they are also voting so far by higher numbers.

2nd SUPERVISORIAL DISTRICT STATS

VOTER REGISTRATION		
TOTAL	395,254	
REPUBLICANS	150,361	38%
DEMOCRATS	131,034	33.2%
INDEPENDENTS	92,286	23.3%
RETURNED BALLOTS		
TOTAL	47,686	12.1%
REPUBLICANS	18,456	12.6%
DEMOCRATS	19,376	14.8%
INDEPENDENTS	7,444	8%

Orange County COVID-19 Stats

ORANGE COUNTY COVID-19 STATS	AS OF 2/23/2021	AS OF 1/26/2021
CUMULATIVE CASES TO DATE	245,135	225,983
CUMULATIVE DEATHS TO DATE	3,848	2,768
DEATHS REPORTED TODAY	0	64
CUMULATIVE TESTS TO DATE	2,980,667	2,587,867
TESTS REPORTED TODAY	12,783	13,849
CASES CURRENTLY HOSPITALIZED	539 *	1,677 *
CASES CURRENTLY IN **ICU**	152	437
CUMULATIVE RECOVERED TO DATE	226,386 *	163,200 *

* = INCLUDES ***ICU*** CASES

Where Orange County Ranks

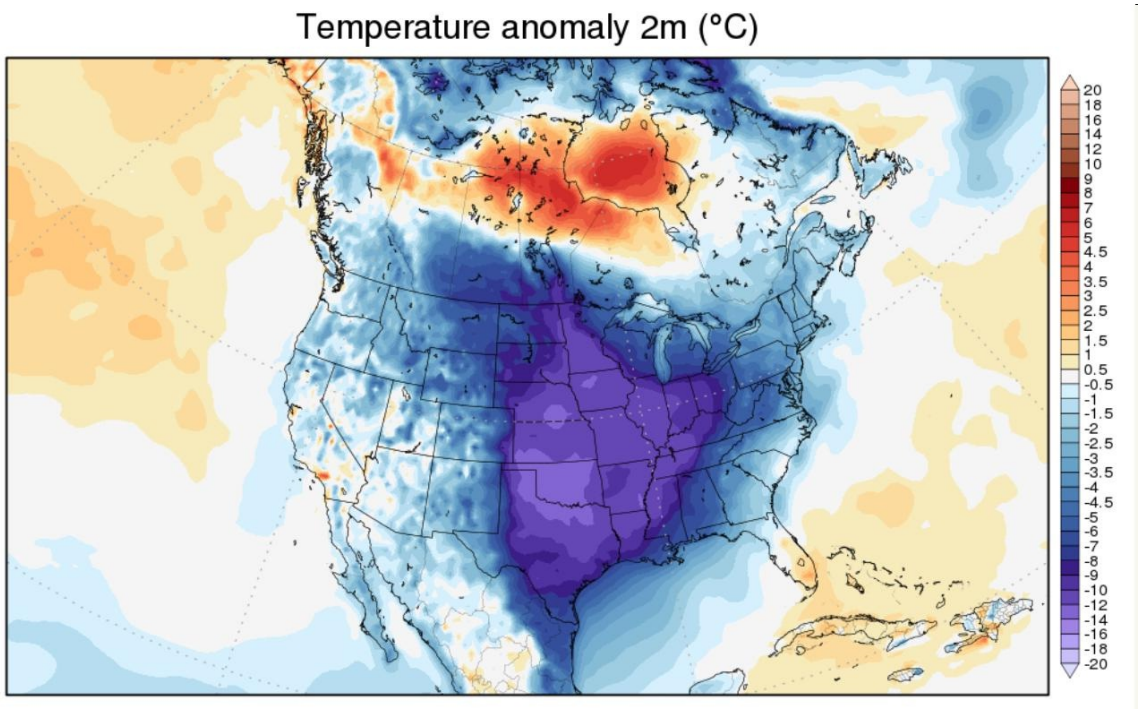
[as of 2/23/2021]

LOCATION	POPULATION	CONFIRMED CASES	DEATHS
CALIFORNIA	40,129,160	3,450,058	49,563
LOS ANGELES COUNTY	10,247,557	1,147,541	19,904
ORANGE COUNTY	**3,228,519**	**245,135**	**3,848**
RIVERSIDE COUNTY	2,468,145	277,730	3,664
SAN DIEGO COUNTY	3,370,418	257,348	3,189
SAN BERNARDINO COUNTY	2,217,398	279,984	2,637

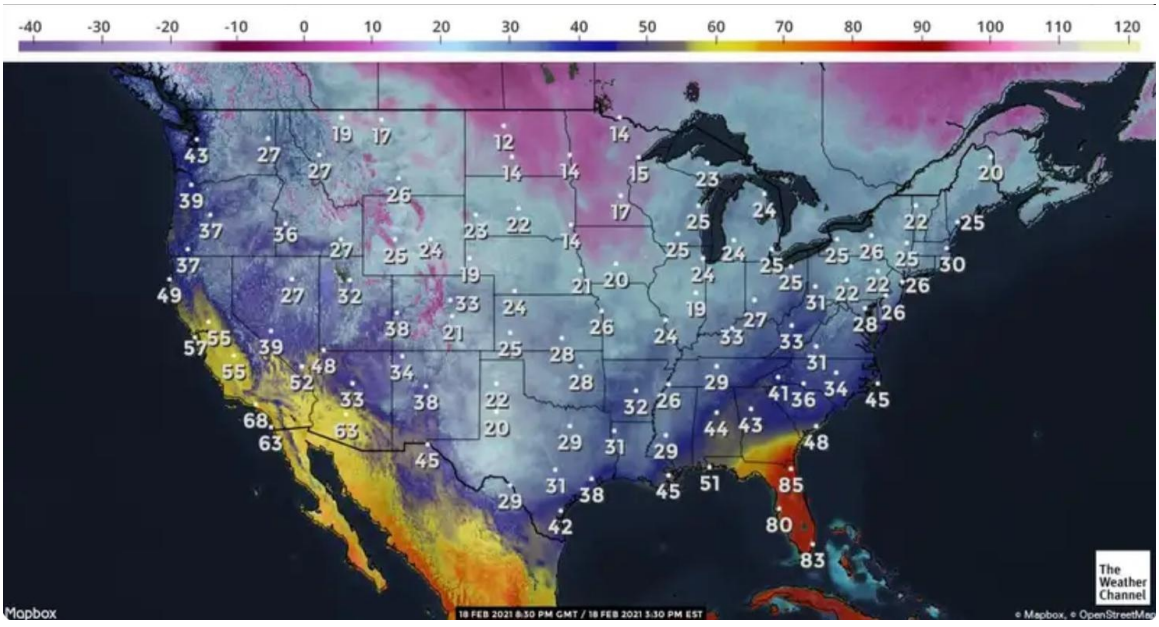
The BIG Chill

The Great Lakes rapidly froze after an extremely slow start. Record low temperatures encompassed the South. Most Americans are bundling up. Numerous cold temperature records were set as some sites report temperatures 50 degrees below normal. All of this is attributed to an Arctic outbreak, as cold air has escaped the North Pole and invaded the United States.

