MEETING OF THE BOARD OF DIRECTORS OF THE
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
Jointly with the
PLANNING & OPERATIONS COMMITTEE
May 3, 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. ADOPTION OF MWDOC'S 2020 URBAN WATER MANAGEMENT PLAN, WATER SHORTAGE CONTINGENCY PLAN, AND 2015 UWMP ADDENDUM (ALONG WITH PUBLIC HEARING INFORMATION)

2. LRP AGREEMENT BETWEEN METROPOLITAN, MWDOC, AND SANTA MARGARITA WATER DISTRICT FOR THE LAS FLORES RECYCLED WATER EXPANSION PROJECT

3. BOARD APPROVAL OF ON-CALL TECHNICAL SERVICES SLATE TO SUPPORT RELIABILITY PLANNING, ENGINEERING & RESOURCE DEVELOPMENT

DISCUSSION ITEMS

4. UPDATE ON COVID-19 (ORAL REPORT)

5. UPDATE REGARDING SMWD SAN JUAN WATERSHED PROJECT (ORAL REPORT)

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. SOUTH COAST WATER DISTRICT DOHENY OCEAN DESALINATION PROJECT UPDATE

7. OC-70 METER ACCURACY TESTING UPDATE

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

9. MWDOC CHOICE SCHOOL PROGRAMS UPDATE

10. 2021 OC WATER SUMMIT UPDATE

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
May 19, 2021

TO: Board of Directors

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

Robert Hunter, General Manager

Staff Contact: Harvey De La Torre
Alex Heide

SUBJECT: **ADOPTION OF MWDOC's 2020 URBAN WATER MANAGEMENT PLAN, WATER SHORTAGE CONTINGENCY PLAN, AND 2015 UWMP ADDENDUM (ALONG WITH PUBLIC HEARING INFORMATION)**

STAFF RECOMMENDATION

Staff recommends the Board of Directors:

- Open the public hearing (as noticed) at the MWDOC Board Meeting on May 19 regarding MWDOC's Proposed 2020 Urban Water Management Plan, MWDOC's proposed 2020 Water Shortage Contingency Plan, and Addendum to MWDOC's 2015 Urban Water Management Plan, to receive input from the public; and
- Adopt the following three (3) resolutions, in the general form presented, with amendments if necessary:
    1. Resolution adopting MWDOC's 2020 Urban Water Management Plan
    2. Resolution adopting MWDOC's 2020 Water Shortage Contingency Plan
    3. Resolution adopting an Addendum to the MWDOC 2015 Urban Water Management Plan

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

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

REPORT

Pursuant to the Urban Water Management Planning Act, each water supplier that is submitting an updated 2020 UWMP with the Department of Water Resources (DWR) must conduct a public hearing prior to adopting their UWMP. To comply with this requirement, MWDOC will hold its public hearing on May 19, 2021 on its proposed 2020 UWMP, 2020 WSCP, and 2015 Addendum. Based on the comments received from the public and the Board, staff will incorporate any changes as appropriate and recommend adoption of the UWMP.

As a wholesale water supplier to 28 member agencies in Orange County, MWDOC's role in preparing an UWMP is to provide projections of its service area's water supply and demands, water sources and uses, and demand management measures. Important elements of the UWMP include a demonstration of supply reliability under a normal year, single dry-year & five consecutive dry-years, water shortage contingency planning in the event of extended drought or catastrophic events, 20x2020 Orange County Regional Alliance calculation, and the emergency planning efforts of the Water Emergency Response Organization of Orange County (WEROC). MWDOC has also provided descriptions of current and proposed local resource projects such as desalination, recycling, and groundwater recovery within MWDOC's service area. Per our regional approach, each MWDOC member agency discusses their own projects, water demands, and supplies, in greater detail in their own UWMP.

As part of the new requirements of the 2020 UWMP, MWDOC has prepared a new Water Shortage Contingency Plan (WSCP) to address shortages of greater than 50%, match the State's six standard shortage levels, outline procedures for the Annual Water Supply & Demand Assessment, and quantify demand reduction actions that can be considered under shortage levels. Additionally, DWR has asked that each WSCP be a "stand-alone" document, so it can be updated outside of the regular UWMP planning cycle, if needed.

Lastly, in order to comply with Delta Stewardship Council (DSC) policy WR-P1, MWDOC has prepared a "Reduced Reliance on the Delta" report through improved regional self-reliance as described in Appendix C of the MWDOC 2020 UWMP. WR-P1 reporting was triggered through Metropolitan's anticipated participation in a Delta Conveyance Project. The reporting, which is required of Metropolitan, MWDOC, and most retail agencies, is to demonstrate consistency of a covered action, such as a Delta Conveyance Project or SWP transfer. Furthermore, Appendix C is also required to be addend to the 2015 UWMP to fully satisfy WR-P1 requirements.

During the review process of the Draft 2020 UWMP, MWDOC has received several comments from its member agencies and stakeholders. Summarized below are the comment letters we received along with their topic(s). MWDOC staff has reviewed each letter carefully and have worked with the respective authors/agencies to fully understand their comments, edits, and suggestions, in order to incorporate them in the UWMP where appropriate.

- IRWD Letter #1– Clarification of projects, programs, and activities related to IRWD, and clarification of demand projection language for MWDOC and the member agencies.
- OCWD Letter #1 – Updated information regarding the OC Groundwater Basin section of the UWMP, BPP projections, and future groundwater projects.

- OCWD Letter #2 – Consideration of Huntington Beach Desalination in the UWMP tables, and additional language related to the project.
- IRWD Letter #2 – Inclusion of updated population figures for a service area boundary adjustment.
- SCAG Letter – Consideration to include the March 2021, 6th cycle Regional Housing Needs Assessment (RHNA) allocation for Orange County and MWDOC's service area.

It should be noted that MWDOC staff met with SCAG staff to ensure that their suggestion of incorporating the 6th RHNA cycle was appropriately understood, researched, and analyzed. In discussions with SCAG staff, CDR, and Metropolitan, MWDOC finds that the RHNA has been appropriately addressed in the 2020 UWMP. Moreover all parties understand the MWDOC's 2020 UWMP includes the most complete and update information available for projecting water demands.

Therefore, attached for your consideration is the final draft version of MWDOC's 2020 UWMP, MWDOC's 2020 WSCP, and Appendix C. All of these documents has been sent to our member agencies, Metropolitan, and cities within our service area. We have also placed them and all related documents on MWDOC's website for review.

BOARD OPTIONS

Option #1:

- Open the public hearing (as noticed) at the MWDOC Board Meeting on May 19 regarding MWDOC's Proposed 2020 Urban Water Management Plan, MWDOC's proposed 2020 Water Shortage Contingency Plan, and Addendum to MWDOC's 2015 Urban Water Management Plan, to receive input from the public; and
- Adopt the following three (3) resolutions, in the general form presented, with amendments if necessary:
    1. Resolution adopting MWDOC's 2020 Urban Water Management Plan
    2. Resolution adopting MWDOC's 2020 Water Shortage Contingency Plan
    3. Resolution adopting an Addendum to the MWDOC 2015 Urban Water Management Plan

Fiscal Impact: No fiscal impact
Business Analysis: Adoption of the MWDOC 2020 UWMP, MWDOC 2020 WSCP, and Addendum to the MWDOC 2015 UWMP will allow MWDOC to meet the DWR submittal deadline of July 1, 2021; as well as assist our member agencies to complete and submit their respective UWMPs to DWR.

Option #2:

- Defer the Public Hearing and Adoption of the MWDOC 2020 UWMP, MWDOC 2020 WSCP, and Addendum to the MWDOC 2015 UWMP to June 16.

Fiscal Impact: Depending on the reasons for the deferral, there could be additional funds needed to have MWDOC's consultants revise, edit and change various tables

and sections of the UWMP. In addition, there could be fiscal impacts to our member agencies, depending on the changes/edits.

Business Analysis: Deferring the Public Hearing or Adoption of the UWMP, WSCP and/or Addendum could delay MWDOC's, as well as our member agencies, submittal to DWR by the required July 1, 2021 deadline.

STAFF RECOMMENDATION

Option #1

Attachments:

1. Resolution adopting MWDOC's 2020 Urban Water Management Plan
2. Resolution adopting MWDOC's 2020 Water Shortage Contingency Plan
3. Resolution adopting an Addendum to the MWDOC 2015 Urban Water Management Plan
4. 2020 UWMP Comment Letters received by MWDOC and respective responses
5. May 3, 2021 P&O PowerPoint Presentation
6. Proposed MWDOC 2020 Urban Water Management Plan
7. Proposed MWDOC 2020 Water Shortage Contingency Plan
8. Proposed MWDOC 2015 Addendum - Appendix C to the 2020 UWMP
9. Links to 2020 UWMP & 2020 WSCP Appendices

RESOLUTION NO. _____

**RESOLUTION OF THE BOARD OF DIRECTORS OF
THE MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
ADOPTING THE
2020 URBAN WATER MANAGEMENT PLAN**

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually prepare and adopt, in accordance with prescribed requirements, an urban water management plan (UWMP) every five years; and

WHEREAS, the California Urban Water Management Planning Act specifics the requirements and procedures for adopting such UWMPs; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on May 19, 2021 at 8:30, or soon thereafter, via Zoom (webinar ID: **882 866 5300**) in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the UWMP and issues related thereto; and

WHEREAS, pursuant to said public hearing on MWDOC's UWMP, MWDOC, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within MWDOC's service area with regard to the WSCP, and encouraged community input regarding MWDOC's WSCP; and

WHEREAS, the Board of Directors of the Municipal Water District of Orange County has duly reviewed, discussed, and considered such Urban Water Management Plan and has determined the 2020 Urban Water Management Plan to be consistent with the California Urban Water Management Planning Act and to be an accurate representation of the water resource plan for the Municipal Water District of Orange County.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Municipal Water District of Orange County that, on May 19, 2021 this District hereby adopts this 2020 Urban Water Management Plan for submittal to the state of California.

Said Resolution was adopted, on roll call, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

I hereby certify that the foregoing is a true and correct copy of Resolution No. _____adopted by the Board of Directors of Municipal Water District of Orange County at its meeting held on May 19, 2021.

ATTEST:

_____

Maribeth Goldsby, Secretary
Municipal Water District of Orange County

RESOLUTION NO. _____

RESOLUTION OF THE MUNICIPAL WATER DISTRICT OF ORANGE COUNTY ADOPTING A WATER SHORTAGE CONTINGENCY PLAN (WSCP)

WHEREAS, The California Urban Water Management Planning Act, (Wat. Code §10610, et seq. (the Act)), mandates that every urban supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt, in accordance with prescribed requirements, a Water Shortage Contingency Plan (WSCP) as part of its Urban Water Management Plan (Plan); and

WHEREAS, the Act specifies the requirements and procedures for adopting such WSCPs; and

WHEREAS, pursuant to recent amendments to the Act, urban water suppliers are required to adopt and electronically submit their WSCPs to the California Department of Water Resources (DWR) by July 1, 2021; and

WHEREAS, pursuant to the Act, "urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers; and

WHEREAS, the Municipal Water District of Orange County (MWDOC) meets the definition of an urban water supplier for purposes of the Act and is required to prepare and adopt and WSCP as part of its 2020 Plan; and

WHEREAS, MWDOC has prepared a WSCP in accordance with the Act, and in accordance with applicable legal requirements, has undertaken certain coordination, notice, public involvement, public comment, and other procedures in relation to its WSCP; and

WHEREAS, in accordance with the Act, MWDOC has prepared its WSCP with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its WSCP, and has also utilized DWR's Urban Water Management Plan Guidebook 2020, including its related appendices, in preparing its WSCP; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding MWDOC's WSCP was published within the jurisdiction of MWDOC on May 3, 2021 and May 10, 2021; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on May 19, 2021 at 8:30, or soon thereafter, via Zoom (webinar ID: **882 866 5300**) in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the WSCP and issues related thereto; and

WHEREAS, pursuant to said public hearing on MWDOC's WSCP, MWDOC, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community

within MWDOC's service area with regard to the WSCP, and encouraged community input regarding MWDOC's WSCP; and

WHEREAS, the Board of Directors has reviewed and considered the purposes and requirements of the Act, the contents of the WSCP, and the documentation contained in the administrative record in support of the WSCP, and has determined that the factual analyses and conclusions set forth in the WSCP are legally sufficient; and

WHEREAS, the Board of Directors desires to adopt the WSCP and to incorporate it as part of its 2020 Plan prior to July 1, 2021 in order to comply with the Act.

WHEREAS, Section 10652 of the California Water Code provides that the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) (CEQA) does not apply to the preparation and adoption of a WSCP as part of Plan pursuant to California Water Code section 10632.

NOW THEREFORE BE IT RESOLVED, the Board of Directors of MWDOC hereby resolves as follows:

1. The Water Shortage Contingency Plan (WSCP) is hereby adopted as amended by changes incorporated by the Board of Directors as a result of input received (if any) at the public hearing and ordered filed with the Secretary of the Board of Directors and shall be incorporated into MWDOC's 2020 Plan;

2. The General Manager is hereby authorized and directed to include a copy of this Resolution in MWDOC's WSCP and/or in MWDOC's 2020 Plan;

3. The General Manager is hereby authorized and directed, in accordance with Water Code sections 10621(d) and 10644(a)(1)-(2), to electronically submit a copy of the WSCP, as part of its 2020 Plan, to DWR no later than July 1, 2021;

4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10644(a), to submit a copy of the WSCP, as part of its 2020 Plan, to the California State Library, and to any city or county within which MWDOC provides water supplies no later than thirty (30) days after this adoption date;

5. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the WSCP available for public review at MWDOC's offices during normal business hours and on its website at www.mwdoc.com no later than thirty (30) days after filing a copy of the WSCP, as part of its 2020 Plan, with DWR;

6. The General Manager is hereby authorized and directed to implement the WSCP in accordance with the Act and to provide recommendations to the Board of Directors regarding the necessary budgets, procedures, rules, regulations, or further actions to carry out the effective and equitable implementation of the WSCP.

7. Board of Directors finds and determines that this resolution is not subject to CEQA pursuant to Water Code Section 10652 because CEQA does not apply to the preparation and adoption of a WSCP

or to the implementation of the actions taken pursuant to such plans. Because this resolution comprises Board of Director's adoption of its WSCP and involves its implementation, no CEQA review is required.

8. The document and materials that constitute the record of proceedings on which this resolution and the above findings have been based are located at 18700 Ward Street, Fountain Valley, CA 92708. The custodian for these records is the Board Secretary.

Said Resolution was adopted, on roll call, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

I hereby certify that the foregoing is a true and correct copy of Resolution No. _____adopted by the Board of Directors of Municipal Water District of Orange County at its meeting held on May 19, 2021.

ATTEST:

_____
Maribeth Goldsby, Secretary
Municipal Water District of Orange County

RESOLUTION NO. _____

RESOLUTION OF THE MUNICIPAL WATER DISTRICT OF ORANGE COUNTY ADOPTING AN ADDENDUM TO THE 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, The California Urban Water Management Planning Act, (Wat. Code §10610, et seq. (the Act)), mandates that every urban supplier of water providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare an Urban Water Management Plan (Plan); and

WHEREAS, the Act generally requires that said Plan be updated and adopted at least once every five years on or before July 1, in years ending in six and one; and

WHEREAS, pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code § 85000, et seq.), the Delta Plan, and Water Code section 85021, which declares that the State's policy is to "reduce reliance on the Delta in meeting California's future water needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency," urban water suppliers are encouraged by the California Department of Resources (DWR) and the Delta Stewardship Council (DSC) to consider adopting an Addendum to their 2015 Plans to demonstrate consistency with the Delta Plan Policy WR P1 to Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003); and

WHEREAS, the Municipal Water District of Orange County (MWDOC) meets the definition of an urban retail water supplier for purposes of the Act; and

WHEREAS, MWDOC has prepared an Addendum to its 2015 Plan in accordance with Delta Plan Policy WR P1, and in accordance with applicable legal requirements, has undertaken certain coordination, notice, public involvement, public comment, and other procedures in relation to its Addendum; and

WHEREAS, in accordance with the Act and Delta Plan Policy WR P1, MWDOC has prepared its Addendum to the 2015 Plan with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its Addendum to its 2015 Plan, and has also utilized DWR's Urban Water Management Plan Guidebook 2020, including its related appendices, in preparing its Addendum to the 2015 Plan; and

WHEREAS, in accordance with applicable law, including Water Code section 10642, and Government Code section 6066, a Notice of a Public Hearing regarding MWDOC's Addendum to the 2015 Plan was published within the jurisdiction of MWDOC on May 3, 2021, and May 10, 2021; and

WHEREAS, in accordance with applicable law, including but not limited to Water Code section 10642, a public hearing was held on May 19, 2021 at 8:30, or soon thereafter, via Zoom (webinar ID: **882 866 5300**) in order to provide members of the public and other interested entities with the opportunity to be heard in connection with proposed adoption of the Addendum to the 2015 Plan and issues related thereto; and

WHEREAS, pursuant to said public hearing on MWDOC's Addendum to the 2015 Plan, MWDOC, among other things, encouraged the active involvement of diverse social, cultural, and economic members of the community within MWDOC's service area with regard to the Addendum to the 2015 Plan and encouraged community input regarding MWDOC's Addendum to the 2015 Plan; and

WHEREAS, the Board of Directors has reviewed and considered the purposes and requirements of the Act and Delta Plan Policy WR P1, the contents of the Addendum to the 2015 Plan, and the documentation contained in

the administrative record in support of the Addendum to the 2015 Plan, and has determined that the factual analyses and conclusions set forth in the Addendum to the 2015 Plan are legally sufficient; and

WHEREAS, the Board of Directors desires to adopt the Addendum to the 2015 Plan prior to July 1, 2021 in order to comply with the Act and Delta Plan Policy WR P1.

WHEREAS, Section 10652 of the California Water Code provides that the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) (CEQA) does not apply to the preparation and adoption, including addenda thereto, of urban water management plans pursuant to this part.

NOW THEREFORE BE IT RESOLVED, the Board of Directors of MWDOC hereby resolves as follows:

1. The Addendum to MWDOC's 2015 Urban Water Management Plan to demonstrate consistency with the Delta Plan Policy to Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance is hereby adopted as amended by changes incorporated by the Board of Directors as a result of input received (if any) at the public hearing and ordered filed with the Secretary of the Board of Directors;

2. The General Manager is hereby authorized and directed to include a copy of this Resolution in MWDOC's 2015 Plan Addendum;

3. The General Manager is hereby authorized and directed, in accordance with Water Code sections 10621(d) and 10644(a)(1)-(2), to electronically submit a copy of the Addendum to the 2015 Plan to DWR no later than July 1, 2021;

4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10644(a), to submit a copy of the Addendum to the 2015 Plan to the California State Library, and to any city or county within which MWDOC provides water supplies no later than thirty (30) days after this adoption date;

5. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the Addendum to the 2015 Plan available for public review at MWDOC's offices during normal business hours and on its website at www.mwdoc.com no later than thirty (30) days after filing a copy of the Addendum to the 2015 Plan with DWR.