February 18-25, 2021 Average of Departure from Normal Temperatures



Mid-afternoon February 18, 2021



Legal and Regulatory

March 1, 2021

1. **Ocean Reduces Carbon Dioxide**: Scientists traditionally approach the greenhouse gas problem by looking at ways to keep CO2 out of the air. UCLA is looking at another approach. Removing CO2 from the oceans. Ocean presently absorb CO2 from the atmosphere on a regular basis. However, the oceans are currently full of CO2. They can only absorb so much. If the oceans had more capacity, they could absorb more, and their capacity is much greater. Oceans, on a volume basis, can absorb 150 times more CO2 than the atmosphere. UCLA has developed a process called single step carbon sequestration and storage (sCS2) which takes CO2 out of the ocean. Electric charges are fed through a mesh in a tank of seawater. The resulting chemical reactions dissolve CO2 with calcium and magnesium producing limestone and other product seen in seashells. The remaining seawater is fed back to the ocean and the byproducts are separated. Currently, the cost and feasibility of the process are not viable. However, as science progresses, who knows.

2. **Heat from Sewers**: King County, Washington, is presently using a novel renewable energy source. Much energy from hot water and other industrial uses is literally going down the drain. When the hot stuff hits the drain, it retains its heat for some time. The current project the county is offering to property owners of large parcel or buildings recaptures this energy for reuse. Heat exchangers placed in the sewer system grab this energy and uses it for heating or cooling structures. This pilot project offers subsidies to landowners to install such a system. The idea is to reduce the overall energy load/demand in the community. They hope this concept will catch on and remove the need for any subsidy based on long-term benefits to the County and landowners.

3. **Klamath Dams and Fire Water**: The Klamath Dam removal project continues to create controversy. Proponents of the Dams claim they are needed as a source of water to fight fires. They also serve as fire breaks in the forest. However, both California and Oregon fire agencies say it will not be a factor. The new plan calls for a camera based system to monitor and discover fires before they get out of hand. In addition, helicopter water locations will be developed and more hydrants put in the area. There is still a debate if fish will benefit from the project.

4. **Baby Salmon Dying**: Last year, biologists at the fish hatchery near Shasta Dam became concerned about baby salmon dying for no apparent reason. They reached out to hatcheries around the US and discovered that this occurred in the 1960s around the Great Lakes. The cause was vitamin B1, thiamine, deficiency. Proper B1 supply is necessary for humans, and practically all plants and animals. A Dutch doctor, Christian Eijkman, won a Nobel Prize in 1929 for this discovery. The hatchery put the little fish in vitamin-enriched water and the dying stopped. So where did the problem come from. During 2019 and 2020, there was unusually large anchovy populations off the Central Coast of California. Salmon were gorging themselves on the surplus. Anchovies contain thiaminase, which breaks down B1, thereby causing health problems for the baby salmon. No one knows for sure the reason for the large numbers of anchovies coming to our shores, but there has been a worldwide problem in wildlife

during 2018 because of B1 deficiencies. Some scientists are looking at sewage, industrial or drug contamination but no one has discovered the actual answer.

5. **Less Snow**: As we have just experienced a major atmospheric river and resulting heavy snow and rain, meteorologists met at Lake Tahoe last month to discuss the future. They concluded that we would experience "precipitation whiplash" for the foreseeable future. That is continued and prolonged drought conditions. At the same time fewer and stronger rain and snow events. This along with warming trends will create quicker snowmelt meaning more runoff and flood conditions. They predict a 4 to 9 degree temperature increase in Tahoe by 2100 and a future possibly without snow at the ski resorts.

6. **Farmers Planting Plans**: California farmers are having increasing problems in deciding what crops to plant and whether to plant at all. Lack of rainfall, water supply restrictions, Covid working conditions, rising electricity costs, changing prices for products on the worldwide market. The decision to fallow land or keep trees alive is truly life and death for various farmers. Commodity crops like cotton and rice are making a comeback worldwide meaning higher revenue generated. Electricity prices makes pumping groundwater sometimes not a viable option. Covid is impacting the labor market, so less labor-intensive crops are preferred. The crop mix in also affected by Covid. Since restaurant demand has been hit hard, specialized products they would order is reduced. Grocery store and home chefs orders are up but they are more general products as compared to restaurants.

7. **Teen Scientist and Soap Nuts**: Shreya Ramachandran, a high school senior in Fremont, California, is working on a cheap way to recycle water. She was working on a project to convert gray water from home use, sinks, showers, laundry machines, to usable water. Shreya's grandmother recently visited from India and brought soap nuts with her. Soap nuts, also known as soap berries, are native to India and are a small yellow or brown fruit encased in a hard shell. Soap nuts are used for bathing in India. They are also sold as detergents and are an effective cleaning agent. Shreya set up a test system for her house, used the nuts for their cleaning needs, and then used the water on various plants to see how the plants reacted. This process is being reviewed by folks and could have large significance. (Shreya has been accepted to Stanford!)

8. **Covid Restrictions Reduced Infection Rates**: Duke University conducted a study of all 3141 counties in the US to determine the impact of two Covid restrictions. Their conclusion was that the moratoria of utility shutoffs and tenant evictions reduced the overall Covid infection rate nationally by over 8%. Both of these measures if not taken would have put more folks together and increased the potential for spreading of the virus. The scope of the Duke study was very large and seemingly significant. These two measures went on and off at different times in the various counties. They further concluded that if the measure were all in effect in March of 2020 and remained in effect until now, that the infection rate would have been reduced by over 14% and death rates by 40%. The death rate for the actual study showed a decrease of over 15%.

9. **Water Markets Good**: The Public Policy Institute of California (PPIC) recently commented on the Wall Street inclusion of water commodity futures on the big board. They acknowledge that there is supporting and opposing views on this development. However, their conclusion was that this would be a positive thing and could reduce the costs of future droughts. Trading would allow water world to better manage the changing water rates that normally occur in water world in California. Future planning would be encouraged by the process and also more

cooperative solutions. They also disclosed that this trading would only impact about 4% of the total water supply in California.

10. **Delta Carbon Program**: We all know the problems in the Delta caused by peat subsidence, weakened levees, and overall sustainability (or lack thereof). Peat loss produces carbon loss in the air and soil level shrinking. The Delta Conservancy is proposing a pilot project to reduce this trend. They plan to take a few islands and make significant changes. The islands will be flooded, which stops further carbon and soil loss. The sunken land will be planted with water loving plants that would produce peat. Peat subsides at about 2 inches per year and would be rebuilt at the same rate. At this rate, it would take about 40 years to bring the land back to where it started. Stay tuned.

11. **Cleaning Wastewater**: A German company is using activate carbon, from renewable sources like wood or coconut husks, to remove certain trace problem substances from wastewater. They use an electrical charge to the carbon to get the result, thereby making the process more environmentally desirable. University of Sydney engineers are using electrical charges to clean heavily polluted industrial wastewater. Specialized electrodes drive oxidation reactions to turn contaminants into harmless gasses or compounds. Both of these techniques are being further researched for viability and financial concerns.

Item No. 7

INFORMATION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Charles Busslinger

SUBJECT: **Approval of AMP Capacity Flow Exceedance Request – South Coast WD & the City of San Clemente**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and file this report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

MWDOC has the obligation to enforce both the Allen McColloch Pipeline (AMP) Sales Agreement and the AMP Proceeds Agreement; these two separate agreements designated the terms and conditions for the transfer/sale of the AMP from the local agencies to MET in 1995.

One of the provisions of the Proceeds Agreement is for MWDOC and the AMP Participants to limit the capacity usage on the AMP by each participant to the capacity they held in the AMP at the time of transfer of the facility to MET.