6. MWDOC finds and determines that this resolution is not subject to CEQA pursuant to Water Code Section 10652 because CEQA does not apply to the preparation and adoption, including addenda thereto, of an urban water management plan or to the implementation of the actions taken pursuant to such plans. Because this resolution comprises MWDOC's adoption of its Addendum to the 2015 Plan and involves its implementation, no CEQA review is required.

7. The document and materials that constitute the record of proceedings on which this resolution and the above findings have been based are located at 18700 Ward Street, Fountain Valley, CA 92708. The custodian for these records is the Board Secretary.

Said Resolution was adopted, on roll call, by the following vote:

AYES:
NOES:
ABSENT:
ABSTAIN:

I hereby certify that the foregoing is a true and correct copy of Resolution No. _____adopted by the Board of Directors of Municipal Water District of Orange County at its meeting held on May 19, 2021.

ATTEST:

_____

Maribeth Goldsby, Secretary
Municipal Water District of Orange County

March 26, 2021

Mr. Robert J. Hunter
General Manager
Municipal Water District of Orange County
18700 Ward Street
Fountain Valley CA 92708

SUBJECT: MWDOC 2020 Urban Water Management Plan Draft Comments

Dear Mr. Hunter:

The Orange County Water District (OCWD) would like to provide comments on the Municipal Water District of Orange County (MWDOC) 2020 Urban Water Management Plan Draft and asks that these comments be included in the release of the draft document for public comment. Our comments are as follows:

1. Page 1-1 - Change the second sentence in the second paragraph to read "…MWDOC has been assisting its member agencies to manage both their water supplies and demands."
2. Page 2-3 – Change the first sentence in the fourth bullet to read "…the primary source of groundwater for 19 retail water suppliers in OC."
3. Page 2-4 – Change the first sentence in the second paragraph to read "As the local wholesale supplier of imported water, MWDOC represents the interests of all but three OC retail water suppliers at MET…"
4. Page 3-5 – In the second paragraph you state that over 45 years your programs have reached nearly 3,000,000 students. Could you clarify how you arrived at that number?
5. Page 4-1 – Change the first sentence in the first paragraph to read "…insight into MWDOC's member agencies future water demands…"
6. Page 4-2 – Change the first sentence in the third paragraph to read "…33.4% of MWDOC's member agencies total water use."
7. Page 4-2 - Change the first sentence in the fourth paragraph to read "… methodology, MWDOC's member agencies total water demands (by source) for the next 25 years are also shown in table 4-1. By 2045, total water demands are projected…"
8. Page 4-3 – Are the values in the first row of Table 4-1 based on the latest estimate from OCWD?
9. Page 4-4 – Change the second sentence in the first paragraph of Section 4.2.1 to read "…percent of MWDOC's member agencies total demands."

10. Page 4-6 – Change the first sentence in the first paragraph of Section 4.3.1 to read “In 2021, MWDOC & OCWD, in collaboration with their member agencies, led the effort…”
11. Page 6-1 – Change the first sentence in the first paragraph to read “…MWDOC’s water supply along with a description of the groundwater, wastewater and recycled water provided by other agencies.”
12. Page 6-2 – Change the title of Figure 6-1 to “2019-2020 WATER SUPPLY SOURCES”
13. Page 6-3 – Change the second sentence in the second paragraph to read “…discussion of the water supply sources in MWDOC’s service area, as well as evaluate…”
14. Page 6-27 – Change the number in the first sentence of the first paragraph from 285,000 to 286,550
15. Page 6-27 – Delete the first sentence of the third paragraph. The OC Basin was not required to submit a GSP
16. Page 6-27 – Change the number in the last sentence of the last paragraph from 82% to 77%
17. Page 6-29 – Change the second sentence in the first paragraph to read “…OCWD exempts a portion of the BEA for their…”
18. Page 6-29 – Change the last sentence in the first paragraph to read “…without having to pay the full BEA for the amount…”
19. Page 6-29 – Add the following sentence to the end of the first paragraph “Coastal pumpers receive BEA revenue from OCWD to assist in offsetting their additional water supply cost from taking less groundwater.”
20. Page 6-29 – Change the number in the third sentence of the fourth paragraph from 82% to 77%
21. Page 6-29 – Change the second sentence in the last paragraph to read “recharged in the Kraemer, Miller, Miraloma and La Palma Basins.”
22. Page 6-40 – In Section 6.3.2.5 you did not include the IRWD Wells 21 & 22 Project
23. Page 6-42 – Change the first sentence in the fifth paragraph to read “In FY 2019-20, two percent of the water supply in MWDOC’s service area was attributed to…”
24. Page 6-43 – Change the last sentence in the third paragraph to read “…published in 2021 and OCWD anticipates that the Prado Dam Water Control Manual will be updated by the US Army Corps of Engineers in 2021 to include stormwater capture to elevation 505 feet year round.”
25. Page 6-43 – Change the last sentence in the last paragraph to read “…as well as MWDOC’s member agencies projected recycled…”
26. Page 6-45 – Change the last sentence in the fourth paragraph to read “The treatment process is described on OCWD’s website.”
27. Page 6-45 – Change the number in the third sentence of the fifth paragraph from 72% to 77%.

28. Page 6-51 – Delete the first paragraph on the OCWD Groundwater Replenishment System Expansion. OCWD is in the process of constructing its final expansion and in doing so will be at its ultimate capacity and recycling 100% of OC San's recyclable wastewater.
29. Page 6-54 – Change the first sentence in the third paragraph of Section 6.8.1.2 to read "…success in accessing water in the OC Basin…"
30. Page 6-55 – In Section 6.8.2 the MWRF Expansion project really doesn't fit the classification of a desalter and you have omitted the IRWD Wells 21 & 22 Project
31. Page 7-6 – Change the number in the first sentence of the fourth paragraph from 285,000 to 286,550

Thank you for consideration of these comments.

Sincerely,

Michael R. Markus, P.E., D.WRE, BCEE, F.ASCE
General Manager

Cc: Harvey De La Torre, MWDOC
John Kennedy, OCWD
Greg Woodside, OCWD

MWDOC

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April 2, 2021

Mr. Michael R. Markus
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley CA 92708

Re: OCWD's Comment Letter on MWDOC's 2020 Draft Urban Water Management Plan

Dear Mr. Markus:

Thank you for providing us your March 26 comment letter on our Internal Draft 2020 Urban Water Management Plan (UWMP). We have carefully reviewed each comment and incorporated them into our April Draft UWMP, where appropriate.

Also in your letter there were two questions (4 & 8) that we have addressed below:

4. *Page 3-5 – In the second paragraph you state that over 45 years your programs have reached nearly 3,000,000 students. Could you clarify how you arrived at that number?*

   Answer: Based on our records, this amount was determined based on reaching out to an average of 65,000 Orange County students each year over a 48-year period.

8. *Page 4-3 – Are the values in the first row of Table 4-1 based on the latest estimate from OCWD?*

   Answer: Yes, these projections incorporate information from the most recent OCWD estimates. These projections are based upon information from the CDM Smith demand forecast and BPP assumptions provided by OCWD Staff.

Again, thank you for your comments and questions, they are very useful in helping us finalizing our UWMP for Board adoption in May.

Should you have any questions, you can contact Harvey De La Torre at (714) 593-5027 or me at (714) 593-5026.

Sincerely,

Robert J. Hunter
General Manager

cc: John Kennedy,
Greg Woodside
Harvey De La Torre

Attachment: OCWD March 26, 2021, Draft UWMP Comment Letter

Irvine Ranch
WATER DISTRICT

April 8, 2021

Harvey De La Torre
Assistant General Manager
Municipal Water District of Orange County
P.O. Box 20895
Fountain Valley, CA 92724

Subject: MWDOC 2020 UWMP Internal Draft – IRWD Comments

Irvine Ranch Water District (IRWD) appreciates the opportunity to review and provide comments on MWDOC's Internal Draft Urban Water Management Plan (UWMP). During the Urban Water Management Plan (UWMP) 2020 planning process we have appreciated MWDOC's efforts to coordinate data exchanges and consistency of information with IRWD. IRWD understands that a Public Review Draft was made available on April 5, 2021 and that some of these points may have already been addressed in the Public Review Draft.

IRWD respectfully submits the following comments for your consideration:

- Due to different methodologies used, IRWD recommends that a general statement be included in the MWDOC UWMP that to the extent where differences exist between MWDOC's UWMP and a retail supplier's UWMP, the retail supplier's UWMP (e.g., forecasts, projections, etc.) takes precedence. Furthermore, in section 4.3.1, IRWD recommends adding another comment noting that the methodology used by individual retailers to develop their demand projections may be different.

- In instances where differences may exist between retailers' UWMP process and responsibilities, IRWD recommends noting these exceptions. For example, IRWD manages its own water loss and SB 555 compliance (2.2.2). While IRWD is participating in the Regional Alliance it is calculating its own individual target and compliance. IRWD has also prepared its own Water Shortage Contingency Plan (WSCP).

- For the WSCP, Table 8-1, there is some confusion regarding how the levels and actions are aligned with individual retailers who may not be at the same level of drought declaration based on their own reliability and drought assessment. This messaging could be confusing to customers of the retail suppliers. This applies to shortage levels 3 and up.

- We recommend the following clarifications regarding Irvine Lake supplies. In section 4.2.2, the surface water should be specified as "imported." In the description between Table 4-4 and 4-5, it should be noted that untreated imported water is purchased for Irvine Lake by IRWD and Serrano Water District. IRWD uses this supply to supplement its recycled water system and is a non-potable use. It is also a supply to the Baker Plan which ultimately is treated for potable use. Serrano Water District uses this supply in its surface water treatment plan and is considered

potable use. IRWD's share of native runoff in Irvine Lake can supplement the Baker Water Treatment Plant and is considered potable use.

- Regarding SBX7-7 and related materials, due to the forthcoming adjustment in population related to the Tustin boundary, IRWD's values for population and water use calculations will change (and would expect that Tustin's will also change). Table 5-2 may need to be adjusted for both the 2015 and 2020 population values. The 2015 actual GPCD of 125 is not shown in the Table 5-3 as the description indicates. IRWD suggests that MWDOC may wish to clarify this or reference the actual 2020 table values as well. In addition, IRWD's 20X2020 individual Target for 2020 is 171 (not 170 as listed in the associated charts, Table 5-2).

- In Figure 6-2 IRWD's logo should be updated with the attached current version.

- In section 6.3.1.3, the definition of the Basin Production Percentage (BPP) seems to be incomplete. IRWD recommends rewording the language to better define the BPP.

- IRWD also offers a few additional notes on projects in chapter 6. Regarding the IRWD Michelson Water Recycling Plant (6.6), if there is limited recycled water demand or storage capacity the effluent may be diverted first to Orange County Water District's Green Acres Project or to Orange County Sanitation District (OCSD). The Groundwater Desalination section (6.8) appears to be missing some IRWD projects. IRWD recommends clarifying the differences between the impaired groundwater and groundwater desalination sections. Some projects remove salts as well as nitrates and other contaminants. The distinctions between how the projects are classified is not clear.

- The IRWD Strand Ranch Water Banking Program (6.9) should be updated to the "Strand and Stockdale Integrated Water Banking Projects". The description only references Strand and should be updated to include Stockdale. The value of 50,000 AF should be updated to reflect that "*IRWD can store up to 126,000AF in the water bank and recover up to approximately 29,000 AF in any single year*." Recommended language changes for this section have been provided, please see attached.

Thank you for allowing IRWD to review and comment on MWDOC's Internal Draft UWMP. Please do not hesitate to contact me at sanchezf@irwd.com if you have any questions on these comments or need additional information. IRWD plans to also review MWDOC's Public Review Draft including the final draft Appendices, and if we have further comments related to MWDOC's Public Draft, will prepare a separate comment letter.

Sincerely,

Fiona M. Sanchez
Director of Water Resourc

MWDOC

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April 16, 2021

Ms. Fiona M. Sanchez
Director of Water Resources
Irvine Ranch Water District
15600 Sand Canyon Ave.
Irvine, CA 92618

Re: MWDOC 2020 UWMP Internal Draft – IRWD Comments

Dear Ms. Sanchez:

Thank you for providing us your April 8 comment letter on our Internal Draft 2020 Urban Water Management Plan (UWMP). We have carefully reviewed each comment with revisions to be reflected in our Final UWMP, where appropriate.

Your comments are very useful in helping us finalizing our UWMP for the Public Hearing and Board adoption in May. We may contact you or your staff if we have any questions on your comments.

Again, thank you for your letter. Should you have any further comments or questions, you can contact me directly at (714) 593-5027

Sincerely,

Harvey De La Torre
Assistant General Manager

cc: Robert Hunter
Alex Heide

Attachment: IRWD 2020 UWMP Internal Draft Comment Letter

ORANGE COUNTY WATER DISTRICT
ORANGE COUNTY'S GROUNDWATER AUTHORITY

April 15, 2021

Via electronic mail: rhunter@mwdoc.com

Rob Hunter
General Manager
Municipal Water District of Orange County
18700 Ward Street
Fountain Valley CA 92708

SUBJECT: Municipal Water District of Orange County 2020 Draft Urban Water Management Plan

Dear Mr. Hunter:

The Orange County Water District (OCWD) would like to provide additional comments on the Municipal Water District of Orange County (MWDOC) 2020 Draft Urban Water Management Plan (2020 Draft UWMP) and asks that consideration of these comments be reflected in the final draft document scheduled to be issued in May.

As you are aware, OCWD's 2015 Groundwater Management Plan identifies the proposed Project as a planned future water supply capable of providing up to 56,000-acre feet per year (50 MGD) of new supply, and the OCWD Board of Directors approved a term sheet in 2018 to guide future negotiations for the purchase of the Project's maximum capacity. The project will also be included in the District's 2021 Groundwater Reliability Plan which is currently being prepared. Poseidon Water anticipates that the facility could achieve its first full year of operation as early as 2027 assuming necessary permits and project approvals are obtained in the next 12 months. This projected operational date should be identified in the MWDOC Final 2020 UWMP.

Furthermore, the Draft UWMP could benefit from more clarity as it pertains to the Huntington Beach Desalination Project's identification as a planned future water supply. Specifically, MWDOC's Draft UWMP section 6-53 states:

> *Under guidance provided by DWR, the Huntington Beach Seawater Desalination Plant's projected water supplies are not included in Table 6-2 due to its current status within the criteria established by State guidelines (DWR, 2020c).*

First, the reference to MWDOC UWMP Table 6-2 appears to be a typographical error as this table appears to be limited to imported wholesale water supplies from the Metropolitan Water District (MET). Second, the DWR 2020c citation referencing state guidelines refers to the Department of Water Resources Urban Water Management Plan Guidebook 2020, 6-36, which states:

Recommended

It is recommended that Suppliers indicate the level to which desalination is being considered by describing whether each potential desalination source is: (a) conceptual in nature, (b) likely to be developed, (c) almost certainly to be developed, or (d) in the process of being developed or in use at this time. The information included in Submittal Tables 6-8 and 6-9 and the optional Planning Tool Supply Worksheet should only be if it falls under categories (c) or (d), but Suppliers may choose to include less firm desalination opportunities in their narratives.

Consultation with DWR staff indicates that the meaning of the word "develop" was intended using the standard definition as defined by Merriam-Webster.[1] The Project is in the late stages of development and has been in the state's permitting process for almost twenty years. As such, the Project has secured property development rights and various local and state permits and approvals including, but not limited to, a Local Coastal Development Permit, Conditional Use Permit, California Environmental Quality Act certification, a National Pollutant Discharge Elimination System Permit from the Santa Ana Regional Water Quality Control Board and a land lease with the California State Lands Commission. The Project also has developed cost estimates, facility Engineering, Procurement and Construction bids, an invitation from the US EPA to apply for up to $585 million in credit assistance under the Water Infrastructure Finance and Innovation Act, and a MET Local Resource Program application jointly submitted to MET in 2013 by all four of Orange County's MWD member agencies – MWDOC and the cities of Anaheim, Fullerton and Santa Ana, and subsequently updated in October 2015 by MWDOC. In fact, the development of the Huntington Beach Desalination Project could be the most mature of any seawater desalination project in the state of California.

In sum, the Project clearly meets the state's definition of "developed" and should fall under DWR Guidebook guidance criterion *(d) in the process of being developed* and therefore should be specifically identified in relevant UWMP tables reflecting that it is a planned future water supply capable of providing a new sources of regional water supply within the 2020 UWMPs 25-year planning horizon.

Thank you for consideration of these comments.

Sincerely,

Michael R. Markus, P.E., D.WRE, BCEE, F.ASCE
General Manager

cc: Harvey De La Torre, MWDOC
John Kennedy, OCWD
Scott Maloni, Poseidon Water
OCWD Board of Directors

[1] April 8, 2021 email from DWR staff to Poseidon Water Vice President Scott Maloni. Merriam-Webster defines "develop" as **a:** to work out the possibilities of //*develop* an idea **b:** to create or produce especially by deliberate effort over time.

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April 20, 2021

Mr. Michael R. Markus
General Manager
Orange County Water District
18700 Ward Street
Fountain Valley, CA 92708

Re: OCWD's Comment Letter #2 on MWDOC's 2020 Draft Urban Water Management Plan

Dear Mr. Markus:

Thank you for providing us your April 15 comment letter on our 2020 Draft Urban Water Management Plan (UWMP). We have carefully reviewed your comments and suggestions regarding our description of the proposed Huntington Beach Poseidon Ocean Desalination Plant (Poseidon HB Project).

Per your suggestion, we will incorporate the following in our upcoming final draft:

- Poseidon's estimated operational date of 2027, assuming all necessary permits and project approvals are obtained; and
- Reflecting that an updated non-binding term sheet between OCWD and Poseidon was developed in 2018; and
- Correction to the reference of MWDOC's UWMP Table 4-1 (instead of Table 6-2).

While we agree the proposed Poseidon HB Project has made progress since our previous 2015 UWMP, the project still has not secured all of its necessary permits, financial and operational agreements, nor the Metropolitan Local Resource Program (LRP) agreement. Without these essential milestones achieved, it is difficult to categorize this project as *"(c) almost certainly to be developed, or (d) in the process of being developed or in use at this time."* For these reasons, we do not quantify this project's supply in our UWMP's Table 4-1[1] planned projections. This is consistent with how the Doheny Desalination Project in Dana Point is addressed as well.