On Dec 16, 2020, the Board delegated authority to the General Manager to make determinations concerning certain AMP capacity flow exceedance requests ('waivers') that meet the criteria indicated in the AMP Proceeds Agreement. Those conditions are for MWDOC to not consider peak flows resulting from:

- emergency situations,

Budgeted (Y/N): N/A	Budgeted amount:	Core __	Choice __
Action item amount:	Line item:		
Fiscal Impact (explain if unbudgeted):			

- inadvertent flow changes, or
- operational adjustments required by Metropolitan or other agencies

Requests which the General Manager determines do not meet this criteria will continue to be brought to the Board for consideration, but the agency will be notified that the request requires additional consideration, so the requesting agency can prepare accordingly.

MWDOC received a request from South Coast Water District on February 22, 2021 for a capacity flow exceedance request ('waiver') from February 22, 2021 - March 1, 2021 due to an emergency main break.

DETAILED REPORT

MWDOC has the obligation to enforce both the Allen McColloch Pipeline (AMP) Sales Agreement and the AMP Proceeds Agreement; these two separate agreements designated the terms and conditions for the transfer/sale of the AMP from the local agencies to MET in 1995.

One of the provisions of the Proceeds Agreement (excerpt below) was for MWDOC and the AMP Participants to limit the capacity usage on the AMP by each participant to the capacity they held in the AMP at the time of transfer of the facility to MET.

One of the provisions of the Proceeds Agreement (excerpt below) was for MWDOC and the AMP Participants to limit the capacity usage on the AMP by each participant to the capacity they held in the AMP at the time of transfer of the facility to MET. Below are the capacities from Exhibit B of the AMP Proceeds Agreement, reorganized for agency consolidations that have occurred since that time.

AMP Participant Agency	**Reach D1**
YLWD	30.04
Anaheim	28.72
Orange	22.74
EOCWD	9.57
IRWD	70.67
MNWD	83.77
ETWD	26.33
SMWD	124.46
TCWD	4.01
San Juan Capistrano	4.91
San Clemente	6.87
SCWD	3.90
	415.99

Section 3.06 (starting on page 20 of the AMP Proceeds Agreement) explains the financial implications for exceeding peak day usage on the AMP, and includes a provision allowing MWDOC to **"not consider peak flows resulting from emergency situations,**

inadvertent flow changes or operational adjustments required by Metropolitan or other agencies" (see below).

Since 1995, MWDOC has provided approximately 19 "waivers" for agencies who exceeded their peak AMP capacity or who might exceed their AMP capacity if a situation was known in advance. This has primarily occurred when local facilities were; out of operation due to an emergency, construction work impacting facilities, or due to planned shutdowns. Some waivers have been requested in advance and then were subsequently not needed.

MWDOC received a request from South Coast Water District (SCWD) on February 22, 2021 for a capacity flow exceedance request ('waiver') from February 22, 2021 until March 1, 2021 due to an emergency main break on the Local Transmission Main. SCWD has increased flows through their SC-5B connection on the South County Pipeline in order to meet demands until the line is repaired.

The General Manager has determined this request meets the conditions specified in the AMP Proceeds Agreement to not consider peak flows from:

- Emergency Situations

and the waiver has been granted.

From the AMP Proceeds Agreement:

section 3.06. Readjustment of Capacities.

During the term of this Agreement and until such time as Metropolitan augments the capacity of the AMP in any manner, including, but not limited to, construction of the Diemer Pump Station or other capital facility, MWDOC shall monitor each

20

Participant's and Leasing Agency's usage. At any time prior to augmentation of capacity in the AMP by Metropolitan, any Participant or Leasing Agency whose peak day flow exceeds its Adjusted Capacity, shall be required to pay for an additional full cubic foot per second (cfs) of capacity for the amount by which it exceeded its Adjusted Capacity rounded to the nearest cfs.

For purposes of determining whether a Participant or Leasing Agency has exceeded its capac.ity, MWDOC shall not consider peak flows resulting from emergency situations, inadvertent flow changes or operational adjustments required by Metropolitan or other agencies. The Peak Flow shall be defined as the most recent three-year moving average peak day flow in each reach of the AMP.

Budgeted (Y/N): N/A	Budgeted amount:	Core __	Choice __
Action item amount:	Line item:		
Fiscal Impact (explain if unbudgeted):			

AMP FLOW WAIVER REQUEST DETERMINATION

February 22, 2021

REQUESTING AGENCY: South Coast WD & City of San Clemente

AGENCY AMP CAPACITY OWNERSHIP 10.77 **cfs**

REQUESTED FLOW: 18 **cfs**

REQUESTED DATES OF WAIVER: February 22, 2021 **TO** March 1, 2021

WAIVER JUSTIFICATION:

☒ EMERGENCY SITUATION

☐ INADVERTENT FLOW CHANGE

☐ OPERATIONAL ADJUSTMENT REQUIRED BY METROPOLITAN OR OTHER AGENCY

☐ OTHER (TO BE REFERRED TO MWDOC BOARD FOR CONSIDERATION)

EXPLANATION:

MWDOC received a request from South Coast Water District (SCWD) on February 22, 2021 for a capacity flow exceedance request ('waiver') from February 22, 2021 until March 1, 2021. SCWD had an emergency main break and needed to increase flows on their SC-5B connection on the South County Pipeline in order to meet demands.

Prepared by: Chris Lingad

☑ Approved

General Manager Signature Robert J. Hunter Date: Feb 23, 2021

Date of MWDOC Board notification: _____

P&O Committee information item date: 3/1/21

Date AMP Participants notified: _____

RJH

Signature: 
Robert Hunter (Feb 23, 2021 14:15 PST)

Email: rhunter@mwdoc.com

Item No. 8

INFORMATION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Sarah Wilson

SUBJECT: **MWDOC Choice School Programs Update**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and file this report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

The Municipal Water District of Orange County (MWDOC) K-12 Choice School Program contractors—Shows That Teach, Discovery Cube Orange County, and Bolsa Chica Conservancy—continue their efforts to book live, interactive virtual water lessons that can be accessed at home or in the classroom by Orange County K-12 teachers and students for the 2020/21 school year.

As virtual sessions are confirmed with Orange County schools, MWDOC Choice School Program contractors update the shared Google Calendar so that participating member agencies are able to view the booking schedule for their service area. Included in this report is a preview of scheduled visits for the months of March and April 2021. Please note that the shared Google Calendar is updated frequently, and will always have the most accurate information. Visits are subject to change due to school and teacher availability. Login information for the shared Google Calendar is available upon request.

DETAILED REPORT

Budgeted (Y/N): Y	Budgeted amount: $401,729	Core __	Choice X
Action item amount:	Line item: 63-7040		
Fiscal Impact (explain if unbudgeted):			

MWDOC Public Affairs staff has worked closely with K-12 Choice School Program contractors to provide Orange County students with safe, structured, interactive water lessons that guide them to identify local water supply sources, explore the challenges faced by Orange County water providers to deliver safe, clean water to homes and businesses, and discover the importance of using water wisely.

The current MWDOC Choice School Program goals can be accessed here.

SHOWS THAT TEACH – ELEMENTARY SCHOOL (K-2)
To date, Shows That Teach has hosted 48 live, virtual assemblies reaching more than 6,800 elementary school students through the MWDOC Choice Elementary School Program (grades K-2). At the time of this report, 16 additional presentations and 2,080 students have been booked to receive the program through the remainder of the 2020/21 school year so far.