Again, thank you for your comments, they are very useful in helping us finalizing our UWMP for the Public Hearing and Board adoption in May.

Should you have any questions, you can contact me directly at (714) 593-5026.

Sincerely,

Robert J. Hunter
General Manager

[1] Of note, this is for projections in Table 4-1, *MWDOC Service Area Water Supply Projections* (4-3) and Appendix B, *DWR Submittal Table 6-9 Wholesale: Water Supplies — Projected (B-14).*

cc: MWDOC Board of Directors
OCWD Board of Directors
John Kennedy, OCWD
Greg Woodside, OCWD
Harvey De La Torre, MWDOC
Brad Coffey, MWD
Scott Maloni, Poseidon Water

Attachment: OCWD April 15, 2021, MWDOC 2020 Draft UWMP

Irvine Ranch
WATER DISTRICT

April 23, 2021

Harvey De La Torre
Assistant General Manager
Municipal Water District of Orange County
P.O. Box 20895
Fountain Valley, CA 92724

Subject: MWDOC 2020 UWMP Public Draft – IRWD Comments

Irvine Ranch Water District (IRWD) appreciates the opportunity to review and provide comments on MWDOC's Public Draft Urban Water Management Plan (Public Draft). During the Urban Water Management Plan (UWMP) 2020 planning process we have appreciated MWDOC's efforts and the responsiveness of MWDOC staff to coordinate data exchanges and consistency of information with IRWD. IRWD offers the following comment on MWDOC's Public Draft:

- As MWDOC is aware, adjustments to the populations of IRWD (and City of Tustin) were made available by the Center for Demographic Research after the release of the Public Draft. Those adjustments should be reflected in the SBX 7-7 calculations, specifically Table 5-2 in MWDOC's Draft Final Plan.

IRWD previously submitted comments on MWDOC's Internal Draft on April 8, 2021. IRWD is aware that MWDOC's Public Review Draft was made available prior to MWDOC's receipt of those comments and appreciates that MWDOC is working to address them in its Draft Final Plan.

Thank you for allowing IRWD the opportunity to review and comment on MWDOC's Draft UWMP and Appendixes. IRWD appreciates the continued coordination between our two agencies in preparing these documents. Please do not hesitate to contact me at sanchezf@irwd.com if you have any questions on these comments or need additional information.

Sincerely,

Fiona M. Sanchez
Director of Water Resources

SCAG
INNOVATING FOR A BETTER TOMORROW

SOUTHERN CALIFORNIA
ASSOCIATION OF GOVERNMENTS
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April 23, 2021

The Honorable Satoru "Sat" Tamaribuchi
President, Municipal Water District of Orange County
18700 Ward Street
Fountain Valley, CA 92708

RE: 2020 Urban Water Management Plan – Regional Housing Needs Assessment Considerations

Dear President Tamaribuchi:

We understand that the Municipal Water District of Orange County (MWDOC) is preparing the agency's 2020 Urban Water Management Plan (UWMP), a document required by the State of California to be submitted to the Department of Water Resources (DWR) at least once every five years. The UWMP's purpose, as detailed in a recent presentation to the MWDOC Planning & Operations Committee, is to analyze and plan for housing and population growth, and related water demand, within MWDOC's service area encompassing 28 water providers in 31 of the 34 cities in Orange County (all Orange County cities except Anaheim, Fullerton, and Santa Ana).

The State's Department of Housing and Community Development (HCD) is focused on ensuring that cities and counties statewide plan for the range of housing that meets the varied needs of all Californians. As part of that process, every eight years, HCD develops a regional determination of housing need, also known as the Regional Housing Needs Assessment (RHNA), for various regions of the state. The Southern California Association of Governments (SCAG) is responsible for developing a RHNA allocation plan for its six-county area, which includes Orange County, based on this regional determination. Cities and counties use the RHNA allocation to update their individual Housing Element to ascertain how and where they will attempt to address the requisite needs for both affordable and market-rate housing within their jurisdictions.

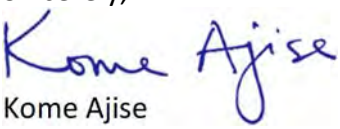
After a multi-year public process that included robust stakeholder engagement, SCAG adopted its final version of the most recent eight-year RHNA allocation plan on March 4, 2021, which HCD approved on March 22, 2021. The adopted RHNA allocation for Orange County's 34 cities and unincorporated territory is 183,861 new housing units over the

next eight years. The total adjusted number for MWDOC's service area (excluding the cities of Anaheim, Fullerton, and Santa Ana) is 150,104 new housing units over the next eight years. The RHNA allocation represents housing units needed to reduce overcrowding and accommodate not only people currently living in the SCAG region but future growth over the next eight years as well. The adopted plan for the SCAG region may be viewed by clicking here.

As MWDOC finalizes its draft 2020 UWMP, SCAG urges that you consider the RHNA allocations for the respective jurisdictions within MWDOC's service area in your water demand projections over the next eight to ten years. California's housing crisis is genuine, and it will require the full commitment of every city and county to not only plan for the units that are desperately needed but also to be part of our consolidated plan required for California to receive millions of federal dollars for housing and community development.

Thank you very much for the opportunity to provide these comments for your consideration. Please feel free to reach out to me if I may answer any questions or provide additional information.

Sincerely,



Kome Ajise
Executive Director

MWDOC's 2020 Final UWMP, WSCP, and 2015 Addendum

Municipal Water District of Orange County

Planning and Operations: May 3, 2021

Final Draft Changes

- 2020 UWMP
  - Updated Groundwater Replenishment information from OCWD.
  - Changes to reflect Member Agency comments
- 2020 WSCP
  - Updated Shortage Communication Protocols
  - Updated Emergency Response sections & references
  - Clarification within the shortage levels
- Appendix C (2015 Addendum)
  - Updated Metropolitan table
  - Updated MWDOC table to reflect new replenishment information

2

Comments Received (Summarized)

- IRWD (2 Comment Letters)
  - Clarification of IRWD related sections
  - Clarification of language related to regional projections
- OCWD (2 Comment Letters)
  - Updated information for groundwater related sections & additional clarification
  - Huntington Beach Desalination consideration in the UWMP tables
- SCAG
  - Recommendation to consider RHNA 6th cycle in the UWMP

MWDOC

3

Next Steps

March 12	Release of Internal Draft of the MWDOC 2020 UWMP
March 18	Presentation of Draft UWMP at Member Agency Manager Meeting
March 29	Deadline for Member Agency comments to be considered for the Public Review Draft
April 5	Public Review Draft presented at the MWDOC Planning and Operations Committee
April 23	Deadline for Comments on the Public Draft of the UWMP
May 3	Final UWMP at MWDOC Planning and Operations Committee
May 19	Final UWMP Public Hearing and Adoption
July 1	Deadline to submit UWMP, WSCP, and Addendum to DWR

MWDOC

Staff Recommendation

Open the public hearing at the MWDOC Board Meeting on May 19 regarding MWDOC's Proposed 2020 UWMP, MWDOC's proposed 2020 WSCP, and Addendum to MWDOC's 2015 UWMP, to receive input from the public; and

Adopt the following three (3) resolutions, in the general form presented, with amendments if necessary:

1. Resolution adopting MWDOC's 2020 UWMP
2. Resolution adopting MWDOC's 2020 WSCP
3. Resolution adopting an Addendum to the MWDOC 2015 UWMP

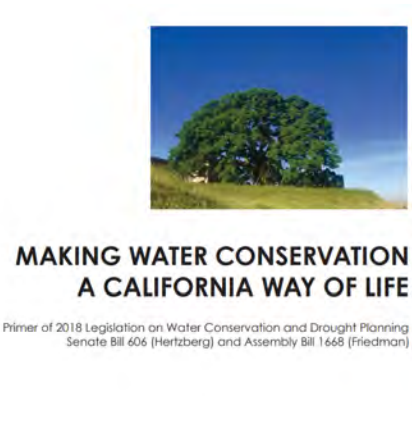
Questions?

- Staff is available for any questions

April 5, 2021 P&O Committee Slides (Updated)

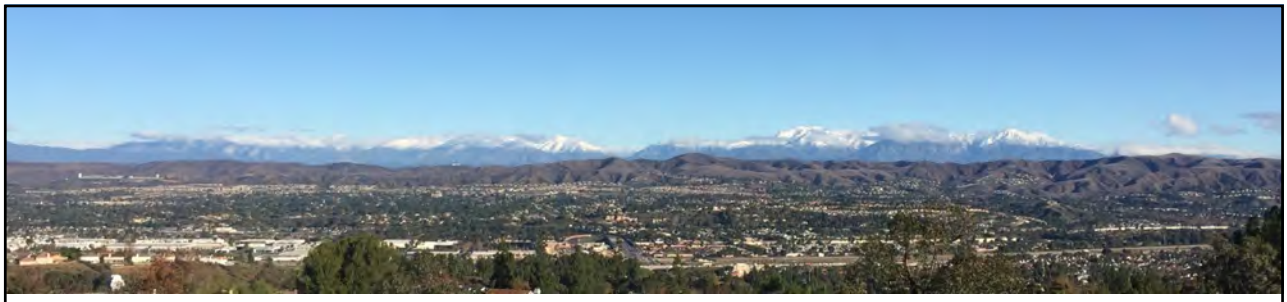
MWDOC

Major New Elements of the 2020 UWMP



- Major Changes due to SB 606 & AB 1668
  - Addition of a five dry-year analysis on the reliability assessment
  - Drought Risk Assessment for certification of water supplies for the upcoming year.
  - Inclusion of Water Loss Reporting
  - Major Changes to Water Shortage Contingency Plans
- Delta Stewardship Council Policies
  - Appendix C – Reduced Reliance on the Delta

8



MWDOC's Regional Approach

- MWDOC's UWMP is a regionally focused plan
- Provides analysis and information at the regional level
  - Water Demand Projections and supply analysis
  - SBx7-7 by 2020 – O.C. Regional Alliance
  - Water Use Efficiency activities and efforts
- Coordination of Water Shortage Contingency Plans & Model Drought Ordinance

9



MWDOC 2020 UWMP

- MWDOC's UWMP demonstrates the supply capabilities to meet expected demands from 2025 to 2045 under average, single-dry year, and five dry-year conditions
- Includes MET's 2020 UWMP supply conditions assumptions which ensures reliability
- Includes OCWD's and other groundwater basin management estimates
- Includes key assumptions in Orange County Reliability Study
- Includes local demand and supply information from the Member Agencies
- Water Shortage Contingency Plan will now be "stand alone"

10

Imported Supplies - Metropolitan

- MWDOC's Supply and Demand analysis is specific to imported water
- MET's 2020 UWMP analysis shows sufficient supplies to meet all anticipated demands in all water year conditions
- Includes the most recent information from DWR and MET on export deliveries from the SWP
- Does not include supplies from the Delta Conveyance Project
- Integrates MET's water shortage contingency plan including their water supply allocation plan and six standard shortage levels

11

Future Local Projects

- Orange County Water District
  - UWMP assumes a Basin Pumping Percentage (BPP) of 85% starting in 2025 and covering the 25 year planning horizon per OCWD
  - Inclusion of OCWD/OCSD Groundwater Replenishment System (GWRS) final expansion
- Recycled Water & Groundwater Recovery Projects
  - Coordination with member agencies and wastewater districts
- Ocean Desalination
  - Description of the efforts in Doheny and Huntington Beach

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MWDOC Service Area Demands

- 2020 MWDOC UWMP Demands are based on a collaboration between CDM Smith Member Agency Demands and the Member Agencies
  - For agencies that submitted their own projections for demands, those were used in-lieu of CDM Smith's.
- Dry Year Analysis
  - Based on the 2016 OC Reliability Study
  - Single Dry Year = FY 2013-14
  - Five Dry Years = FY 2011/12-FY 2015-16
  - Conservative Scenario of a 6% increase in demands during dry years

MWDOC's Demands

MWDOC Service Area Water Supply Projections (AF)

Water Source	2020	2025	2030	2035	2040	2045
OCWD Basin GW	192,652	231,936	236,430	236,506	236,280	236,274
Non-OCWD GW	21,267	22,734	24,747	24,763	24,740	24,890
Recycled Water	42,330	52,017	53,891	56,926	57,043	57,094
Surface Water	9,897	4,700	4,700	4,700	4,700	4,700
Imported (Retail M&I)	142,879	119,743	120,573	123,502	123,107	122,819
Total M&I Demand	409,025	431,130	440,341	446,398	445,870	445,778
Imported Irvine Lake Fill (Non-M&I)	649	4,017	4,017	4,017	4,017	4,017
Imported GW Replenishment (Non-M&I)	18,027	51,600	51,600	51,600	51,600	51,600
Total non- M&I Demand	18,676	55,617	55,617	55,617	55,617	55,617
Total Water Demand	427,701	486,747	495,958	502,014	501,487	501,394

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MWDOC's Supply and Demand Assessment

Five Dry Years Supply and Demand Comparison						
		2025	2030	2035	2040	2045
First year	Supply totals	**172,611**	**176,121**	**177,446**	**179,846**	**179,449**
	Demand totals	**172,611**	**176,121**	**177,446**	**179,846**	**179,449**
	Difference	**0**	**0**	**0**	**0**	**0**
Second year	Supply totals	**175,094**	**176,297**	**178,067**	**179,762**	**179,389**
	Demand totals	**175,094**	**176,297**	**178,067**	**179,762**	**179,389**
	Difference	**0**	**0**	**0**	**0**	**0**
Third year	Supply totals	**177,578**	**176,473**	**178,688**	**179,678**	**179,328**
	Demand totals	**177,578**	**176,473**	**178,688**	**179,678**	**179,328**
	Difference	**0**	**0**	**0**	**0**	**0**
Fourth year	Supply totals	**180,061**	**176,649**	**179,309**	**179,594**	**179,267**
	Demand totals	**180,061**	**176,649**	**179,309**	**179,594**	**179,267**
	Difference	**0**	**0**	**0**	**0**	**0**
Fifth year	Supply totals	**182,545**	**183,425**	**186,530**	**186,110**	**185,806**
	Demand totals	**182,545**	**183,425**	**186,530**	**186,110**	**185,806**
	Difference	**0**	**0**	**0**	**0**	**0**

15


MWDOC Water Shortage Contingency Plan

- Stand Alone Document that can be update outside of the 2020 UWMP
  - Standardized for the six standard levels 10%, 20%, 30%, 40%, 50%, and greater than 50%
  - Inclusion of a 0% shortage level that contains permanent water use efficiency measures
  - Inclusion of procedures and process for an annual water supply and demand assessment
  - Includes shortage response actions and estimates of potential to close the supply gap for several major actions
- MWDOC's WSCP will help to "fold into" the Member Agency Plan's

16

Appendix C – Reduced Reliance on the Delta (New)

- Agencies participating in a covered action in the Delta must comply with Delta Stewardship Council (DSC) Policies
- DSC Policy WR-P1 - *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance*
- Metropolitan, MWDOC, and the retail agencies are all required to complete Appendix C
- MWDOC has been closely coordinating with Metropolitan
  - Appendix C in MWDOC's 2020 UWMP reflects MWDOC investments in conservation and member agency projects that have reduced reliance on the Delta
- MWDOC's 2020 Appendix C will be appended to the 2015 UWMP to ensure compliance with WR P1

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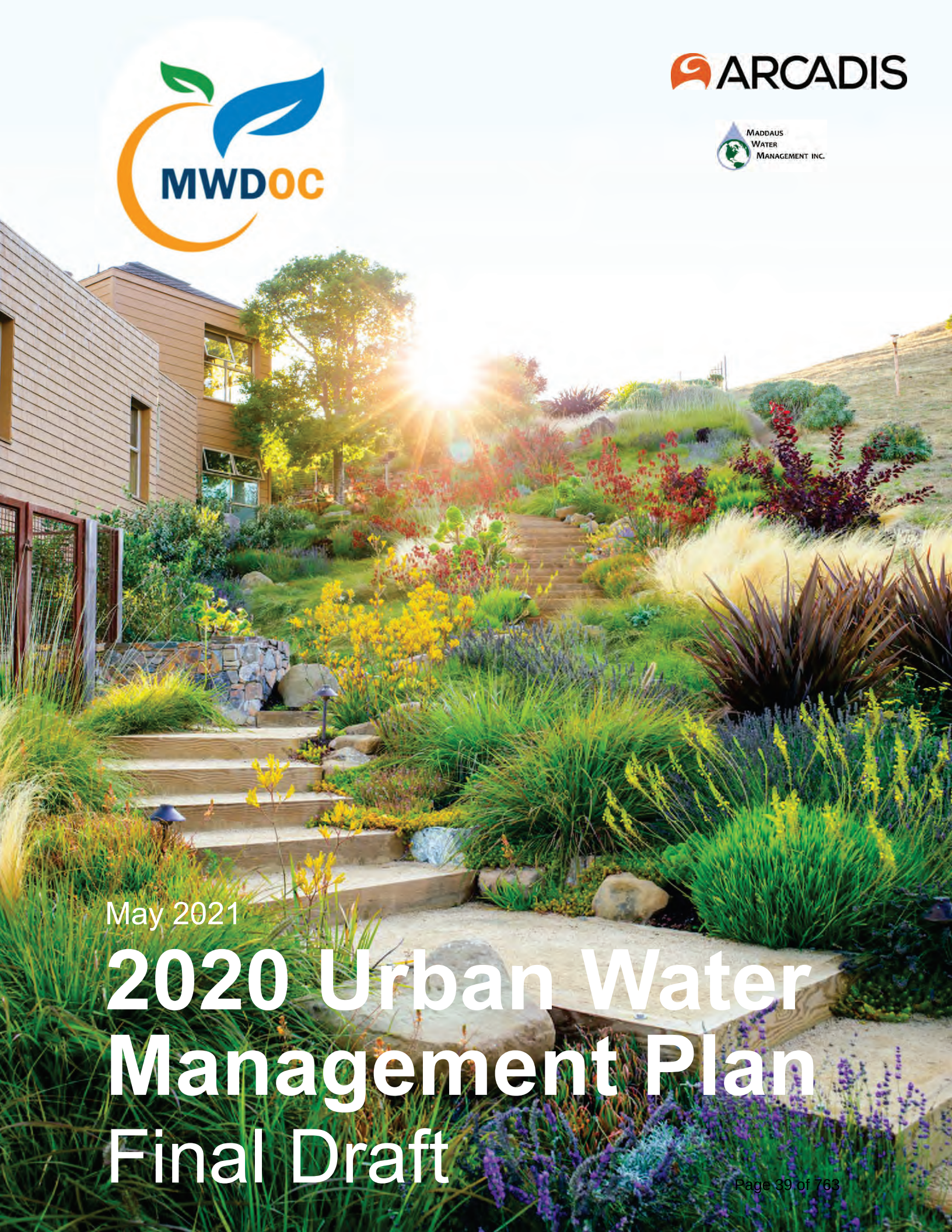
Reduce Reliance on the Delta

- Near-term (2025) –regional self-reliance is expected to increase by 243 TAF from the 2010 baseline
  - Represents about 37 percent of 2025 normal water year retail demands compared to the baseline
- Long-term (2040) –Regional self-reliance is expected to increase by nearly 265 TAF from the 2010 baseline
  - Represent about 38 percent of 2040 normal water year retail demands compared to the baseline
- MWDOC and its Member Agencies have made significant efforts in Conservation and local projects to increase Regional self-reliance

MWDOC



May 2021

2020 Urban Water Management Plan

Final Draft

2020 URBAN WATER MANAGEMENT PLAN

Prepared for:

Municipal Water District of Orange County

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Date:

May 2021

MESSAGE FROM THE BOARD OF DIRECTORS

Since the Municipal Water District of Orange County's (MWDOC) formation in 1951, MWDOC has remained steadfast in its commitment to provide a reliable supply of high-quality water for Orange County at a reasonable rate.

Through leadership, representation at the Metropolitan Water District of Southern California (MET), and collaboration with our retail agencies, MWDOC seeks opportunities to improve Orange County's water resources and reliability. By integrating local planning challenges and regional stakeholder partnerships, MWDOC maximizes water system reliability and overall system efficiencies. MWDOC works to expand Orange County's water supply portfolio by providing planning and local resource development in the areas of recycled water, groundwater, ocean water desalination, and water-use efficiency.

DIRECTORS

Division 1 Al Nederhood

Brea, Buena Park, portions of Golden State Water Company, La Habra, La Palma, Yorba Linda Water District.

Division 2 Larry D. Dick

Garden Grove, Orange, Tustin and Villa Park, and unincorporated North Tustin.

Division 3 Robert R. McVicker

Cypress, Fountain Valley, Los Alamitos, Stanton, Westminster, the western portion of Garden Grove, and nearby portions of unincorporated Orange County

Division 4 Karl W. Seckel, P.E.

Huntington Beach, Seal Beach, and portions of Costa Mesa, Irvine and Newport Beach.

Division 5 Sat Tamaribuchi

Newport Beach, Laguna Woods, portions of Irvine, Lake Forest, Laguna Hills, Aliso Viejo, and parts of Mission Viejo.

Division 6 Jeffery M. Thomas

Tustin and Rancho Santa Margarita, portions of Irvine, Lake Forest, Mission Viejo, San Juan Capistrano, and San Clemente.

Division 7 Megan Yoo Schneider, P.E.

Aliso Viejo, Dana Point, Laguna Beach, Laguna Hills, Laguna Niguel, Mission Viejo, San Clemente, and San Juan Capistrano.

MISSION STATEMENT

"To provide reliable, high-quality supplies from Metropolitan Water District of Southern California and other sources to meet present and future needs, at an equitable and economical cost, and to promote water use efficiency for all of Orange County."

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

%	Percent
20x2020	20% water use reduction in GPCD by year 2020
ACWRF	Aliso Creek Water Reclamation Facility
ADU	Accessory Dwelling Unit
AF	Acre-Feet
AFY	Acre-Feet per Year
AVEK	Antelope Valley-East Kern
AWTP	Advanced Water Treatment Plant
AWWA	American Water Works Association
Base	Marine Corps Base, Camp Pendleton
Basin 8-1	Orange County Grounwater Basin
BEA	Basin Equity Assessment
Biops	Biological Opinions
BMP	Best Management Practice
BPP	Basin Production Percentage
BPOU	Baldwin Park Operable Unit
CDR	Center for Demographic Research
CDWC	California Domestic Water Company
CLWUE	Comprehensive Landscape Water Use Efficiency
CII	Commercial/Industrial/Institutional
COA	Coordinated Operation Agreement
CRA	Colorado River Aqueduct
CTP	Coastal Treatment Plant
CUP	Conjunctive Use Program
CVP	Central Valley Project
CWRP	Chiquita Water Reclamation Plant
DATS	Deep Aquifer Treatment System
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin River Delta
DLR	Detection Limit for Purposes of Reporting
DMM	Demand Management Measure
DOF	Department of Finance
DRA	Drought Risk Assessment
DPR	Direct Potable Reuse
DVL	Diamond Valley Lake
DWR	California Department of Water Resources
EBSD	Emerald Bay Services District
EIR	Environmental Impact Report

EOCWD	East Orange County Water District
ESA	Endangered Species Act
ET	Evapotranspiration
ETWD	El Toro Water District
FIRO	Forecast Informed Reservoir Operations
FY	Fiscal Year
GAC	Granular Activated Carbon
GAP	Green Acres Project
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GRF	Groundwater Recovery Facility
GRP	Groundwater Reliability Plan
GSA	Groundwater Sustainabiltiy Agency
GSP	Groundwater Sustainability Plan
GSWC	Golden State Water Company
GWRP	Groundwater Recovery Plant
GWRS	Groundwater Replenishment System
GWRSFE	Groundwater Replenishment System Final Expansion
HEN	High Efficiency Sprinkler Nozzle
HET	High Efficiency Toilet
ICS	Intentionally Created Surplus
IPR	Indirect Potable Reuse
IRP	Integrated Water Resources Plan
IRWD	Irvine Ranch Water District
ITP	Incidental Take Permit
JADU	Junior Accessory Dwelling Unit
LAWRP	Los Alisos Water Recycling Plant
LBCWD	Laguna Beach County Water District
LRP	Local Resources Program
M&I	Municipal and industrial
MAF	Million Acre-Feet
MAF	Million Acre-Feet per Year
MCL	Maximum Contaminant Level
Mesa Water	Mesa Water District
MET	Metropolitan Water District of Southern California
MF	Microfiltration
MGD	Million Gallons per Day
MNWD	Moulton Niguel Water District
MTBE	Methyl Tert-Butyl Ether

MWDOC	Municipal Water District of Orange County
MWRF	Mesa Water Reliability Facility
MWRP	Michelson Water Recycling Plant
NDMA	N-nitrosodimethylamine
OC Basin	Orange County Groundwater Basin
OC San	Orange County Sanitation District
OCWD	Orange County Water District
OCWRP	Oso Creek Water Reclamation Plant
OSY	Operating Safe Yield
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
Plan	Urban Water Management Plan
Poseidon	Poseidon Resources LLC
PPCP	Pharmaceuticals and Personal Care Product
PPB	Parts per Billion
PPT	Parts Per Trillion
RA	Replenishment Assessment
RDA	Resource Development Assessment
RHNA	Regional Housing Needs Assessment
RO	Reverse Osmosis
RoC on LTO	Reinitiation of Consultation for Long-Term Operations
RRWTP	Robinson Ranch Wastewater Treatment Plant
RTP	Regional Treatment Plant
RWQCB	Regional Water Quality Control Board
SARCCUP	Santa Ana River Conservation and Conjunctive Use Program
SBx7-7	Senate Bill 7 as part of the Seventh Extraordinary Session, Water Conservation Act of 2009
SCAB	South Coast Air Basin
SCAG	Southern California Associations of Governments
SCWD	South Coast Water District
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
Serrano	Serrano Water District
SJBA	San Juan Basin Authority
SMWD	Santa Margarita Water District
SNWA	Southern Nevada Water Authority
SOCWA	South Orange County Wastewater Authority
SWP	State Water Project
SWRCB	California State Water Resources Control Board

TAZ	Traffic Analysis Zone
TCWD	Trabuco Canyon Water District
TDS	Total Dissolved Solids
TVMWD	Three Valleys Municipal Water District
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	Ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act of 1983
VOC	Volatile Organic Compounds
WRD	Water Replenishment District of Southern California
WRF	Water Research Foundation
WRP	Water Recycling Plant
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
YLWD	Yorba Linda Water District

EXECUTIVE SUMMARY

INTRODUCTION AND UWMP OVERVIEW

The Municipal Water District of Orange County (MWDOC) prepared this 2020 Urban Water Management Plan (UWMP) to submit to the California Department of Water Resources (DWR) to satisfy the UWMP Act of 1983 (UWMP Act or Act) and subsequent California Water Code (Water Code) requirements. MWDOC is a wholesale water supplier that provides water to 28 retail water suppliers in Orange County using imported water supplies obtained from its regional wholesaler, Metropolitan Water District of Southern California (MET).

UWMPs are comprehensive documents that present an evaluation of a water supplier's reliability over a long-term (20-25 year) horizon. This 2020 UWMP provides an assessment of the present and future water supply sources and demands within the MWDOC's service area. It presents an update to the 2015 UWMP on the MWDOC's water resource needs, water use efficiency programs, water reliability assessment and strategies to mitigate water shortage conditions. It also presents a new 2020 Water Shortage Contingency Plan (WSCP) designed to prepare for and respond to water shortages. This 2020 UWMP contains all elements to meet compliance of the new requirements of the Act as amended since 2015.

UWMP PREPARATION

MWDOC coordinated the preparation of this 2020 UWMP with other key entities, including MET (regional wholesaler for Southern California and the direct supplier of imported water to MWDOC), Orange County Water District (OCWD) (Orange County Groundwater Basin [OC Basin] manager and provider of recycled water in north Orange County), and retail water suppliers in Orange County which include MWDOC's 28 member agencies and the three cities which are direct members of MET – Anaheim, Fullerton, and Santa Ana. MWDOC also coordinated with other entities which provided valuable data for the analyses prepared in this UWMP, such as the Center for Demographic Research (CDR) at California State University Fullerton for population projections.

SYSTEM DESCRIPTION

MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911 to provide imported water to inland areas of Orange County. Governed by an elected seven-member Board of Directors, MWDOC is MET's third largest member agency based on assessed valuation. Today, MWDOC manages all of Orange County's imported water supply except for water imported to the cities of Anaheim, Fullerton, and Santa Ana. MWDOC is committed to ensuring water reliability for more than 2.34 million residents in its 600-square-mile service area. Although MWDOC does not own water facilities and does not have jurisdiction over local supplies, it works to ensure the delivery of reliable water supplies to the region. MWDOC focuses on sound planning and appropriate investments in water supply, water use efficiency, regional delivery infrastructure, and emergency preparedness.

WATER USE CHARACTERIZATION

MWDOC is the wholesale provider of treated and untreated imported water from MET for municipal and industrial (M&I) uses (i.e., direct uses) and non-M&I (indirect uses e.g., groundwater recharge) within its service area.

MWDOC's service area M&I water use has consistently exceeded 400,000 acre-feet per year (AFY) until recently. Since fiscal year (FY) 2013-14, as a result of drought, retail water usage (including recycled water) began to trend downward. FY 2015-16 was the first year that water use in the MWDOC's service area dropped below 400,000 AF due to large-scale water efficiency efforts undertaken by MWDOC and member agencies.

25-year Water Use Projection

MWDOC's total service area water demands are expected to gradually increase between now and 2023 due to projected growth in M&I demands. The bulk of the increases between 2023 and 2025 are due to indirect imported demands for groundwater replenishment returning in those years 2024 and 2025. The current regulatory impacts of PFAS in the OC Basin has reduced the need for purchasing any imported groundwater replenishment water, due to reductions in groundwater pumping expected to last until 2023. Over the next 25 years, total water demands within the MWDOC service area are projected to increase by about 17% from approximately 428,000 acre-feet (AF) in 2020 to approximately 501,000 AF by 2045. This demand projection considers such factors as current and future demographics, future conservation measures, and ground and surface water needs.

CONSERVATION TARGET COMPLIANCE

MWDOC in collaboration with all its retail member agencies as well as the Cities of Anaheim, Fullerton, and Santa Ana, created the Orange County 20x2020 Regional Alliance to assist retail agencies in complying with the requirements of Water Conservation Act of 2009, also known as SBx7-7 (Senate Bill 7 as part of the Seventh Extraordinary Session). Signed into law on February 3, 2010, it requires the State of California to reduce urban water use by 20% by 2020.

Retail water suppliers are required to comply with SBx7-7 individually or as a region in collaboration with other retail water suppliers, in order to be eligible for water related state grants and loans. As a wholesale water supplier, MWDOC is not required to establish a baseline or set targets for daily per capita water use itself. Orange County, as a region, had a 2020 target water use of 159 gallons per capita per day (GPCD). The actual water use in 2020 was 109 GPCD which is well below its target. This is indicative of the collective efforts of MWDOC and retail agencies in reducing water use in the region.

WATER SUPPLY CHARACTERIZATION

Imported water from MET accounts for about 33% of MWDOC's service area water use. The other 67% is from various other sources, including groundwater from the OC Basin, groundwater from other smaller groundwater basins such as the Main San Gabriel Basin, and recycled water. The Orange County Sanitation District (OC San) and South Orange County Wastewater Authority (SOCWA) are the wastewater providers of North county and South county agencies, respectively. A few MWDOC member agencies produce their own recycled water.

WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Every urban water supplier is required to assess the reliability of their water service to its customers under a normal year, a single dry year, and multiple dry water years. The water service reliability assessment compares projected supply to projected demand for three long-term hydrological conditions: a normal year, a single dry year, and a drought period lasting five consecutive years. MWDOC as an imported water provider relies on its wholesaler's water reliability assessments which concluded that it will be able to meet MWDOC's service area demands for imported water under normal, single-dry, and five-year consecutive dry conditions over the next 25 years (2020 – 2045).

Overall, MWDOC's service area depends on a combination of imported and local supplies to meet its service area water demands. MWDOC has taken numerous steps to ensure its member agencies have adequate supplies. Development of numerous local sources augment the reliability of the imported water system. The water supplies available to the MWDOC service area are projected to meet full-service demands based on the findings by MET in its 2020 UWMP starting 2021 through 2045 during normal years, single dry year, and five consecutively dry years.

WATER SHORTAGE CONTINGENCY PLANNING

Water shortage contingency planning is a strategic planning process that MWDOC engages to prepare for and respond to water shortages. A water shortage, when water supply available is insufficient to meet the normally expected customer water use at a given point in time, may occur due to a number of reasons, such as water supply quality changes, climate change, drought, and catastrophic events (e.g., earthquake). The MWDOC WSCP provides a water supply availability assessment and structured steps designed to respond to actual conditions. This level of detailed planning and preparation will help maintain reliable supplies and reduce the impacts of supply interruptions.

The WSCP serves as the operating manual that MWDOC will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSCP contains the processes and procedures that will be deployed when shortage conditions arise so that the MWDOC governing body, its staff, and its retail agencies can easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate to the degree of water shortfall anticipated.

DEMAND MANAGEMENT MEASURES

MWDOC has demonstrated its commitment to water use efficiency through multi-faceted and holistic water use efficiency programs. As a wholesaler, MWDOC facilitates implementation of DMM throughout Orange County. MWDOC's efforts focus on the following three areas: Regional Program Implementation, Local Program Assistance, and Research and Evaluation. MWDOC develops, obtains funding for, and implements regional water savings programs on behalf of all retail water agencies in Orange County. This approach minimizes confusion to consumers by providing the same programs with the same participation guidelines, maintains a consistent message to the public to use water efficiently, and provides support to retail water agencies by acting as program administrators for the region. MWDOC provides assistance on a variety of local programs including, but not limited to Water Loss Control and Management Program, Public Outreach, and Choice K-12 School Programs.

1 INTRODUCTION AND UWMP OVERVIEW

MWDOC prepared this 2020 UWMP to submit to the California Department of Water Resources (DWR) to satisfy the UWMP Act of 1983 (UWMP Act or Act) and subsequent California Water Code (Water Code) requirements. MWDOC is a wholesale water supplier that provides water to 28 water suppliers in Orange County using imported water supplies obtained from its regional wholesaler, Metropolitan Water District of Southern California (MET). MWDOC, as one of MET's 26 member agencies, has prepared this 2020 UWMP in collaboration with MET and its own member agencies.

UWMPs are comprehensive documents that present an evaluation of a water supplier's reliability over a long-term (20-25 year) horizon. In response to the changing climatic conditions and regulatory updates since the 2015 UWMP, MWDOC has been assisting its member agencies to manage both their water supplies and demands. The water loss audit program, water conservation measures, and efforts for increased self-reliance in order to reduce dependency on imported water from the Sacramento-San Joaquin Delta (the "Delta") are some of the water management actions that MWDOC has taken to maintain the reliability of water supply for its service area.

This 2020 UWMP provides an assessment of the present and future water supply sources and demands within the MWDOC's service area. It presents an update to the 2015 UWMP on the MWDOC's water resource needs, water use efficiency programs, water reliability assessment and strategies to mitigate water shortage conditions. It also presents a new 2020 Water Shortage Contingency Plan (WSCP) designed to prepare for and respond to water shortages. This 2020 UWMP contains all elements to meet compliance of the new requirements of the Act as amended since 2015.

1.1 Overview of Urban Water Management Plan Requirements

The UWMP Act enacted by California legislature requires every urban water supplier (Supplier) providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an UWMP with the DWR every five years in the years ending in six and one.

For this 2020 UWMP cycle, DWR placed emphasis on achieving improvements for long term reliability and resilience to drought and climate change in California. Legislation related to water supply planning in California has evolved to address these issues, namely Making Conservation a Way of Life [Assembly Bill (AB) 1668 and Senate Bill (SB) 606] and Water Loss Performance Standards - SB 555. New UWMP requirements in 2020 are a direct result of these new water regulations. Two complementary components were added to the 2020 UWMP. First is the WSCP to assess the Supplier's near term 5-year drought risk assessment (DRA) and provide a structured guide for the Supplier to deal with water shortages. Second is the Annual Water Supply Demand Assessment (WSDA) to assess the current year plus one dry year i.e., short-term demand/supply outlook. Analyses over near- and long-term horizons together will provide a more complete picture of Supplier's reliability and will serve to inform appropriate actions it needs to take to build up capacity over the long term.