"We really enjoyed today's virtual assembly. The students were incredibly engaged and everything was so interactive. Highly recommend!" – 1st grade teacher, Brea Country Hills Elementary, City of Brea

"Very well done. Highly engaging for the students. Good information presented at the appropriate level." – Principal, Meairs Elementary, City of Garden Grove

DISCOVERY CUBE OC – ELEMENTARY (3-6) AND MIDDLE SCHOOL (7-8)
To date, Discovery Cube OC has hosted 70 live, virtual assemblies reaching more than 3,070 elementary school students through the MWDOC Choice Elementary School Program (grades 3-6). At the time of this report, 11 additional presentations and approximately 520 students have been booked to receive the program through the remainder of the 2020/21 school year so far.

To date, Discovery Cube OC has scheduled 8 live, virtual assemblies for approximately 640 7th grade students participating in the MWDOC Choice Middle School Program (grades 7-8).

BOLSA CHICA CONSERVANCY – HIGH SCHOOL (9-12)
To date, the Bolsa Chica Conservancy has hosted 8 live, virtual classroom presentations reaching roughly 230 high school students at El Toro High School and Santa Ana High School. At the time of this report, 13 additional classrooms at Edison High School, Brea Olinda High School, and Santa Ana High School have been booked to receive the MWDOC Choice High School Program (grades 9-12) through the remainder of the 2020/21 school year so far.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	1 3-6 WESTMINSTER	2 3-6 WESTMINSTER	3 K-2 LA HABRA El "Virtual Water	4 7-8 SANTA ANA	5 3-6 ETWD Del Cerro 7-8 SANTA ANA	6
7	8 3-6 GARDEN GROVE 3-6 WESTMINSTER	9 K-2 WESTMINSTER	10 K-2 LA PALMA GB K-2 WESTMINSTER	11 7-8 SANTA ANA	12 K-2 SANTA ANA K-2 SAN CLEMENTE 7-8 SANTA ANA	13
14	15 3-6 EWSTMINSTER	16	17 K-2 WESTMINSTER	18	19	20
21	22 3-6 SAN CLEMENTE	23	24	25 9-12 SANTA ANA	26 9-12 SANTA ANA	27
28	29 3-6 SAN CLEMENTE	30	31	1	2	3

Apr 2021 (Pacific Time - Los Angeles)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29 3-6 SAN CLEMENTE	30	31	1	2	3
4	5	6	7	8	9	10
11	12 9-12 BREA Brea	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1

Item No. 9

INFORMATION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Damon Micalizzi

SUBJECT: **2021 OC Water Summit Update**

STAFF RECOMMENDATION

Staff recommends the Public Affairs & Legislation Committee: Receive and file the report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

REPORT

Staff is presently looking for an outdoor venue and virtual platforms for the 2021 OCWater Summit, scheduled for June 4, 2021. The event would be a hybrid presentation with virtual and in-person attendance made available for guests and presenters.

All confirmed presenters have agreed to participate in person and virtually if needed. The event will include sessions on water supply, Contaminants of Emerging Concern (CECs), technological advancements in weather forecasting, and local resources. Fritz Coleman is back to serve as Master of Ceremonies and moderator.

The shift to a hybrid event does present several challenges, and quick decisions as the event is fast approaching. As such, the OC Water Summit Ad Hoc Committee is meeting again on March 1 to discuss logistics and the possibility of delaying the event to October, when a return to the Disney Grand Californian as a venue will likely be a more viable option.

Item No. 10

INFORMATION ITEM
March 1, 2021

TO: **Planning & Operations Committee**
(Directors Yoo Schneider, Nederhood, Seckel)

FROM: **Robert Hunter, General Manager**

Staff Contact: Damon Micalizzi

SUBJECT: **February 24th Virtual Water Policy Forum**

STAFF RECOMMENDATION

Staff recommends the Public Affairs & Legislation Committee: Receive and file the report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

DETAILED REPORT

More than 160 guests attended MWDOC's Virtual Water Policy Forum held on February 24th. The event featured Nancy Vogel, Director of the Governor's Water Portfolio Program, and Susan Tatayon, Chair of the Delta Stewardship Council, to take a closer look at the Governor's plan for long-term water resilience and discussed how the Delta Plan aims to achieve the state's coequal goals of sustainable water supplies and environmental protection.

Video of the event is published on MWDOC's YouTube channel and via Social Media. The overwhelming majority of feedback received was positive.

This was the second Virtual Water Policy Forum hosted by MWDOC since social distancing edicts were put into place. Staff is presently considering dates, topics, and options for MWDOC's next Water Policy Forum.

ENGINEERING & PLANNING	
Economic Benefit Studies and Modeling Work to Quantify the Benefits of Local Projects in the Context of MET's 2020 Integrated Resources Plan (IRP)	MWDOC staff is working with the Brattle Group and CDM Smith on the Economic Benefits Studies and modeling work. In this process, the consulting team will be working with MWDOC and the member agencies regarding the survey of businesses in Orange County. CDM Smith has completed initial modeling work for a water demand analysis and presented preliminary results to MWDOC's member agencies at the Managers Meeting on January 21, 2021. Final drafts should be completed in March 2021. This analysis will serve to support the Urban Water Management Plans and provide information for the Economic Benefits study. Wallace Walrod, economist for Orange County Business Council and sub-consultant for the Brattle Group, is putting together the business survey portion of the studies. Dr. Walrod will provide information on the business survey in February to allow MWDOC member agencies to provide input to the business survey. MWDOC staff is working with Dr. Walrod to schedule a meeting to obtain member agency input on the business survey.
OC-70 Meter Testing Update	MWDOC, MET and EOCWD agreed to a reference standard for testing at OC-70 using a calibrated mag meter as a reference for testing the billing meter is to be installed upstream of the OC-70 facility and then compared to the existing venturi meter. EOCWD provided use of a new 16-inch McCrometer magnetic flow meter to MET for this testing. The mag meter was sent to Utah State Water Research Lab for calibration. The off-the-shelf calibration of this new meter (KA value) proved to be 8% off when tested in a straight pipe run against the NIST certified weight tank but with good repeatability. The calibrated meter was then tested in the simulated pipe system to the weight tank and adjusted by another 0.5%. MET then completed installation of the mag meter at OC-70. Site conditions encountered at OC-70 differed from the as-built drawings, causing MET to scramble to make several adjustments in the field. Field testing at OC-70 are anticipated to be completed on March 1, 2021. Another short OC-70 shutdown is scheduled for March 17-19, 2021 to pull the mag meter and spools and then send them back to Utah Water Research Lab for final calibration verification.
OC Hydraulic Model	Black & Veatch has completed the first two project tasks and constructed the hydraulic model using Innovyze's InfoWater modeling platform. B&V is currently calibrating the model in preparation for use of the model in early 2021. Staff and B&V are currently working with member agencies to define potential project scopes of work. More information will be presented as they develop. A meeting was coordinated with B&V and Metropolitan staff on February 9, 2021 to review model calibration of the AMP. Staff is waiting on a few final data points to complete the calibration.