The various key new additions in the 2020 UWMP included as a result of the most recent water regulations are:

- **Water Shortage Contingency Plan (WSCP) –** WSCP helps a Supplier to better prepare for drought conditions and provides the steps and water use efficiency measures to be taken in times of water shortage conditions. WSCP now has more prescriptive elements, including an analysis of water supply reliability; the water use efficiency measures for each of the six standard water shortage levels that correspond to water shortage percentages ranging from 0 – 10 percent to greater than 50 pecrcent; an estimate of potential to close supply gap for each measure; protocols and procedures to communicate identified actions for any current or predicted water shortage conditions; procedures for an annual water supply and demand assessment; monitoring and reporting requirements to determine customer compliance; and reevaluation and improvement procedures for evaluating the WSCP.
- **Drought Risk Assessment –** Suppliers are now required to compare their total water use and supply projections and conduct a reliability assessment of all their sources for a consecutive five-year drought period beginning 2021.
- **Five Consecutive Dry-Year Water Reliability Assessment** - The three-year multiple dry year reliability assessment in previous UWMPs has now been extended from three to five consecutive dry years to include a more comprehensive assessment of the reliability of the water sources to improve preparedness of Suppliers for extended drought conditions.
- **Seismic Risk –** The UWMP now includes a seismic risk assessment of the water supply infrastructure and a plan to mitigate any seismic risks on the water supply assets.
- **Groundwater Supplies Coordination –** The UWMP should be in accordance with the Sustainable Groundwater Management Act of 2014 and consistent with the Groundwater Sustainability Plans (GSPs), wherever applicable.
- **Lay Description** – To provide a better understanding of the UWMP to the general public, a lay description of the UWMP is included, especially summarizing the Supplier's detailed water service reliability assessment and the planned management steps and actions to mitigate any possible shortage scenarios.

1.2 UWMP Organization

This UWMP is organized into 10 main sections aligned with the DWR Guidebook recommendations. The subsections are customized to tell MWDOC's story of water supply reliability and plans to overcome any water shortages over a planning horizon of the next 25 years.

Section 1 Introduction and UWMP Overview gives an overview of the UWMP fundamentals and briefly describes the new additional requirements passed by the Legislature for 2020 UWMP.

Section 2 UWMP Preparation identifies this UWMP as an individual planning effort of MWDOC, lists the type of year and units of measure used and introduces the coordination and outreach activities conducted by MWDOC to develop this UWMP.

Section 3 System Description gives a background on MWDOC and its climate characteristics, population projections, demographics, socioeconomics, and predominant current and projected land uses of its service area.

Section 4 Water Use Characterization provides historical, current, and projected water use by customer category for the next 25 years for MWDOC and the projection methodology used by MWDOC to develop the 25-year projections**.**

Section 5 Conservation Target Compliance reports data of the Orange County Regional Alliance, which is administered by MWDOC to track the SB X7-7 water use conservation target compliance of all the retail agencies in Orange County, i.e., the member agencies of MWDOC and the cities of Anaheim, Fullerton, and Santa Ana.

Section 6 Water Supply Characterization describes the current water supply portfolio of MWDOC as well as the planned and potential water supply projects and water exchange and transfer opportunities.

Section 7 Water Service Reliability and Drought Risk Assessment assesses the reliability of MWDOC's water supply service to its customers for a normal year, single dry year and five consecutive dry years scenarios. This section also includes a DRA of all the supply sources for a consecutive five-year drought period beginning 2021.

Section 8 Water Shortage Contingency Planning is a brief summary of the standalone WSCP document which provides a structured guide for MWDOC to deal with water shortages, incorporating prescriptive information and standardized action levels, lists the appropriate actions and water use efficiency measures to be taken to ensure water supply reliability in times of water shortage conditions, along with implementation actions in the event of a catastrophic supply interruption.

Section 9 Demand Management Measures provides a description of the MWDOC's current and planned measures and programs to help the retail customers in its service area comply with their SB X7-7 water use conservation targets.

Section 10 Plan Adoption, Submittal, and Implementation provides a record of the process MWDOC followed to adopt and implement its UWMP.

2 UWMP PREPARATION

MWDOC's 2020 UWMP is an individual UWMP for MWDOC to meet the California Water Code (Water Code) compliance as a wholesale water supplier. While MWDOC opted to prepare its own UWMP and meet Water Code compliance individually, the development of this UWMP involved close coordination with its member agencies, its wholesale supplier MET, along with other key entities within the region.

2.1 Individual Planning and Compliance

MWDOC opted to prepare its own UWMP (Table 2-1) and comply with the Water Code individually, while closely coordinating with MET and various key entities as discussed in Section 2.2 to ensure regional integration. The UWMP Checklist was completed to confirm the compliance of this UWMP with the Water Code (Appendix A). All of DWR standardized tables are provided in Appendix B.

Generally, MWDOC and the majority of its retail member agencies selected to report demands and supplies using fiscal year as the basis (Table 2-2).

Table 2-1: Plan Identification

DWR Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance**
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☑	Water Supplier is also a member of a Regional Alliance	Orange County 20x2020 Regional Alliance
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Table 2-2: Supplier Identification

DWR Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☑	Supplier is a wholesaler
☐	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables are in calendar years
☑	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
7/1	
Units of measure used in UWMP *	
Unit	AF
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES: The energy intensity data is reported in calendar year consistent with the Greenhouse Gas Protocol.	

2.2 Coordination and Outreach

2.2.1 Integration with Other Planning Efforts

MWDOC, as the wholesale water supplier, coordinated this UWMP preparation with other key entities, including MET (regional wholesaler for Southern California and the direct supplier of imported water to MWDOC), Orange County Water District (OCWD) (OC Groundwater Basin [OC Basin or "Basin 8-1"] manager and provider of recycled water in north OC), and retail water suppliers in OC which include MWDOC's 28 member agencies and the three cities which are direct members of MET – Anaheim, Fullerton, and Santa Ana. MWDOC also coordinated with other entities which provided valuable data for the analyses prepared in this UWMP, such as the Center for Demographic Research (CDR) at California State University Fullerton for population projections.

Some of the key planning and reporting documents that were used to develop this UWMP are:

- **MET's 2020 Integrated Water Resources Plan (IRP)** (In progress) is a long-term planning document to ensure water supply availability in Southern California and provides a basis for water supply reliability in Orange County.
- **MET's 2020 UWMP** was developed as a part of the 2020 IRP planning process and was used by MWDOC as another basis for the projections of supply capability of the imported water received from MET.
- **MET's 2020 WSCP** provides a water supply availability assessment and guide for MET's intended actions during water shortage conditions, which determine MWDOC's shortage conditions.
- **MWDOC's 2020 WSCP** provides a water supply availability assessment and structured steps designed to respond to actual conditions that will help maintain reliable supplies and reduce the impacts of supply interruptions.
- **2021 OC Water Demand Forecast for MWDOC and OCWD Technical Memorandum (Demand Forecast TM)** provides the basis for water demand projections for the MWDOC's service area.
- **OCWD's Groundwater Reliability Plan (GRP)** (to be finalized after July 2021) provides the latest information on groundwater management and supply projection for the OC Basin, the primary source of groundwater for 19 retail water suppliers in OC.
- **OCWD's 2019-20 Engineer's Report** provides information on the groundwater conditions and basin utilization of the OC Basin.
- **2017 Basin 8-1 Alternative** is an alternative to the GSP for the OC Basin and provides significant information related to sustainable management of the basin in the past and hydrogeology of the basin, including groundwater quality and basin characteristics.
- **Hazard Mitigation Plan** provides the basis for the seismic risk analysis of the water system facilities.
- **Orange County Local Agency Formation Commission's 2020 Municipal Service Review for MWDOC Report** provides comprehensive review of the municipal services provided by MWDOC.
- **Water Master Plans and Sewer Master Plans** of the cities and counties serving within the MWDOC's service area provide information on water infrastructure planning projects and plans to address any required water system improvements.
- **Groundwater Management Plans** provide the groundwater sustainability goals for the basins in the MWDOC's service area and the programs, actions, and strategies activities that support those goals.

Statewide Water Planning

In addition to regional coordination with various agencies described above, MWDOC as a MET member agency is currently a part of MET's statewide planning effort to reduce reliance on the water imported from the Delta.

It is the policy of the State of California to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. This policy is codified through the Delta Stewardship Council's Delta Plan Policy WR P1 and is measured through Supplier reporting in each Urban Water Management Planning cycle. WR P1 is relevant to water suppliers that plan to participate in multi-year water transfers, conveyance facilities, or new diversions in the Delta.

Through significant local and regional investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts, MWDOC has demonstrated a reduction in Delta reliance and a subsequent improvement in regional self-reliance. For a detailed description and documentation of MWDOC's consistency with Delta Plan Policy WR P1 see Section 7.4 and Appendix C.

2.2.2 Wholesale and Retail Coordination

All MWDOC retail member agencies developed their UWMPs in conjunction with MWDOC's UWMP. Per the Water Code requirements to help its retail customers develop their own UWMPs, MWDOC facilitated the projections of the water demand by retail agency and supply that will be available from MWDOC over the next 25 years. Table 2-3 lists these retail water suppliers.

As the local wholesale supplier of imported water, MWDOC represents the interests of all but three OC retail water suppliers at MET and administers various regional programs and measures to help its retail customers meet various State requirement compliance, such as the OC Regional Alliance for SB x7-7 compliance, regional water loss program for SB 555 compliance, and regional water use efficiency programs. Sections 5 and 9 provide detailed information on these programs. While MWDOC assists retail member agencies in meeting requirements, the agencies also administer and operate their own programs to meet State requirement compliance, with more detail on these programs to be found in their respective UWMPs.

Table 2-3: Wholesale: Water Supplier Information Exchange

DWR Submittal Table 2-4 Wholesale: Water Supplier Information Exchange	
☑	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with Water Code Section 10631. Completion of the table below is optional. If not completed, include a list of the water suppliers that were informed.
Section 3-2 (Page 3-5)	**Provide page number for location of the list.**
☐	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631. **Complete the table below.**
NOTES:	

2.2.3 Public Participation

For further coordination with other key agencies and to encourage public participation in the review and update of this Plan, MWDOC held a public hearing and notified key entities and the public per the Water Code requirements. Sections 10.2 and 10.3 describe these efforts in detail. In addition, due to the diverse population that MWDOC serves, there was a Spanish translator available at the public hearing to assist any members of the public wishing to participate in the public hearing process that may need that service.

3 SYSTEM DESCRIPTION

MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911 to provide imported water to inland areas of Orange County. Governed by an elected seven-member Board of Directors, MWDOC is MET's third largest member agency based on assessed valuation.

MWDOC is a regional water wholesaler and resource planning agency, managing all of OC's imported water supply except for water imported to the cities of Anaheim, Fullerton, and Santa Ana. MWDOC is committed to ensuring water reliability for more than 2.34 million residents in its 600-square-mile service area. To that end, MWDOC focuses on sound planning and appropriate investments in water supply, water use efficiency, regional delivery infrastructure, and emergency preparedness.

Lying in the South Coast Air Basin (SCAB), its climate is characterized by southern California's "Mediterranean" climate with mild winters, warm summers and moderate rainfall. In terms of land use, MWDOC's service area in the North OC is almost built out with predominantly residential units with pockets dedicated to commercial, institutional, governmental uses and open space and parks and the existing vacant lots in South OC are gradually transitioning to residential and commercial mixed-use areas. The current population of 2,342,740 is projected to increase by 8% over the next 25 years.

3.1 Agency Overview

This section provides information on the formation and history of MWDOC, its organizational structure, roles, and objectives.

3.1.1 Formation and Purpose

Orange County was settled around areas of surface water. San Juan Creek supplied the mission at San Juan Capistrano. The Santa Ana River supplied the early Cities of Anaheim and Santa Ana. The Santa Ana River also provided water to a large aquifer underlying the northern half of the county, enabling settlers to move away from the river's edge and still obtain water by drilling wells.

By the early 1900s, Orange County residents understood that their water supply was limited, the rivers and creeks did not flow all year long, and the aquifer would eventually be degraded or even dry up if the water was not replenished on a regular basis.

In 1928, the Cities of Anaheim, Santa Ana, and Fullerton joined with 10 other southern California cities to form MET. Their objective was to build an aqueduct from the Colorado River to provide the additional water necessary to sustain the growing southern California economy and its enviable lifestyle.

OCWD was formed in 1933 to protect the County's water rights on the Santa Ana River. Later that mission was expanded to manage the underground aquifer, optimizing use of local supplies and augmenting those with imported supplies provided through the MET's member agencies in Orange County.

It was not long before other parts of Orange County also saw the need for supplemental supplies. A severe drought in the late 1940s further emphasized this need for coastal communities from Newport Beach to San Clemente. In 1948, coastal communities from Newport Beach south to the San Diego

county line formed the Coastal Municipal Water District as a way to join in the benefits provided by MET. Three years later, MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911 to provide imported water to inland areas of Orange County. To improve services and reduce cost, the Coastal Municipal Water District became a part of MWDOC in January 2001.

Today, MWDOC is MET's third largest member agency, providing and managing the imported water supplies used within its service area.

3.1.2 MWDOC Board of Directors

MWDOC is governed by an elected seven-member Board of Directors, with each board member elected from a specific area of the County and elected to a four-year term by voters who reside within that part of the MWDOC service area. The Board of Directors map is shown on Figure 3-1.

Each director is a member of at least one of the following standing committees: Planning and Operations; Administration and Finance; and Executive. Each committee meets monthly. The full Board convenes for its regular monthly meeting on the third Wednesday of the month and holds a Board workshop on MET issues the first Wednesday of the month.

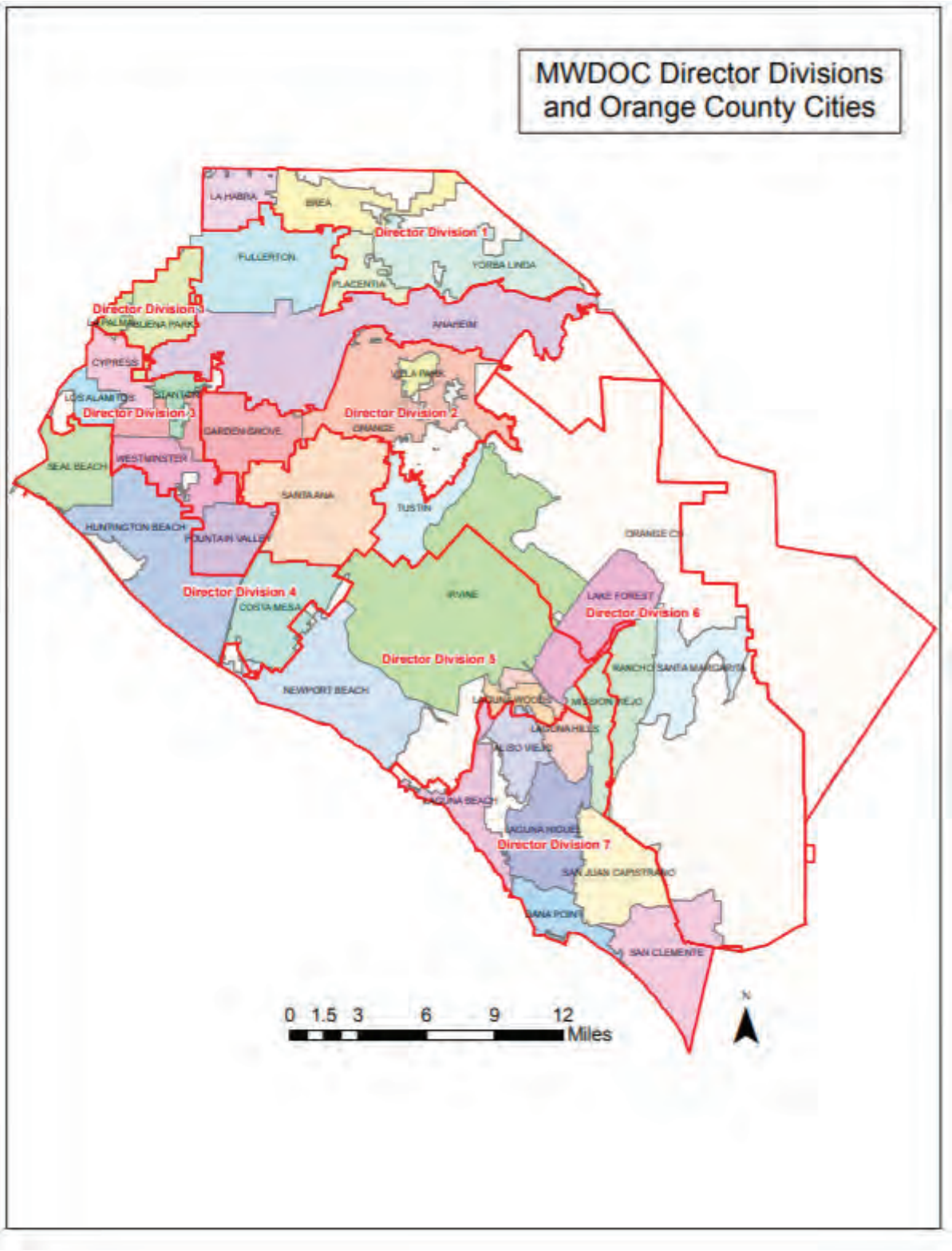


Figure 3-1: MWDOC Board of Directors Map, by Director Division

3.1.3 Relationship to MET

MWDOC became a member agency of MET in 1951 to bring supplemental imported water supplies to parts of Orange County. MET is a consortium of 26 cities and water agencies that provides supplemental water supplies to parts of Los Angeles, Orange, San Diego, Riverside, San Bernardino, and Ventura Counties. MET's two main sources of supply are the Colorado River and the Delta. Supplies from these sources are delivered to southern California via the Colorado River Aqueduct (CRA) and the State Water Project (SWP). MWDOC purchases imported water from these sources from MET and sells the water to its 28 member agencies, which provide retail water services to the public.

3.1.4 Goals and Objectives

MWDOC's Mission Statement is "*To provide reliable, high-quality supplies from Metropolitan Water District of Southern California and other sources to meet present and future needs, at an equitable and economical cost, and to promote water use efficiency for all of Orange County."*

MWDOC's related water management goals and objectives are to:

- Represent the interests of the public within its jurisdiction;
- Appoint its representative directors to the Board of MET;
- Inform its directors and its retail agencies about MET issues;
- Collaborate with MET in its planning efforts and act as a resource of information and advocate for our retail agencies;
- Purchase water from MET and represent the interest of our service area at MET;
- Work together with Orange County water agencies and others to focus on solutions and priorities for improving Orange County's future water supply reliability;
- Cooperate with and assist OCWD and other agencies in coordinating the balanced use of the area's imported and native surface and groundwater;
- Plan and manage the allocation of imported water to its retail agencies during periods of shortage;
- Coordinate and facilitate the resolution of water issues and development of joint water projects among its retail agencies;
- Represent the public and assist its retail agencies in dealing with other governmental entities at the local, regional, state, and federal levels on water-related issues; and
- Inform its retail agencies and inform and educate the general public on matters affecting present and future water use and supply.

As a regional wholesaler, MWDOC has roles that are broadly applicable to all of its retail agencies. A key goal of MWDOC is to provide broad reaching services and programs at an economy-of-scale that the retail agencies cannot reasonably provide as single entities.

Since 1991, MWDOC has offered educational classes, water use surveys, and a variety of consumer incentives for indoor and outdoor water-efficient devices for all residents and businesses throughout Orange County. Through the program, MWDOC provides a wide variety of water saving rebates and programs to residential, commercial, industrial, and institutional customers. MWDOC's programs have resulted in the conservation of more than 17.1 billion gallons of water each year.

For nearly five decades, MWDOC's Water Education programs have reached millions of Orange County K-12 students. The programs are offered on behalf of and in coordination with MWDOC's retail agencies, designed to increase the public's understanding of current water issues and challenges, opportunities, and associated costs involved in securing a reliable supply of high-quality water. Additionally, as part of its multi-faceted public education effort, MWDOC sponsors the Orange County Boy Scout Council's Soil & Water Conservation Merit Badge and Orange County Girl Scouts Water Resources and Conservation Patch. These two programs, designed and hosted by MWDOC Public Affairs staff, are presented as hands-on educational clinics, reaching hundreds of children each year with impactful water-centric education.

MWDOC also develops and coordinates a substantial number of public information, education, and outreach programs and activities for adults to elevate stakeholders' awareness of current water issues that affect the region's water supply's health and reliability. These programs emphasize and encourage efficient water use and water-saving practices and offer insight into proposed policy and water reliability investments in the region's best interest.

3.2 Water Service Area

MWDOC serves more than 2.34 million residents in a 600-square-mile service area (Figure 3-2). Although MWDOC does not have its own water facilities and does not have jurisdiction over local supplies, it works to ensure the delivery of reliable water supplies to the region.

MWDOC serves imported water in Orange County to 28 water agencies. These entities, comprised of cities and water districts, are referred to as MWDOC member agencies and provide water to approximately 2.34 million customers. MWDOC retail agencies include:

- City of Brea
- City of Buena Park
- City of Fountain Valley
- City of Garden Grove
- City of Huntington Beach
- City of La Habra
- City of La Palma
- City of Newport Beach
- City of Orange
- City of San Clemente
- City of San Juan Capistrano
- East Orange County Water District (EOCWD)
- El Toro Water District (ETWD)
- Emerald Bay Services District (EBSD)
- Irvine Ranch Water District (IRWD)
- Golden State Water Company (GSWC)
- Laguna Beach County Water District (LBCWD)
- Mesa Water District (Mesa Water)
- Moulton Niguel Water District (MNWD)
- Orange County Water District (OCWD)
- Santa Margarita Water District (SMWD)
- Serrano Water District (Serrano)

- City of Seal Beach
- City of Tustin
- City of Westminster
- South Coast Water District (SCWD)
- Trabuco Canyon Water District (TCWD)
- Yorba Linda Water District (YLWD)

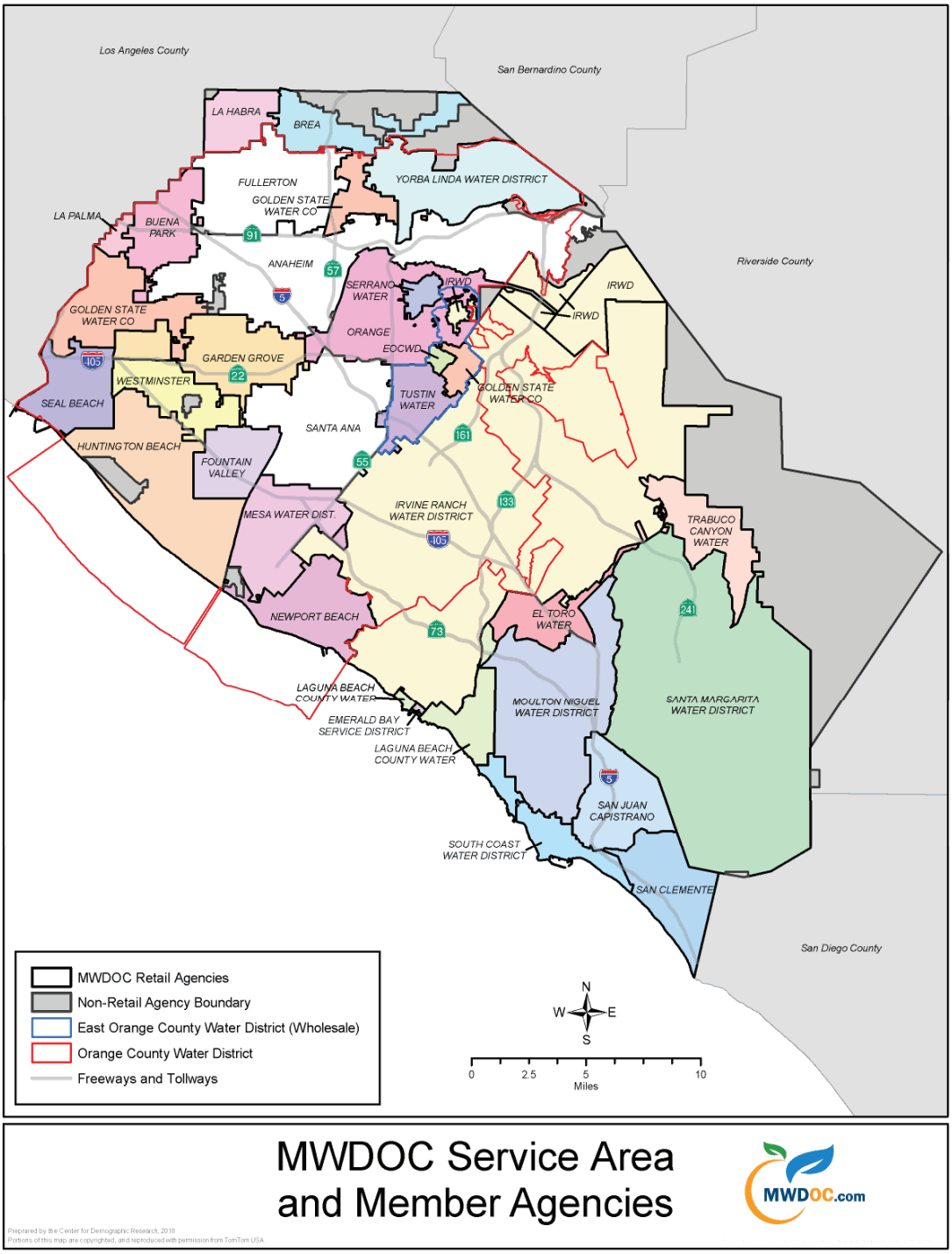


Figure 3-2: MWDOC's Water Service Area by Retail Agency

3.3 Climate

MWDOC's service area is located within the SCAB that encompasses all of OC, and the urban areas of Los Angeles, San Bernardino, and Riverside counties. The SCAB climate is characterized by southern California's "Mediterranean" climate: a semi-arid environment with mild winters, warm summers, and moderate rainfall.

Local rainfall and temperature greatly influence water usage in the service area. The biggest variation in annual water demand is due to changes in rainfall and temperature. In Orange County, the average daily temperatures range from 58.2 ˚F in December and January to 75.2 ˚F in August (Table 3-1). The average annual precipitation is 13.1 inches, although the region is subject to significant variations in annual precipitation (Table 3-2). The average evapotranspiration (ET_0) is above 40 inches per year (Table 3-3) which is greater than three times the annual average rainfall.

Table 3-1: OC 30-Year Average Temperature

Orange County 30-Year Average (1991-2020) Temperature													
Orange County Temperature (°F)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Average Daily High Temperature	70.3	70.3	72.2	74.2	75.7	78.6	83.6	85.5	84.7	80.4	75.1	69.2	76.6
Average Daily Temperature	59.2	59.5	61.7	63.9	66.6	69.7	73.9	75.2	74.1	69.7	63.7	58.2	66.3
Average Daily Low Temperature	48.2	48.9	51.3	53.6	57.6	60.8	64.2	64.8	63.5	58.9	52.2	47.3	55.9
Source: NOAA Weather Station (Santa Ana Fire Station #135)													

Table 3-2: OC 30-Year Average Precipitation Orange County 30-Year Average Precipitation

Orange County 30-Year Average (1991-2020) Precipitation													
Orange County Average Precipitation (Inches)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Central Orange County	3.1	3.2	1.8	0.7	0.3	0.1	0.0	0.0	0.1	0.6	0.8	2.3	13.1
Source: County of Orange Santa Ana Rainfall Station #121 (Santa Ana Crime Lab)													

Table 3-3: OC Evapotranspiration

Orange County Evapotranspiration													
Orange County ET_o	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Laguna Beach	2.2	2.7	3.4	3.8	4.6	4.6	4.9	4.9	4.4	3.4	2.4	2.0	43.3
Irvine	2.2	2.5	3.7	4.7	5.2	5.9	6.3	6.2	4.6	3.7	2.6	2.3	49.9
NOTE: ET_o values are from Model Water Efficient Landscape Ordinance, September 10, 2009, Appendix A: Reference ET_o Table													

Although service area demands are influenced by local rainfall and temperature, the imported water supply that MWDOC provides to its member agencies is not. It should also be noted that MET's core water supplies from the SWP and the CRA are largely influenced by climate conditions in northern California and the Colorado River Basin, respectively. Both regions have variable hydrologic conditions that can significantly impact MET's water supplies. This past decade we have seen dramatic swings in annual precipitation and temperatures on the SWP. In 2014, California saw the lowest ever "Table A" State Project Water Allocation of contract supplies and two years later in 2017, experienced the highest SWP allocation since 2006. In a similar way the Colorado River Basin also experienced annual swings in hydrology; however, the multi-year drought conditions due to record low precipitation has largely been mitigated through the large volume of water Basin States have been storing in Lake Mead to maintain the system.

3.4 Population, Demographics, and Socioeconomics

3.4.1 Service Area Population

MWDOC serves a 2020 population of 2,342,740 according to CDR. MWDOC's population is composed of the sum of its 28 member agencies populations. Overall, the population is projected to increase 8 percent by 2045. Table 3-4 shows the population projections in five-year increments out to the year 2045 within MWDOC's service area.

Table 3-4: Wholesale: Population - Current and Projected

DWR Submittal Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045
	2,342,740	2,411,727	2,473,392	2,518,117	2,532,393	2,530,621
NOTES: Source - Center for Demographic Research at California State University, Fullerton, 2020						

3.4.2 Demographics and Socioeconomics

Generally, housing within MWDOC's service area is becoming denser with addition of new residential units. This is apparent in many of the cities located in the northern and central areas of MWDOC's service area. Whereas in South Orange County, the southern portion of MWDOC's service area, there still remains open land suitable for further development and growth. As shown below in Table 3-5, the total number of dwelling units in the MWDOC service area is expected to increase by 7.4 percent in the next 25 years from 870,800 in 2020 to 934,984 in 2045.

Table 3-5: MWDOC Service Area Dwelling Units by Type

MWDOC Service Area Dwelling Units by Type						
Dwelling Units	2020	2025	2030	2035	2040	2045
Total	**870,800**	**894,953**	**906,206**	**921,751**	**927,884**	**934,984**
Single Family	435,011	438,288	440,878	444,562	445,293	445,872
All Other*	435,789	456,665	465,328	477,189	482,591	489,112

Source: Center for Demographic Research at California State University, Fullerton, 2020

*Includes duplex, triplex, apartment, condo, townhouse, mobile home, etc. Yachts, houseboats, recreational vehicles, vans, etc. are included if is primary place of residence. Does not include group quartered units, cars, railroad box cars, etc.

In addition to the types and proportions of dwelling units, various socio-economic factors such as age distribution, education levels, general health status, income and poverty levels affect MWDOC's water management and planning. Based on the U.S. Census Bureau's QuickFacts, OC has about 15.3 percent of population of 65 years and over, 21.7 percent under the age of 18 years and 5.8 percent under the age of 5 years. 85.5 percent of the OC's population with an age of more than 25 years has a minimum of high school graduate and 40.6 percent of this age group has at least a bachelor's degree.

3.4.3 CDR Projection Methodology

MWDOC contracts with CDR to update the historic population estimates for 2010 to the current year and provide an annual estimate of population served by each of its retail water suppliers within its service area. CDR uses geographic information system (GIS) mapping and data from the 2000 and 2010 U.S. Decennial Censuses, State Department of Finance (DOF) population estimates, and the CDR annual population estimates. These annual estimates incorporate annual revisions to the DOF annual population estimates, often for every year back to the most recent Decennial Census. As a result, all previous estimates were set aside and replaced with the most current set of annual estimates. Annexations and boundary changes for water suppliers are incorporated into these annual estimates.

In the summer of 2020, projections by water supplier for population and dwelling units by type were estimated using the 2018 Orange County Projections dataset. Growth for each of the five-year increments was allocated using GIS and a review of the traffic analysis zones (TAZ) with a 2019 aerial photo. The growth was added to the 2020 estimates by water supplier.

3.5 Land Uses

3.5.1 Current Land Uses

Land use within the service area of MWDOC is primarily residential. Based on the zoning designation collected and aggregated by Southern California Association of Governments (SCAG) in 2018 the current land use within the MWDOC's service area can be categorized as follows:

- Single family residential – 23.6%
- Multi-family residential – 7.3%
- Agriculture – 1.6%
- Commercial – 5.6%
- Industrial – 4.1%
- Institutional/Governmental – 7.1%
- Open space and parks – 32.6%
- Other – 17.2% (e.g., Undevelopable or Protected Land, Water, and Vacant)
- No land use designations – 0.9%

3.5.2 Projected Land Uses

Land uses in North OC and South OC are both predominantly residential. North OC is substantially built out, with a majority residential land uses with some mixed-use areas dedicated to commercial, institutional, and governmental uses. Future developments planned in North OC are mainly redevelopment and infill projects. South OC has a greater potential for development, with vacant areas gradually transitioning to residential and commercial mixed-use areas.

Moving forward, the following requirements and changes in laws will impact the future land use in OC:

- **Regional Housing Needs Assessment (RHNA)** - State law requires jurisdictions to provide their share of the RHNA allocation. SCAG determines the housing growth needs by income for local jurisdictions through RHNA. The cities will continue planning to meet their RHNA allocation requirements.
- **Accessory Dwelling Units (ADUs)** – ADUs are separate small dwellings embedded within residential properties. There has been an increase in the construction of ADUs in California in response to the rise in interest to provide affordable housing supply. The Legislature updated the ADU law effective January 1, 2020 to clarify and improve various provisions to promote the development of ADUs. (AB-881, "Accessory dwelling units," and AB-68, "Land use: accessory dwelling units") These include:
    - allowing ADUs and Junior Accessory Dwelling Units (JADUs) to be built concurrently with a single-family dwelling. JADUs max size is 500 sf.
    - opening areas where ADUs can be created to include all zoning districts that allow single-family and multi-family uses
    - maximum size cannot be less than 850 sf for a one-bedroom ADU or 1,000 sf for more than one bedroom (California Department of Housing and Community Development, 2020)

About 92% of the ADUs in California are being built in the single-family zoned parcels (University of California Berkeley, 2020). The increase in ADUs implies an increase in number of people per dwelling unit which translates to higher water demand.

4 WATER USE CHARACTERIZATION

4.1 Water Use Overview

One of the main objectives of this UWMP is to provide an insight into MWDOC's service area's future water demands. This section describes MWDOC's service area's current and future water demands (direct and indirect), factors that influence demands, and the methodology used to forecast of future water demands over the next 25 years.

As shown in Figure 4-1 and Table 4-1, MWDOC's service area's total water use was 427,701AF in Fiscal Year (FY) 2019-20. MWDOC is the wholesale provider of imported water that provides treated and untreated water from MET for municipal and industrial (M&I) (direct uses) and non-M&I (indirect uses) within its service area. MWDOC member agencies also use water from various other sources, including the OC Basin (managed by OCWD) and other smaller groundwater basins such as the Main San Gabriel Basin. OC San and South Orange County Wastewater Authority (SOCWA) are the wastewater providers of North county and South county agencies, respectively. A few MWDOC member agencies produce their own recycled water.

4.2 Past and Current Water Use

As shown below, MWDOC's service area's retail M&I total water usage has consistently exceeded 400,000 AFY until recently (Figure 4-1). Since FY 2013-14, retail water usage (including recycled water) has begun to trend downward, and FY 2015-16 was the first year that water use dropped below 400,000 AF. Nevertheless, MWDOC's service area population has continued to grow over the past 30 years (Figure 4-1). This trend is likely due to large-scale water efficiency efforts undertaken by MWDOC and its member agencies.

Note that FYs 2011-12 to 2015-16 represent the driest five-consecutive year historic sequence for MWDOC's service area water supply. This period included the driest four-year statewide precipitation on record (2012-15) and the smallest Sierra-Cascades snowpack on record (2015, with 5 percent of average). It was marked by extraordinary heat: 2014, 2015 and 2016 were California's first, second and third warmest year in terms of statewide average temperatures. Locally, Orange County rainfall for the five-year period totaled 36 inches, the driest on record. As a result, State mandated conservation goals were issued to retail water agencies throughout the state with the aim of reducing statewide water use by 25% as compared to the FY 2013-14 baseline.