Doheny Ocean Desalination Project	South Coast Water District (SCWD) continues working on the project: • In 2019, SCWD was awarded an $8.3 million award from the Water Infrastructure Improvements for the Nation Act of 2016 (WIIN). In December 2020, the Interior Department notified SCWD that the project was selected for an additional $11.7 million for the project for FY 21 for a cumulative total of $20 million which is the existing maximum for WIIN Act Desalination Program funding. • SCWD received an extension on filing a Water Infrastructure Finance and Innovation Act (WIFIA) loan application until June 30, 2021. • SCWD submitted their NPDES permit application on March 13, 2020. Regional Board comments were received in September 2020. SCWD re-submitted in January 2021 and anticipates a Board hearing on the NPDES permit in Summer 2021. • A draft Coastal Development Permit has been submitted to Coastal Commission on 11/23/20 and the Commission staff have provided comments. Resubmission of the permit application is anticipated in Mid 2021. • Work is progressing on an Alternative Energy Study by Burns & McDonnell for the project. A draft report is under review by SCWD. • Work is also progressing on the Financial Analysis for a 2 mgd and 5 mgd scenario through Clean Energy Capital. Work is on hold pending input from the Alternative Energy Study. • Also making progress is a third-party hydrogeologic review of San Juan Creek to determine if and to what extent near shore pumping may have on inland groundwater wells. Additional geophysical field work has been completed and a technical working group meeting was held on December 7, 2020 to review the results. The geology in the vicinity of Stonehill Drive is extremely complex but testing shows that there is a subsurface barrier which impedes groundwater flows between the upper and lower portions of the creek in the vicinity of Stonehill Drive. The hydrogeologists are now modeling the test findings to determine the extent of hydrogeologic flows between the upper and lower portions of the creek and should have 3D modeling results in March 2021. • A draft report on a Doheny/GRF Hybrid Option Study has been submitted to SCWD for review in January 2021. • SCWD has identified additional environmental permitting tasks related to preparation, technical support and submission for key resource agencies. The proposed tasks will be completed during the next 8 months, with the final public heading taking place by October 2021. On June 25, 2020 the SCWD Board approved an amendment to the Clean Energy Capital Financial Analysis to evaluate alternative project options that meet reliability benefits for SCWD similar to the Doheny Desalination Project, along with reducing overall life-cycle costs in light of the uncertain economic situation moving forward due to the COVID-19 pandemic.

	The Doheny Desalination Project is currently sized at a capacity of up to 5 MGD, which exceeds SCWD's average potable water demand expected during emergency situations. SCWD has only received interest from SMWD for about 1 mgd of supply from Doheny. This leaves South Coast with potential capacity for others in a 5 MGD facility. Based on this, along with regional financial hardships caused by the COVID-19 pandemic and potential economic recession, SCWD believes that it is necessary to consider alternative, and potentially lower cost project options, to utilize and potentially expand existing assets as a means to meet their reliability needs. This amended study is reviewing design parameters and existing conditions at SCWD's existing Groundwater Recovery Facility (GRF), to obtain a comprehensive understanding of actual production capacity of the GRF and current limitations and reliability concerns. A range of additional water production volumes needed to maintain emergency reliability for SCWD will be developed. Current estimates are that 1.2 to 2.2 mgd of additional reliability will be needed for SCWD based on a GRF production volume of 0.8 mgd.
SMWD San Juan Watershed Project	Santa Margarita WD continues to focus on diversifying its water supply portfolio toward obtaining a goal of 30% local supplies. The San Juan Watershed Project is one project SMWD is working on toward that goal. The original project was envisioned to have three Phases; Phase 1 included three rubber dams along San Juan Creek to recover about 700 Acre-Feet-per Year (AFY); Phase 2 added up to 8 additional rubber dams and the introduction of recycled water into the creek to improve replenishment of the basin to recover up to 6,120 AFY, and Phase 3 added more recycled water topping out at approximately 9,480 AFY. Under this arrangement, most or all of the production and treatment involved the existing San Juan Groundwater Desalter with expansions scheduled along the way to increase production beyond 5 mgd. Fish passage and regulatory hurdles to satisfy subsurface travel time requirements continue to be addressed. SMWD has since modified the project. Currently SMWD is working with the Ranch on the next phase of development within SMWD's service area and also working on access to riparian groundwater from the Ranch in the upper portions of the San Juan Creek watershed. SMWD plans to construct a water filtration plant to treat this additional water, which currently has the working title of 'The Ranch Water Filtration Plant' (RWFP). The draft CEQA documentation for the RWFP is going to the SMWD E&O Committee for review in February 2021. SMWD anticipates that the RWFP plant will begin operation in the 1st quarter of 2022. This new first phase will treat approximately 1,000 AFY of non-potable water to produce 800 – 900 AFY of potable water, which will then be put directly into the SMWD water system. The RWFP treatment system will consist of Microfiltration or Ultrafiltration, Reverse Osmosis and Chloramines. SMWD also continues to work with the California Department of Fish and Wildlife (CDFW) and National Marine Fisheries Service (NMFS) on steelhead

	trout regulations for any work occurring within San Juan Creek stream. This new RWFP 1st phase is 'off-stream' which is allowing the project to move forward. A new 2nd phase of the project will look to use infiltration basins (stormwater/flood) that will be constructed as part of the Ranch's next phase of development. SMWD is looking to fill these new basins with recycled water in the summer when the basins are empty and then take it back out. By doing this SMWD anticipates being able to increase the source water supplies for the RWFP to approximately 5,000 AFY. Both State and US Bureau of Reclamation grants are being pursued for this project. SMWD has discovered that the local geology has high vertical percolation rates and sufficient groundwater basin travel time (lower horizontal conductivity) to potentially allow percolation of treated recycled water with an ability to meet the required travel time regulations. SMWD is of the opinion that permitting for percolation augmentation using recycled water from the nearby Trampas reservoir can be added as permitting allows. SMWD believes the new project may be able to ultimately produce 4,000 to 5,000 AFY; they believe the original project will continue to be developed for production out of the wells and treatment provided by San Juan Capistrano as the two agencies merge. Ultimate production out of the basin could exceed 10,000 AFY if all goes well.
South Orange County Emergency Service Program	MWDOC, IRWD, and Dudek have completed the study to determine if the existing IRWD South Orange County Interconnection capacity for providing emergency water to South Orange County can be expanded and/or extended beyond its current time horizon of 2030. Dudek participated in the November 6, 2019 SOC workshop to re-engage with the SOC agencies on this project. Support from the agencies was expressed to take a small next step to install Variable Frequency Drives at a pump station within IRWD which would be paid for by SOC to help move water from the IRWD system to SOC in an emergency. The Variable Frequency Drives will provide more flexibility to the IRWD operations staff to allow additional water to be sent to SOC while meeting all of the IRWD needs.
Strand Ranch Project	MWDOC and IRWD are continuing to exchange ideas on how to implement the program to capture the benefits that can be provided by the development of "extraordinary supplies" from the Strand Ranch Project. Staff from MWDOC and IRWD met in August 2020 and have been reaching out to other agencies to determine the level of interest in the project.
Poseidon Resources Huntington Beach Ocean	The Santa Ana Regional Water Quality Control Board (SARWQCB) continues to work with Poseidon on renewal of the National Pollutant Discharge Elimination System (NPDES) Permit for the proposed HB Desalination Project.