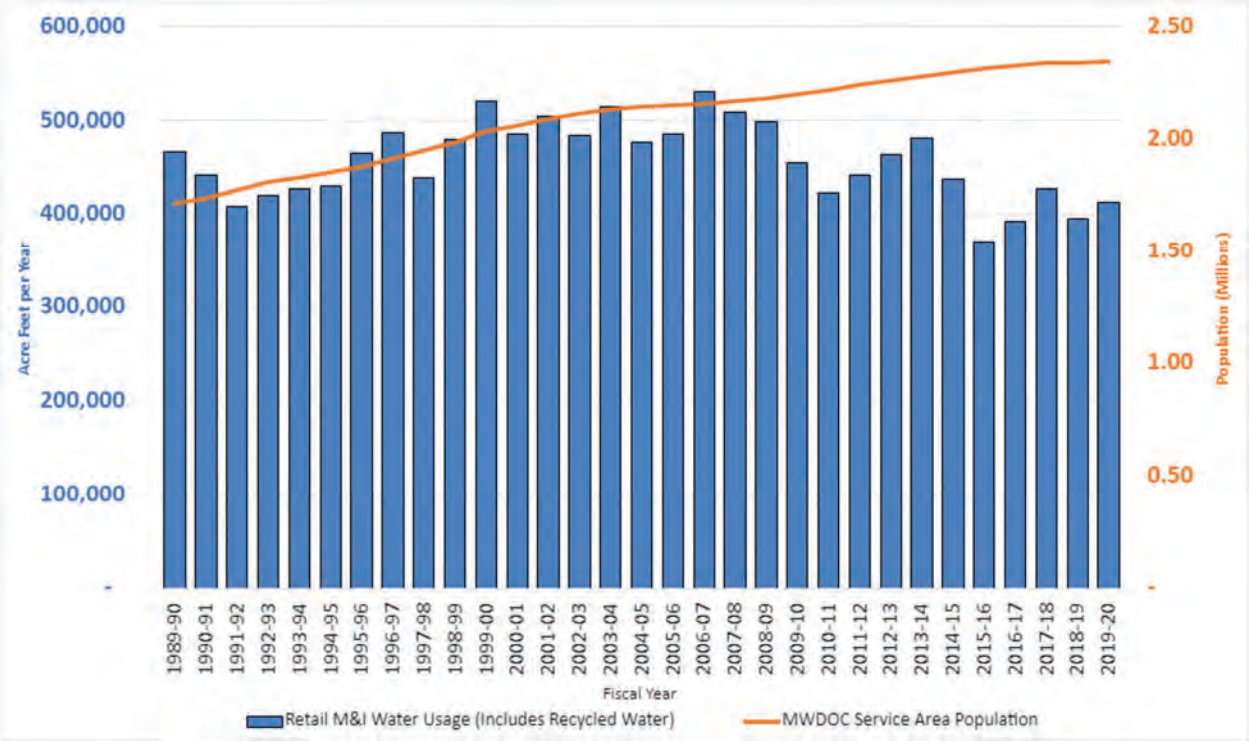


Figure 4-1: MWDOC's Service Area Historical Water Use and Population

Integrating M&I (direct) and non-M&I (indirect) usages of water in the planning process can be confusing and misleading and does not necessarily reflect the actual level of consumptive water demand in the region. In practice, the two types of water usage are often shown separately. Table 4-1 presents MWDOC's service area existing and future water use by source for these two types of uses separately. MWDOC's service area total water usage in FY 2019-20 was 427,701 AF; direct (M&I) usage accounted for 409,025 AF of that total (95.6%), while indirect (non M&I) uses accounted for the remainder (Table 4-1). The total usage was met through a combination of groundwater, imported water, surface water, and recycled water (Table 4-1**).** In FY 2019-20, about 45% of the total demand was met through OC Basin ground water.

Of note, while total water usage of all water sources is important to understand, MWDOC is the wholesale provider of only imported (untreated & treated) water from MET. In FY 2019-20, 161,555 AF of the total water demand was water from MET used for either direct or indirect uses (Table 4-2).

M&I treated and untreated imported water accounts for 33.4% of MWDOC's service area's total water use. 9.9% of total water use is recycled (non-potable) water that retail agencies use directly for M&I uses. Non M&I applications of MET water include groundwater replenishment (18,027 AF in FY 2019-20) and Irvine Lake fill (649 AF in FY 2019-20). Remaining contributions are detailed in Table 4-1.

Based on the Demand Forecast TM (Appendix H) methodology, MWDOC's service area's total water demands (by source) for the next 25 years are also shown in Table 4-1. By 2045, total water demand is projected to be 501,394 AF, a 17.2% increase (as compared to 2020 actuals). OC Basin groundwater is expected to continue providing a notable percentage of total water demand between 2020 and 2045 (roughly 47.1% in 2045).

Table 4-1: MWDOC's Service Area Existing and Future Water Use by Source

MWDOC Service Area Water Supply Projections (AF)						
Water Source	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
OCWD Basin GW[1]	192,652	231,936	236,430	236,506	236,280	236,274
Non-OCWD GW[1]	21,267	22,734	24,747	24,763	24,740	24,890
Recycled Water[1]	42,330	52,017	53,891	56,926	57,043	57,094
Surface Water[1]	9,897	4,700	4,700	4,700	4,700	4,700
MET (Retail M&I)[2]	142,879	119,743	120,573	123,502	123,107	122,819
Total M&I Demand	**409,025**	**431,130**	**440,341**	**446,397**	**445,870**	**445,777**
MET Irvine Lake Fill (Non-M&I)[2]	649	4,017	4,017	4,017	4,017	4,017
MET GW Replenishment (Non-M&I)[2,3]	18,027	51,600	51,600	51,600	51,600	51,600
Total non- M&I Demand	**18,676**	**55,617**	**55,617**	**55,617**	**55,617**	**55,617**
Total Water Demand	**427,701**	**486,747**	**495,958**	**502,014**	**501,487**	**501,394**

NOTES:

[1] Agency usage from various sources including OC Basin (managed by OCWD) and other smaller groundwater basins. OCWD and South Orange County Wastewater Authority (SOCWA) are the wastewater providers of North county and South county agencies, respectively. A few MWDOC member agencies produce their own recycled water.

[2] MWDOC is the wholesale provider of imported water that provides treated and untreated water from MET for M&I (direct) and non-M&I (indirect) uses within its service area.

[3] Includes indirect use which are Cyclic Program, Groundwater replenishment, and seawater barrier water.

MWDOC's wholesale demands for potable and non-potable water in 2020 totaled 161,555 AF (Table 4-2). Sales to agencies (treated and untreated imported water) comprised 88.4% of the total volume. Untreated imported water for groundwater recharge comprised 11.2%, and untreated import water for surface storage comprised 0.4% (Table 4-2). This table only includes water (potable and non-potable) that is purchased from MET and sold by MWDOC to their retail agencies and OCWD.

Table 4-2 Wholesale: Demands for Potable and Non-Potable Water – Actual

DWR Submittal Table 4-1 Wholesale: Demands for Potable and Non-Potable Water - Actual			
Use Type	2020 Actual		
	Additional Description	Level of Treatment When Delivered	Volume (AF)*
Sales to other agencies	MWD Treated and Untreated Imported Water	Drinking Water	142,879
Groundwater recharge	Untreated Import Water for Groundwater Recharge + Sea Water Barrier	Raw Water	18,027
Other Potable	Untreated Import Water for Surface Storage	Raw Water	649
		TOTAL:	161,555
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

4.2.1 Direct (M&I) Use – Municipal/Industrial and Agricultural Demands

Direct water use in Orange County includes municipal, industrial, and agricultural use. It represents, based on a 10-year average, approximately 81 percent of MWDOC's service area total demands. Demands for direct use are met through imported water (treated and untreated), groundwater, local surface water, and recycled water. M&I demands represent the full spectrum of water use within a region, including residential and commercial, industrial, institutional (CII), as well as un-metered uses (e.g., hydrant flushing, fire-fighting). Agricultural demands represent less than 1 percent of the total direct use. It has significantly decreased over the years due to development and urban growth within the service area.

4.2.2 Indirect (non-M&I) Use – Replenishment/Barrier and Surface Water Demands

Indirect water use in Orange County includes water to replenish groundwater basins and to serve as a barrier against seawater intrusion. It represents, based on a 10-year average, 19 percent of MWDOC's total demands. Most, if not all of the indirect water use delivered is for managing and replenishing the OC Basin. This water is purchased by OCWD, a special district created by the state and governed by a ten-member Board of Directors to protect, manage, and replenish the OC Basin with purchased imported water, storm water, and recycled water. OCWD further protects the groundwater basin from seawater intrusion through the injection of imported and recycled water along the coast, known as the Talbert Injection Barrier.

Since demands for replenishment of the groundwater basin storage and seawater barriers are driven by the availability of local supplies to OCWD, the demand forecast for this type of use is based on the projection of the following supplies under normal conditions:

- Santa Ana River Flows (Base flows & Storm flows);
- Incidental Recharge;
- Imported supplies from MET; and
- Recycled supplies for replenishment & seawater barrier use.

In addition to Replenishment and Barrier demands, MWDOC also provides imported water to meet the needs of surface water demands, such as those that occurs with respect to Irvine Lake. The water delivered to Irvine Lake is used for both consumptive purposes and water storage. Imported water delivered into Irvine Lake can be held for short or long periods of time to be later delivered for consumptive use. Based on a 10-year average, surface water supplies total 4,000 acre-feet per year (AFY) in Irvine Lake.

Figure 4-2 shows the historical demand of imported water for indirect consumption in MWDOC's service area. Since 2011, groundwater replenishment comprised much of the indirect water demands.
In FY 2019-20, this trend changed due to lower demands for groundwater, and thereby replenishment, primarily due to contamination of the groundwater basin from PFAS. In FY 2017-18, total demand for indirect imported water was higher than average due to an increase in in-lieu water deliveries because of the significant amount of imported water MET received due to the historical amounts of rainfall/snowfall in Northern California.

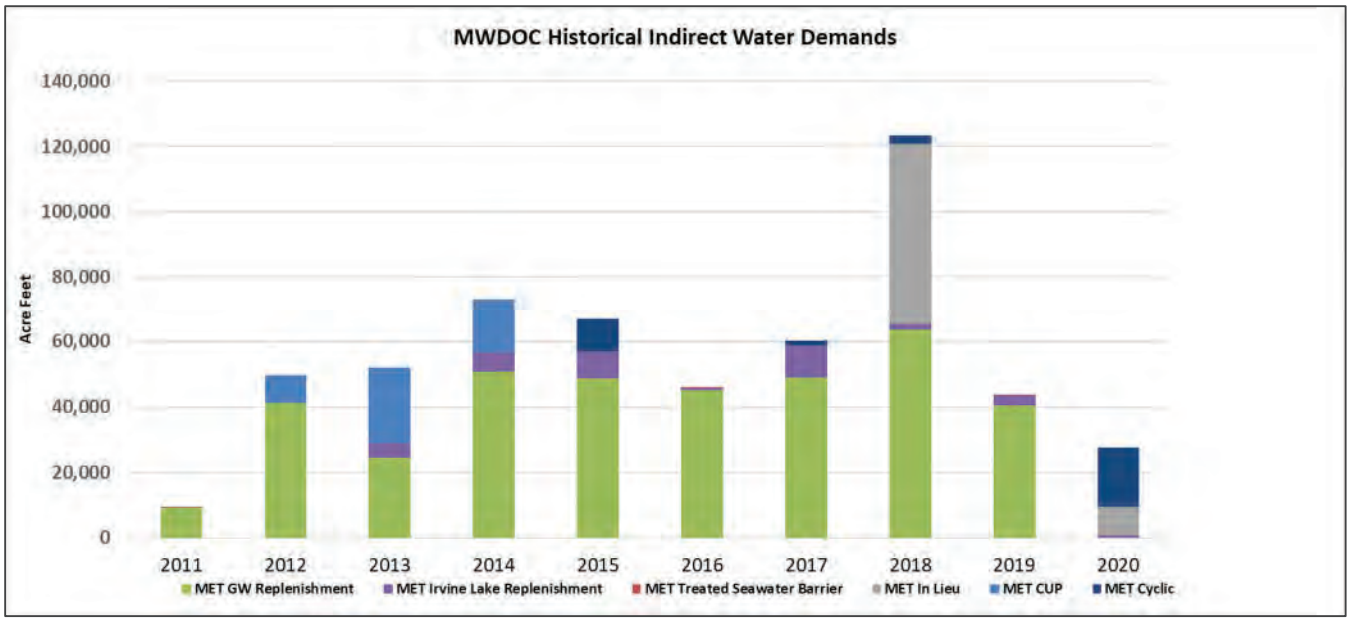


Figure 4-2: MWDOC's Historical Imported Water Use for Indirect Consumption

4.3 Water Use Projections

4.3.1 Water Use Projection Methodology

In 2021, MWDOC and OCWD, in collaboration with their member agencies, led the effort to update water demand projections originally done as part of the 2021 OC Water Demand Forecast for MWDOC and OCWD. The updated demand projections, prepared by CDM Smith, were for the Orange County region as a whole, and provided retail agency specific demands. The projections span the years of 2025-2050 and are based upon information surveyed from each Orange County water agency. Appendix H presents details of the projection methodology.

The forecast methodology began with a retail water agency survey that asked for FY 2017-18, FY 2018-19 and FY 2019-20 water use by major sector, including number of accounts. If a member agency provided recycled water to customers that information was also requested. Given that FY 2017-18 was a slightly above-normal demand year (warmer/drier than average) and FY 2018-19 was a slightly below-normal demand year (cooler/wetter than average), water use from these two years were averaged to represent an average-year base water demand.

For the residential sectors (single-family and multifamily) the base year water demand was divided by households in order to get a total per unit water use (gallons per home per day). In order to split household water use into indoor and outdoor uses, three sources of information were used, along with CDM Smith's expertise. The sources of information included: (1) *the Residential End Uses of Water* (Water Research Foundation, 2016); (2) California's plumbing codes and landscape ordinances; and (3) CA DWR's Model Water Efficient Landscape Ordinance (MWELO) calculator.

Three different periods of residential end uses of water were analyzed as follows:

- **Pre-2010 efficiency levels** – Has an average indoor water use that is considered to be moderately efficient, also does not include the most recent requirements for MWELO.
- **High-efficiency levels** – Includes the most recent plumbing codes that are considered to be highly efficient, and also includes the most recent requirements for MWELO.
- **Current average efficiency levels** – Represents the weighted average between pre-2010 efficiency and high efficiency levels, based on average age of homes for each retail water agency.

For outdoor residential water use, the indoor per capita total was multiplied by each member agency-specific persons per household in order to get an indoor residential household water use (gallons per day per home), and then was subtracted from the base year total household water use for single-family and multifamily for each agency based on actual water use as reported by the agency surveys.

For existing residential homes, the current average indoor and outdoor water use for each member agency were used for the year 2020. It was assumed that indoor water uses would reach the high efficiency level by 2040. Based on current age of homes, replacement/remodeling rates, and water utility rebate programs it is believed this assumption is very achievable. It was also assumed that current outdoor water use would be reduced by 5% by 2050.

For new homes, the indoor high efficiency level was assumed for the years 2025 through 2050. Outdoor uses for new homes were assumed to be 25% and 30% lower than current household water use for single-family and multifamily homes, respectively. This methodology is illustrated in Figure 4-3 below.

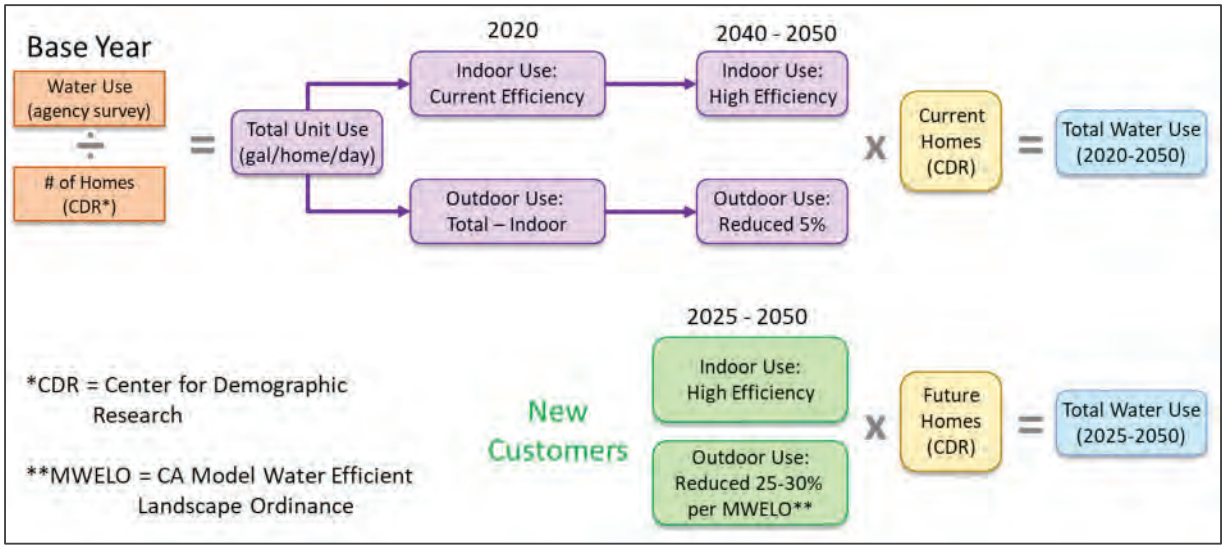


Figure 4-3 Water Use Projection Methodology Diagram

Existing and projected population, single-family and multifamily households for each retail water agency were provided by CDR under contract by MWDOC and OCWD. CDR provides historical and future demographics by census tracts for all of Orange County (Section 3.4). Census tract data is then clipped

to retail water agency service boundaries in order to produce historical and projected demographic data by agency.

For the CII water demands, which have been fairly stable from a unit use perspective (gallons/account/day), it was assumed that the unit demand in FY 2019-20 would remain the same from 2020-2025 to represent COVID-19 impacts. Reviewing agency water use data from FY 2017-18 through FY2019-20 revealed that residential water use increased slightly in FY 2019-20 while CII demands decreased slightly as a result of COVID-19. From 2030 to 2050, the average CII unit use from FY 2017-18 and 2018-19 was used. These unit use factors were then multiplied by an assumed growth of CII accounts under three broad scenarios:

- Low Scenario – assuming no growth in CII accounts
- Mid Scenario – assuming 0.5% annual growth in CII accounts
- High Scenario – assuming 1.5% annual growth in CII accounts

For most retail agencies, the Mid Scenario of CII account growth was used, but for those retail agencies that have had faster historical growth the High Scenario was used. For those retail agencies that have had relatively stable CII water demand, the Low Scenario was used.

For those agencies that supply recycled water for non-potable demands, we used agency-specified growth assumptions. Most agencies have already maximized their recycled water and thus are not expecting for this category of demand to grow. However, a few agencies in South Orange County do expect moderate growth in recycled water customers.

For large landscape customers served currently by potable water use, we assumed these demands to be constant through 2050, except for agencies that have growing recycled water demands. For the agencies that have growing recycled water demands, large landscape demands served by potable water were reduced accordingly. For non-revenue water, which represents the difference in total water production less all water billed to customers, this percentage constant through 2050.

A member agency's water use demand projection is the summation of their residential water demand, CII demands, large landscape and recycled water demands, and water losses all projected over the 25-year time horizon. These demands were provided to each of the Orange County water agencies for their review, feedback, and revision before being finalized.

The MWDOC regional water demand projection was collaboratively developed between MWDOC and its member agencies. This collaboration involved the projection model developed by CDM Smith as well as specific assumptions provided by MWDOC's member agencies. There were also some specific retail agency projections that were utilized in the MWDOC regional demand projections. Each MWDOC Member Agency water demand projections, analyses, methodologies, and assumptions can be found in their respective UWMPs.