Desalination Project	The renewal of the NPDES permit for the proposed desalination facility requires a California Water Code section 13142.5(b) determination in accordance with the State's Ocean Plan (a.k.a. the Desalination Amendment). To make a consistency determination with the Desalination Amendment, the Regional Board is required to analyze the project using a two-step process: 1. Analyze separately as independent considerations, a range of feasible alternatives for the best available alternative to minimize intake and mortality of all forms of marine life: a. Site b. Design c. Technology d. Mitigation Measures 2. Then consider all four factors collectively and determine the best combination of feasible alternatives. The key areas required by the Ocean Plan on which the Santa Ana Water Board is required to make a determination, includes: • Facility onshore location; • Intake considerations including subsurface and surface intake systems; **• Identified need for the desalinated water;** • Concentrated brine discharge considerations; • Calculation of the marine life impacts; and • Determination of the best feasible mitigation project available. On December 6, 2019, SARWQCB, Regional Board staff conducted a workshop in Huntington Beach that was heavily attended with a considerable range of views expressed at the meeting. On May 15, 2020, SARWQB held a second workshop, which focused on the identified need for the desalinated water and marine life mitigation requirements. Karl Seckel presented to the Regional Board on a number of topics including: MWDOC's role in Orange County, alternative definitions of "need" for a water supply project and the role of water agencies, Urban Water Management Plans, non-mandated planning documents, and what was and was NOT in the 2018 OC Water Reliability Study. On September 15, 2020, the Regional Board postponed action on the waste discharge permit renewal at the request of Poseidon to allow additional time to address concerns raised in three days of public hearings. **On February 12, 2021**, the Santa Ana Regional Water Board released a tentative order detailing proposed revisions to the project. The Tentative order is available at:

	https://www.waterboards.ca.gov/santaana/public_notices/docs/2021/NPH_Poseidon_Order_R8-2021-0011.pdf The changes include: • Revisions to the mitigation acres for the inlet dredging in Bolsa Chica so that the dredging accounts for no more than 25% of the mitigation acreage needed to minimize the intake and mortality of all forms of marine life. Poseidon has proposed additional mitigation to meet the requirements of the Ocean Plan and proposed additional restoration at the Bolsa Chica Wetlands and the creation of an artificial reef along the Palos Verdes Peninsula to satisfy the remaining mitigation requirements. • a finding regarding the human right to water policy adopted the State and adopted by the SARWQB as a core value. The Order is consistent with and promotes the human right to water policy. • The deadline for the Discharger to submit the Climate Change Action Plan was revised from within 3 years of the effective date of the Order to within 18 months. **Written comments are due by 5:00 p.m. on March 15, 2021.** Two hearings with oral public comments are scheduled for April 2021 to review the revisions and vote on renewing Poseidon's permit. Assuming success at the Regional Board, Poseidon would then seek its final permits from the California Coastal Commission (CCC). The CCC has committed to reviewing the permit within 90 days of the SARWQCB NPDES permit issuance.
Trampas Canyon Dam and Reservoir	Trampas Canyon Reservoir and Dam (Trampas Reservoir) is a seasonal recycled water storage reservoir, with a total capacity of 5,000 AF, of which 2,500 AF is available to meet Santa Margarita Water District's projected base recycled water demands, and 2,500 AF to meet future water supply needs. When completed, the Trampas Reservoir will allow SMWD to store recycled water in the winter and draw on that water during the peak summer months. The construction of the Trampas Canyon Recycled Water Seasonal Storage Reservoir consists of three main components: 1. Trampas Canyon Dam (Dam) 2. Conveyance facilities to transport recycled water into and out of the Reservoir (Pipelines) 3. Trampas Canyon Pump Station (Pump Station) The construction of the facilities is being completed in three phases: 1. Preconstruction/Site Preparation for the Dam and Pump Station Construction Project Status – Completed in 2018

	2. Dam and Pipelines Project Status – A Dedication Ceremony was held on October 9, 2020. All of the pipelines that convey the recycled water to and from the reservoir have been completed. SMWD is fine tuning its plans to fill, monitor, and operate the reservoir based on any feedback from the Division of Safety of Dams (DSOD). It is anticipated that the reservoir can begin filling the beginning of March. 3. Pump Station Project Status – The Pump Station construction is in the punch list phase. All pre-startup work necessary for pumping has been completed. SMWD has opted not to operate and test the pumps until it has the flexibility of sending water into the Reservoir, which will make the testing activities more efficient and help conserve water. The Emergency Action Plan (EAP) for Trampas Dam has been finalized and submitted to CalOES. This satisfies the requirement for DSOD to have an EAP in place prior to issuance of a permit to impound water behind the dam.
AMP Shutdown in 2021 to Replace PCCP Sections	In 2016, MET initiated a Prestressed Concrete Cylinder Pipe (PCCP) rehabilitation program to install 100 miles of steel liner throughout the MET system to address structural issues associated with prestressed steel wire failures in PCCP. As part of the program, MET monitors PCCP for wire breaks on a regular basis. MWDOC staff was notified that an internal inspection of the AMP revealed two pipe segments with increased wire breaks within the PCCP portion south of OC-70. Metropolitan Engineering considers this section of the pipeline to be at high-risk due to pipe segments that have 20 or more wire breaks. The minimum relining length needed is approximately 1,000 feet and requires a minimum 37-day shutdown for the portion of the AMP south of OC-70. MET had originally scheduled the AMP PCCP relining to begin in about 5 years, but based on the survey, MET does not recommend that repairs to these segments wait until Fall 2021. Two MWDOC member agency projects are also scheduled around the same time as the pending AMP shutdown; a South Coast Water District vault rehabilitation on the JTM that was previously postponed due to the previous Diemer shutdown, and Santa Margarita Water District relocation of a portion of the Aufdenkamp Connection Transmission Main (ACTM) to accommodate the I-5 widening project. The South Coast project is scheduled for completion by mid- February 2021. MWDOC staff coordinated meetings with all affected AMP participants to discuss expediting the ACTM work. The agencies agreed to share $35,000 in additional costs to accelerate the return of the ACTM to service. SMWD staff

	report that the ACTM project is moving forward on schedule and anticipate being back in service prior to the AMP shutdown. The AMP shutdown is planned for April 4, 2021 through May 10, 2021. Staff coordinated a meeting with impacted AMP agencies on February 9, 2021 to discuss scenarios regarding moving water around the impacted agencies to meet demands during the shutdown. Staff is continuing to work with affected agencies and will keep both the Board and the AMP Participants informed as more information becomes available.
Other Shutdowns	**Orange County Feeder** MET is planning to reline and replace valves in a section of the Orange County Feeder from Bristol Ave to Corona Del Mar – this is the last section of this 80-year-old pipeline to be lined. Due to CIP budgeting changes, MET has proposed new shutdown dates of September 15, 2021 through June 15, 2022. MET will be re-evaluating this Orange County Feeder relining project in the June 2021 budget review. **Joint Transmission Main** SCWD is near completion of a rehabilitation project of their CM-10 vault on the Joint Transmission Main (JTM) which will include replacement of existing valves. MWDOC is coordinating this work with MET and SCWD, so the above referenced AMP shutdown and this project do not overlap. **Aufdenkamp Connection Transmission Main** SMWD is nearing completion on relocation of a section of the ACTM pipeline for the I-5 widening project. We are also coordinating with MET and SMWD, so the above referenced AMP shutdown and this project do not overlap. **OC Feeder extension** MET is planning to reline 300-linear feet of the OC Feeder extension affecting the City of Newport Beach. Due to CIP budgeting changes, MET has proposed revised shutdown dates of June 16, 2022 through July 10, 2022. MET will be re-evaluating this Orange County Feeder relining project in the June 2021 budget review. **Lake Mathews Forebay** MET is also planning a shutdown of the Lake Mathews Forebay for maintenance and repair work which will affect the Santiago Lateral from March 1-14, 2021. Staff is currently coordinating with MET and IRWD & Trabuco Canyon WD on this shutdown.
Meetings	
	MWDOC staff along with ABS Consulting, IDS Group and Optima RPM participated in several construction progress meetings in the month of February

	regarding the admin building seismic retrofit and remodel. Weekly progress meetings will continue through the completion of the project.
	Chris Lingad attended a meeting with the City of Brea and MET on February 8, 2021 to discuss issues regarding the city's service connection OC-62.
	Charles Busslinger and Chris Lingad attended a meeting with Black & Veatch and MET on February 9, 2021 to discuss technical details concerning MWDOC's hydraulic model.
	Charles Busslinger and Chris Lingad attended a meeting with EOCWD and MET on February 9, 2021 to discuss details regarding the OC-70 meter testing.
	Charles Busslinger and Chris Lingad attended a meeting with EOCWD, MET and Utah Water Research Lab on February 22, 2021 to discuss plan changes to the OC-70 meter testing.
	Charles Busslinger attended the CalDesal Annual Conference on February 10-11, 2021.

Planning and Operations Committee
WEROC Status Report

February 2021

COVID-19 (CORONA VIRUS) COORDINATION

- WEROC continues to monitor the State and County for changing information and is sharing information with agencies as it becomes available.
- WEROC is participating in the weekly Operational Area Conference calls.
- WEROC continues to hold bi-weekly conference calls on Tuesdays with member agencies to report on Federal, State, and County changes. Calls continue to support the sharing of information between agencies.
- Vicki continues to support agencies daily with COVID-19 related questions and guidance needs.
- On 2/3/21 Vicki sent a follow up letter to Dr Clayton Chau and Dr ChinsioKwong in follow up to the conversation back in December regarding the water and wastewater essential critical workers in the Phase 1-B vaccine distribution. As of the time of this report, Water and Wastewater is still in 1C.
- On 2/10/21, Vicki participated on a national CDC/CISA water and wastewater call in regards to the vaccine. Vicki posed the question if the CDC can assist with the movement of water and wastewater. CDC responded agencies should work with the state and local health departments. It was stated we have been doing that but, they seem to continue to point to each other. WEROC will not this is a nationwide issue, and agencies continue to feel this frustration.
- CalOSHA is reanalyzing the Emergency Temporary Standards in place for section 3205. WEROC will monitor the discussions and outcomes and provide information to the agencies as it is available. CalOSHA meetings on this issue occurred 2/11, 2/12 & 2/16. As of the time of this report, CalOsha has not made any changes.
- WEROC is continuing POD planning efforts, contracts and plans of cooperation in the event this planning resource is required for the future or another event. This includes securing the partnership with staff to provide inoculations.
- Vicki is working with the County Incident Management Team assigned to the County POD system for any special district agencies who want to support the county effort with support staff at the POD location. This was at the request of one of the special district agency inquiring.

FEBRUARY INCIDENTS/EVENTS

(CYBER, MUTUAL ASSISTANCE COORDINATION)

- WEROC coordinated with the OCIAC and a member agency on an identified vulnerability.

- WEROC assisted an agency with logistical support on a potential supply chain issue for a chemical required for treatment.

- WEROC assisted an agency with a water main break, and location of an oddball pipe. WEROC also facilitated the mutual assistance agreement between another agency in order to fabricate a part .

COORDINATION/PARTICIPATION WITH MEMBER AGENCIES AND OUTSIDE AGENCIES

- On 2/10, Vicki attended the Operational Area Executive Board Meeting as the OA Water and Wastewater Mutual Aid Coordinator and provided a report on events over the past couple of months.

- WEROC followed up with State DWR regarding the certification testing and exams availability virtually in follow up to a conversation and request back in November 2020. DWR on 2/12 stated certification exams for operators will be available online within the next few weeks. WEROC will continue to track on this issue impacting training and provide an update to the member agencies.

- Vicki reviewed the SMWD Trampas Dam Emergency Response Plan and provided comments as requested by 2/1.

- Daniel reviewed the Lake Mission Viejo Dam Emergency Response Plan and provided comments as requested by 2/23.

- WEROC is working closely with the OCIAC on any potential vulnerabilities and threats to the water systems or identified issues in Orange County. Executive level and the cyber points of contacts for WEROC will be notified if there is a specific threat.

- Daniel is providing important cyber security information to the member agencies. The Cyber Communications group is being used to disseminate this information.

- WEROC continues to assist the County/Operational Area Emergency Management Division with getting the water and wastewater Special Districts signed Operational Area Agreements completed. The new Operational Area agreement went into effect in September 2020. At this time, there is still 6 special district water agencies that have not submitted their completed agreements.

- Vicki worked with Heather from Government Affairs on a response regarding the federal government making changes to the Disaster Declaration Process and the ability to access public assistance funding. The federal proposal is looking at cost of assistance estimates being added to the process. If this moves forward, this well significantly impact the state of California, counties, cities and Special Districts ability to access funding.

- Vicki is working with OCWA on the May SafetyFest training for field workers. Vicki scheduled the 2 speakers for the 2 ½ hour event to be held in May.

- On 2/24 Daniel attended the SDG&E briefing on their emergency plan and resources available.

- On 2/26, Vicki was a presenter/member of the CSDA Emergency Preparedness Summit Panel. This was a joint effort with CDA and the USC Sol Price School of Public Policy

WEROC ASSESSMENT IMPLEMENTATION AND PLANNING EFFORTS

- The WEROC Emergency Operations Plan is 90% completed. Since last report, Daniel has completed the draft and it is with WEROC Management for review.

- In relation to the WEROC Assessment Report, the Records and Data Management project is 78% completed.

- Training and Exercise Plan is 100% competed.

- WEROC CalCard solution is 90% completed, card has been received, process authorities documents specific to EOC is process are being created.

- Planning Maintenance and Recommendation Matrix is 30% completed as comparison of federal and state mandates in relationship to current planning continues.

AMERICA'S WATER INFRASTRUCTURE ACT (AWIA)

- WEROC and its consultant, Herndon Solutions Group (HSG) continues to work with WEROC agencies to achieve compliance with America's Water Infrastructure Act (AWIA).
- Tier II agencies successfully completed their RRA submittals by the December 31, 2020 deadline. The Emergency Response Plan phase will be due in June, 2021. Tier II agencies began their Emergency Response Plan meetings at the end of January.
- Tier III agency Initial Workshops are being conducted and the Tier III agencies RRA are due June 30, 2021.
- 13 agencies workshops were conducted in the month of February utilizing various virtual platforms dependent on the agency preference.
- Vicki coordinated with the Orange County Certified Unified Program Agency (CUPA) on behalf of all water agencies participating in the AWIA project. HSG is preparing a letter of certification to provide to the OC CUPA in order to meet the Local Emergency Planning Committee requirement set forth within AWIA 2018.

EMERGENCY OPERATIONS CENTER READINESS AND SYSTEMS

- Daniel is working on maintaining the operational function for the South EOC. He is focused on the projects areas with the generator and IT systems.
- There is no update from the County on the status of the WebEOC Resource Management and Resource Request board issues or timeline when the issues will be resolved.
- Janine is updating information in safety center, and member agency contact information.

TRAINING AND EXERCISES

- An ICS 400 – Advanced ICS Command and General Staff Course for member agencies, February 23 – 26th.
- Daniel is scheduling 800 MHz radio training, One class has been conducted in February and additional classes are being scheduled and circulated with the member agencies.

- Daniel facilitated a Virtual training tabletop wit MWDOC staff on 2/22. This was the first of a series of trainings what will be provided to MWDOC employees as EOC training gets back on track.
- Vicki is assisting OC Sans with exercise scenario and sequence of events development for their exercise in April.

- Daniel began his National Emergency Management Advanced Academy (NEMAA). This is national offered class targeting California representatives from Federal, State, City, County, Local, Tribal, and Territorial Governments, along with Emergency Managers from Higher Education, DOD, Private Sector, American Red Cross, Public Health and Volunteers. In order to attend, you have to be sponsored and selected. This course will further enhance Daniels' experience and professional career.

Status of Water Use Efficiency Projects
February 2021

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Smart Timer Rebate Program	MWDSC	Ongoing	Ongoing	In January 2021, 131 smart timers were installed in Orange County. To date, 29,308 smart timers have been installed through this program.
Rotating Nozzles Rebate Program	MWDSC	Ongoing	Ongoing	In January 2021, no rotating nozzles were installed in Orange County. To date, 571,581 rotating nozzles have been installed through this program.
SoCal Water$mart Residential Indoor Rebate Program	MWDSC	Ongoing	Ongoing	In January 2021, 146 high efficiency clothes washers and 16 premium high efficiency toilets were installed in Orange County. To date, 123,027 high efficiency clothes washers and 60,674 high efficiency toilets have been installed through this program.
SoCal Water$mart Commercial Rebate Program	MWDSC	Ongoing	Ongoing	In January 2021, 55 plumbing flow control valves and 165 laminar flow restrictors were installed in Orange County. To date, 110,915 commercial devices have been installed through this program.
Industrial Process/ Water Savings Incentive Program (WSIP)	MWDSC	Ongoing	Ongoing	This program is designed to improve water efficiency for commercial customers through upgraded equipment or services that do not qualify for standard rebates. Incentives are based on the amount of water customers save and allow for customers to implement custom water-saving projects. Total water savings to date for the entire program is 1,284 AFY and 5,791 AF cumulatively.

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Turf Removal Program	MWDOC	Ongoing	Ongoing	In January 2021, 14 rebates were paid, representing $139,772 in rebates paid this month in Orange County. To date, the Turf Removal Program has removed approximately 23 million square feet of turf.
Spray to Drip Rebate Program	MWDOC	Ongoing	Ongoing	This is a rebate program designed to encourage residential and commercial property owners to convert their existing conventional spray heads to low-volume, low-precipitation drip technology. To date, the Spray to Drip Rebate Program has converted approximately 1,064,412 square feet of area irrigated by conventional spray heads to drip irrigation.
Recycled Water Retrofit Program	MWDSC	Ongoing	Ongoing	This program provides incentives to commercial sites for converting dedicated irrigation meters to recycled water. To date, 167 sites, irrigating a total of 1,601 acres of landscape, have been converted. The total potable water savings achieved by these projects is 3,498 AFY and 15,219 AF cumulatively.

Public & Governmental Affairs Activities Report
January 26, 2021 – February 22, 2021

Member Agency Relations	Public Affairs Staff: • Developed Water Awareness Poster Contest Media Kit for member agencies to promote • Developed and distributed School Program Media Kit for participating member agencies • Printed and delivered member agency bill inserts • Planned and hosted kickoff meeting for Consumer Confidence Reports • Participated in the County COVID-19 PIO conference calls Governmental Affairs Staff: • Created a Doodle Poll for an upcoming legislative meeting with member agency staff & sent a calendar invite to participants • Distributed the MWDOC Member Agency grants report • Sent requests to the Cities of Fountain Valley, Huntington Beach & San Juan Capistrano, and SMWD & YLWD requesting updates on projects for the grants report • Hosted a meeting with member agency legislative staff to discuss priority legislation and coordination of efforts
Community Relations	Public Affairs Staff: • Met with Metropolitan Water District of Southern California to discuss virtual Girl Scout program partnership Governmental Affairs Staff: • Attended the ACC-OC Legislative Affairs Committee meeting • Attended the Association of Women in Water, Energy and Environment panel discussion on diversity in the workforce • Participated in the CSDA Professional Development Committee
Education	Public Affairs Staff: • Participated and presented at the Metropolitan Water District of Southern California Education Coordinator's Meeting • Attended the Department of Water Resources (DWR) Water Education Committee (WEC) Meeting • Participated in a California Environmental Literacy Leadership Council meeting • Met with DWR to discuss MWDOC's presentation on the Water Energy Education Alliance (WEEA) at the next WEC meeting • Met with Orange County Community Foundation (OCCF) to confirm a presentation of WEEA to the OCCF Workforce Development Initiative group • Met with Tomorrows Talent to discuss development of Memorandum of Understandings between school districts and utilities for CTE and other workforce pathway programs • Met with Ten Strands CTE working group to discuss integration of environmental literacy into Career Technical Education programs

	• Provided information to City of San Clemente, Santa Margarita Water District, Moulton Niguel Water District, Mesa Water, City of Brea, City of Santa Ana, City of Fullerton, and City of La Palma regarding MWDOC K-12 Choice School Programs • Provided Orange County STEM Initiative with information and resources regarding MWDOC K-12 Choice School Programs to share on their social media pages • Prepared and provided Director Nederhood with comparison of MWDOC K-12 Choice School Programs for FY 19-20 and 20-21
Media Relations	Public Affairs Staff: • Prepared and distributed content for social media • Met with Strategic Digital Communications contractor Hashtag Pinpoint to discuss social media and campaign strategies
Special Projects	Public Affairs Staff: • Participated in the Orange County Water Summit Committee Meeting with Orange County Water District and MWDOC Directors Yoo Schneider, Thomas, and Seckel • Launched submission opening for Water Awareness Poster Contest • Initiated preparations and logistics for the February 24th Virtual Water Policy Forum • Developed promotional resources for MWDOC and UC Master Gardeners partnership • Distributed February 2021 eCurrents • Completed over 300 updates to contact database • Updated Pressure Regulating Valve program marketing materials • Participated in Water Emergency Response Organization of Orange County tabletop exercise • Created content for special OC Register Sunday Water insert • Continued preparations for the budget • Participated in meeting with Directors Schneider, Nederhood and Seckel to discuss Communications Plan • Completed a Grant Management training course through Grant USA • Completed several website updates and created a new landing page for Education Initiatives • Confirmed a speaking opportunity for President Tamaribuchi to the Newport-Balboa Rotary Club • Attended Rowland Water District's 1st annual Community Forum Exploring Water Industry Careers Governmental Affairs Staff: • Staffed the ISDOC Quarterly Luncheon with guest speaker Sheriff Don Barnes

	• Staffed the ISDOC Executive Committee meeting • Prepared the ISDOC 2nd VP Call for Candidates notice • Staffed the monthly WACO meeting featuring guest speaker Eric Saperstein who provided a federal legislative update • Attended Virtual Statewide Supervisors Academy courses • Staffed the WACO Planning Committee meeting
Legislative Affairs	Governmental Affairs Staff: • Met with staff from Metropolitan to coordinate and begin scheduling meetings with legislative district staff • Participated in the ACWA COVID Relief and LIRA working group meeting (multiple meetings) • Participated in the Metropolitan Member Agency Legislative Coordinators meetings • Attended the CSDA Legislative Committee meeting • Participated in the Southern California Water Coalition Legislative Task Force meeting • Met with Metropolitan's Kathy Viatella regarding their sponsored legislation • Attended the CMUA Regulatory Committee meeting and the Legislative Committee meeting • Coordinated with IRWD staff in advance of the ACWA Region 10 State Legislative Committee pre-call • Along with MWDOC's federal advocates, met with staff from Congresswoman Young Kim's staff and Congresswoman Michelle Steel's staff • Participated in the ACWA State Legislative Committee meeting