4.3.1.1 Weather Variability and Long-Term Climate Change Impacts

In any given year water demands can vary substantially due to weather. In addition, long-term climate change can have an impact on water demands into the future. For the 2014 OC Water Reliability Study, CDM Smith developed a statistical model of total water monthly production from 1990 to 2014 from a

sample of retail water agencies. This model removed impacts from population growth, the economy and drought restrictions in order to estimate the impact on water use from temperature and precipitation.

The results of this statistical analysis are:

- Hot/dry weather demands will be 5.5% greater than current average weather demands
- Cooler/wet weather demands will be 6% lower than current average weather demands
- Climate change impacts will increase current average weather demands by:
    - 2% in 2030
    - 4% in 2040
    - 6% in 2050

4.3.2 25-Year Water Use Projection

4.3.2.1 Water Use Projections for 2021-2025

Total demands (direct and indirect) are met through imported water (treated and untreated), groundwater, local surface water, and recycled water. MWDOC utilizes total demands to incorporate the best available planning information when projecting the imported water demands of its service area. As shown in Table 4-3 below, MWDOC's total service area water demands are expected to gradually increase in the first three years (2021 to 2023) due to projected growth in the service area's M&I demands; however, the bulk of the increase in demands are projected in the last two years, as a result of indirect imported demands for groundwater replenishment returning in the years 2024 and 2025.

The current regulatory impacts of PFAS in the OC Basin has reduced the need for purchasing any imported groundwater replenishment water, due to reductions in groundwater pumping. This is expected to last over the next three years (2021 to 2023), under normal hydrological conditions. However, with groundwater treatment anticipated to be online for a number of retail agencies in the years 2023 and 2024, groundwater production is expected to increase. Thus, OCWD estimates a gradual need of imported replenishment water in years 2024 and 2025. With the final expansion of OCWD's Groundwater Replenishment System (GWRS) online in 2023, the future need of imported replenishment water is expected to average 51,600 AF per year.

Table 4-3: MWDOC's Service Area Total Potable and Non-Potable Demand Projections for 2021-2025

Total Water Demand					
Fiscal Year Ending	2021	2022	2023	2024	2025
Total Water Demand (AF)	431,539	435,377	439,215	461,948	486,747
NOTES: This assumes no replenishment water in 2021, 2022, and 2023 due impacts from PFAS.					

4.3.2.2 Water Use Projections for 2025-2045

Under normal conditions, total direct and indirect water demands are projected to increase to 501,394 AF by the year 2045, an increase of about 3% between 2025 and 2045 (Table 4-4). This demand projection comes from MWDOC's Demand Forecast TM update done in 2021, that considered such factors as

current and future demographics, future conservation measures, and ground & surface water needs. Section 4.3.1 offers a description of the methodology used to calculated MWDOC's demand projections.

Table 4-4: MWDOC's Service Area Total Potable and Non-Potable Demand Projections for 2025-2045

Total Water Demand					
Fiscal Year Ending	2025	2030	2035	2040	2045
Total Water Demand (AF)	486,747	495,958	502,014	501,487	501,394
NOTES:					

Table 4-5 presents 2025-2045 demand projections for water (potable and non-potable) that is purchased from MET and sold by MWDOC to their retail agencies and OCWD. Projections for groundwater recharge and other potable uses (i.e., Irvine Lake fill) are expected to remain constant between 2025 and 2045. Sales to other agencies is expected to rise by about 2.5% (comparing 2025 values to 2045 values).

Table 4-5: Wholesale: Use for Potable and Raw Water – Projected

DWR Submittal Table 4-2 Wholesale: Use for Potable and Raw Water - Projected						
Use Type	Additional Description	Projected Water Use (AF) *				
		2025	2030	2035	2040	2045 (opt)
Sales to other agencies	MWD (Retail M&I)	119,743	120,573	123,502	123,107	122,819
Groundwater recharge	MWD GW Replenishment (Non-M&I)	51,600	51,600	51,600	51,600	51,600
Other Potable	MWD Irvine Lake Fill (Non-M&I)	4,017	4,017	4,017	4,017	4,017
	TOTAL:	175,360	176,190	179,119	178,724	178,436
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

A comparison of actual (2020) and projected (2025-2045) wholesale total water use is presented in Table 4-6 below.

Table 4-6: Wholesale: Total Water Use (Potable and Non-Potable)

DWR Submittal Table 4-3 Wholesale: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable and Raw Water From Tables 4-1W and 4-2W	161,555	175,360	176,190	179,119	178,724	178,436
Recycled Water Demand* From Table 6-4W	0	0	0	0	0	0
TOTAL WATER DEMAND:	161,555	175,360	176,190	179,119	178,724	178,436
NOTES: Volumes in AF.						

4.4 Water Loss

MWDOC is a recognized industry leader in Water Loss programs and activities. While MWDOC does not own or operate any transmission or distribution system themselves, MWDOC helps member agencies evaluate and reduce their distribution systems' real and apparent losses through comprehensive Water Loss Control Programs. In 2015, the MWDOC Board of Directors authorized staff to begin implementing a Water Loss Control Technical Assistance Program (TAP) to support member agency compliance with Senate Bills 1420 and 555, both of which address distribution system Water Loss. The TAP program established a menu of technical assistance that water retailers can elect to participate in. These programs connect water retailers with industry experts who provide one on one technical assistance through data analysis, agency specific advising, and assessment. The TAP services offered by MWDOC include Water Balance Compilation, Component Analysis of Real and Apparent Losses, Source/Production Meter Accuracy Testing, Billing Data Chain Assessment, and Internal Water Loss Committee Planning. MWDOC's Water Loss Control TAP has a very positive impact on building knowledge of water loss recovery strategies by all retail water agencies in the County and implementation of those strategies. To date MWDOC has hosted 30 Water Loss Work Group Meetings with approximately 35 agency representatives' attending each meeting. A total of 137 Annual Water Balances have been compiled and validated over the last five years, vastly improving water agency understanding of volumes of real and apparent losses, strategies to recovery losses and value of losses.

Due to the success of the TAP program, MWDOC began to consider other services that would assist in controlling water loss. In 2019, the MWDOC Board authorized the implementation of a Water Loss Control Shared Services Business Plan (Business Plan) based on the needs outlined in the survey and the direction of the Water Loss Control Performance Standards currently in development. Services provided under the program available to MWDOC member agencies include Water Balance Validation, Customer Meter Accuracy Testing, Distribution System Pressure Surveys, Distribution System Leak

Detection, Suspected Leak Investigations, and No Discharge Distribution System Flushing (No-DES). Since the start of the shared services program in August 2019, more than 780 miles of distribution system leak detection has been completed, which resulted in discovery of 373 hidden leaks that have been repaired or are in the process of being repaired. These leak repairs result in recovering more than 84.5 million gallons of water valued at more than $300,000 per year. A total of 1,439 water meter accuracy tests have been completed by 6 agencies improving agency knowledge of meter performance and accuracy of water balance results. A total of thirty-two sites have been monitored during pressure surveys for three agencies that were used to calculate average system pressure, calibrate hydraulic models and investigate pressure anomalies. And lastly, 12 miles of distribution system mains have been flushed resulting in improved water quality for consumers and recovery of 176,200 gallons of water that was filtered and returned to the distribution system for beneficial use.

5 CONSERVATION TARGET COMPLIANCE

The Water Conservation Act of 2009, also known as SBx7-7 (Senate Bill 7 as part of the Seventh Extraordinary Session), signed into law on February 3, 2010, requires the State of California to reduce urban water use by 20 percent by the year 2020 (20x2020). To achieve this each retail urban water supplier must determine baseline water use during their baseline period and target water use for the years 2015 and 2020 to meet the state's water reduction goal. Retail water suppliers are required to comply with SBx7-7 individually or as a region in collaboration with other retail water suppliers, or demonstrate they have a plan or have secured funding to be in compliance, in order to be eligible for water related state grants and loans on or after July 16, 2016.

As a wholesale water supplier, MWDOC is not required to establish a baseline or set targets for daily per capita water use. However, it is required to provide an assessment of its present and proposed future measures, programs and policies that will help its retail water suppliers achieve their SBx7-7 water use reduction targets. One of the ways MWDOC is assisting its retail agencies is by leading the coordination of Orange County Regional Alliance for all of the retail agencies in Orange County. MWDOC's role is to assist each retail water supplier in Orange County in analyzing the requirements and establishing their baseline and target water use, as guided by DWR.

The following sections describe the efforts by MWDOC to assist retail agencies in complying with the requirements of SBx7-7, including the formation of a Regional Alliance to provide additional flexibility to all water suppliers in Orange County. This section also includes the documentation of calculations that allow retail water suppliers to use recycled water for groundwater recharge (indirect reuse) to offset a portion of their potable demand when meeting the regional as well as individual water use targets for compliance purposes. A discussion of programs implemented to support retail agencies in achieving their per capita water reduction goals is covered in Section 9 – Demand Management Measures of this UWMP.

5.1 Orange County 20x2020 Regional Alliance

MWDOC in collaboration with all of its retail agencies as well as the Cities of Anaheim, Fullerton, and Santa Ana, has created the Orange County 20x2020 Regional Alliance in an effort to create flexibility in meeting the daily per capita water use targets. This Regional Alliance allows all of Orange County to benefit from regional investments, such as the GWRS, recycled water, and water conservation programs. The members of the Orange County 20x2020 Regional Alliance are shown in Table 5-1.

Table 5-1: Members of Orange County 20x2020 Regional Alliance

Orange County 20x2020 Regional Alliance	
Anaheim	MNWD
Brea	Newport Beach
Buena Park	Orange
EOCWD	San Clemente
ETWD	San Juan Capistrano
Fountain Valley	Santa Ana
Fullerton	Santa Margarita Water District
Garden Grove	Seal Beach
GSWC	Serrano
Huntington Beach	SCWD
IRWD	TCWD
La Habra	Tustin
La Palma	Westminster
LBCWD	YLWD
Mesa Water	

Within a Regional Alliance, each retail water supplier will have an additional opportunity to achieve compliance under either an individual target or a regional water use target.

- If the Regional Alliance meets its water use target on a regional basis, all agencies in the alliance are deemed compliant.
- If the Regional Alliance fails to meet its water use target, each individual supplier will have an opportunity to meet their water use targets individually.

Individual water suppliers in the Orange County 20x2020 Regional Alliance will state their participation in the alliance and include the regional 2015 and 2020 water use targets in their individual UWMPs.

As the reporting agency for the Orange County 20x2020 Regional Alliance, MWDOC has documented the calculations for the regional urban water use reduction targets. MWDOC will also provide annual monitoring and reporting for the region on progress toward the regional per capita water use reduction targets.

5.2 Water Use Target Calculations

To preserve maximum flexibility in the Orange County 20x2020 Regional Alliance, each water supplier in the Regional Alliance first calculates its individual target in its retail UWMP as if it were complying individually. Then, the individual targets are weighted by each supplier's population and averaged over all members in the alliance to determine the regional water use target.

5.2.1 Retail Agency Compliance Targets

As described above, the first step in calculating a regional water use target is to determine each water supplier's individual target. DWR has established four target options for urban retail water suppliers to choose from in calculating their water use reduction targets under SBx7-7. The four options are as follows:

- *Option 1* requires a simple 20 percent reduction from the baseline by 2020 and 10 percent by 2015.
- *Option 2* employs a budget-based approach by requiring an agency to achieve a performance standard based on three metrics
    - Residential indoor water use of 55 gallons per capita per day (GPCD)
    - Landscape water use commensurate with the Model Landscape Ordinance
    - 10 percent reduction in baseline CII water use
- *Option 3* is to achieve 95 percent of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan.
- *Option 4* requires the subtraction of Total Savings from the baseline GPCD:
    - Total savings includes indoor residential savings, meter savings, CII savings, and landscape and water loss savings.

MWDOC has analyzed each of these options and has worked with all retail agencies in Orange County to assist them in selecting the most suitable option in 2010 and 2015. In 2015, retail water agencies may update their 2020 water use target using a different target method than was used in 2010. However, the target method is not permitted to change after the 2015 UWMP is submitted with the exception of having changes to the distribution service area.

5.2.2 Regional Targets Calculation and 2020 Compliance

The regional water use targets for the Orange County 20x2020 Regional Alliance are calculated by weighting the individual retail agency water use targets by population and averaging them over all members of the alliance (Appendix B1). The calculation of the baseline water use and water use targets in the 2010 UWMP was based on the 2000 U.S. Census population numbers obtained from CDR. In 2015, the baseline water use and water use targets for all retail agencies have been revised using population numbers based on the 2010 U.S. Census obtained from CDR in 2012.

The regional alliance target calculation is provided below in Table 5-2. Column (1) and (2) show the 2015 and 2020 population for each individual supplier. The individual targets, including appropriate deductions for recycled water, for each supplier is provided in column (3) for the 2015 interim targets, and column (4) for the 2020 final targets.

To calculate the weighted averages for each retail water supplier, the population is multiplied by the individual targets to get a weighted total for each individual supplier. This is found in column (3) for the 2015 interim targets and in column (5) for the 2020 final targets. The regional targets for the Orange County 20x2020 Regional Alliance are then derived as the sum of the individual weighted averages divided by the total population for a regional alliance.

For example, the 2020 water use target for the City of Brea is 221 GPCD, and the 2020 population is 45,317. By multiplying this 2020 target by the population, the result is a weighted average of 10,003,978. The sum of the weighted averages for all members of the Orange County 20x2020 Regional Alliance is 505,077,088. By dividing this weighted total by the regional population of 3,185,461, the resulting regional 2020 water use target is 159 GPCD.

The source of the information in Table 5-2, including the population figures, is from within the individual 2020 UWMPs for each water supplier in the Orange County 20x2020 Regional Alliance.

Table 5-2: Calculation of Regional Urban Water Use Targets for Orange County 20x2020 Regional Alliance

Calculation of Regional Compliance Daily Per Capita Water Use						
Orange County 20x2020 Regional Alliance	(1) 2015 Population	(2) 2020 Population	(3) Individual Targets 2015	(4) Weighted Total 2015	(5) Individual Targets 2020	(6) Weighted Total 2020
Brea	42,943	45,317	248	10,664,892	221	10,003,978
Buena Park	82,495	82,023	178	14,687,524	158	12,980,878
EOCWD RZ	3,252	3,210	261	850,233	232	746,002
ETWD	48,579	47,911	183	8,905,378	163	7,807,042
Fountain Valley	57,768	56,747	157	9,049,547	142	8,032,538
Garden Grove	176,666	176,635	152	26,922,535	142	25,002,684
GSWC	169,213	168,108	157	26,567,284	142	23,795,687
Huntington Beach	197,787	201,327	151	29,937,195	142	28,497,837
IRWD	378,245	418,163	192	72,503,652	170	71,249,163
La Habra	61,913	61,923	151	9,353,551	150	9,304,086
La Palma	15,921	15,567	149	2,371,281	140	2,179,079

Calculation of Regional Compliance Daily Per Capita Water Use						
Orange County 20x2020 Regional Alliance	(1) 2015 Population	(2) 2020 Population	(3) Individual Targets 2015	(4) Weighted Total 2015	(5) Individual Targets 2020	(6) Weighted Total 2020
LBCWD	20,103	19,468	183	3,684,178	163	3,171,382
Mesa Water	109,542	111,051	163	17,814,705	145	16,053,433
MNWD	168,999	170,236	194	32,829,113	173	29,395,029
Newport Beach	63,229	61,916	228	14,407,217	203	12,540,480
Orange	138,647	138,995	203	28,156,956	181	25,091,226
San Clemente	51,280	51,065	172	8,817,256	153	7,804,701
San Juan Capistrano	37,987	38,301	206	7,832,864	183	7,020,098
Santa Margarita WD	156,469	161,264	190	29,688,827	169	27,198,793
Seal Beach	24,001	24,000	149	3,570,691	142	3,397,200
Serrano WD	6,421	6,263	434	2,785,481	386	2,415,057
South Coast WD	34,993	34,232	169	5,916,823	150	5,145,021
Trabuco Canyon WD	12,747	12,921	233	2,973,383	200	2,581,514
Tustin	67,611	66,421	170	11,500,554	151	10,042,788
Westminster	94,394	94,068	137	12,900,652	130	12,232,790
Yorba Linda WD	74,741	75,608	266	19,899,036	237	17,893,214
Anaheim	361,290	365,987	183	65,977,152	162	59,408,797
Fullerton	140,672	141,648	201	28,253,525	179	25,288,490
Santa Ana	338,336	335,086	123	41,538,549	116	38,731,637
Regional Alliance Total	3,136,244	3,185,461	**173**	550,360,035	**159**	505,010,624

Table 5-3 provides the regional urban water use targets for the Orange County 20x2020 Regional Alliance – the 2015 target is 173 GPCD and the 2020 target is 159 GPCD. The actual 2015 GPCD achieved by the regional alliance is 125 GPCD indicating that not only has the region met its 2015 target but it has already well below its 2020 water use target. This is indicative of the collective efforts of MWDOC and retail agencies in reducing water use in the region. Note, the target and actual GPCD values listed include appropriate deductions for recycled water used for indirect potable reuse (IPR) as detailed below.

Table 5-3: Urban Water Use Target and Actual GPCD for Orange County 20x2020 Regional Alliance

	2020 Target GPCD	2020 Actual GPCD
Orange County 20X2020 Regional Alliance	159	109

5.2.3 Deducting Recycled Water Used for IPR

SBx7-7 allows urban retail water suppliers to calculate a deduction for recycled water entering their distribution system indirectly through a groundwater source. Individual water suppliers within the OC Basin have the option of choosing this deduction to account for the recharge of recycled water into the OC Basin by OCWD, historically through Water Factory 21, and more recently by GWRS. These deductions also benefit all members of the Orange County 20x2020 Regional Alliance.

MWDOC has provided the documentation for the calculations of this deduction to assist retail water suppliers if they choose to include recycled water for IPR in their individual targets. This calculation is applied as a deduction from the water supplier's calculation of Gross Water Use. Table 5-4 provides the calculation to deduct recycled water for IPR for OC Basin Agencies. Because year-to-year variations can occur in the amount of recycled water applied in a groundwater recharge operation, a previous five-year average of recharge is used, as found in column (1). To account for losses during recharge and recovery, a factor of 96.5 percent is applied in column (2). After accounting for these losses, the estimated volume of recycled water entering the distribution system is calculated in column (3).

In column (4), the annual deduction for recycled water for IPR is expressed as a percentage of the total volume of water extracted from the OC Basin in that year. This is the annual percentage of total OCWD basin production that is eligible for a deduction. For individual water suppliers in the OC Basin, the annual deduction is calculated as their basin pumping in a given year multiplied by the value in column (4).

For example, if Agency A pumped 10,000 AF of water from the OC Basin in FY 2004-05, then 1.47 percent of that total production would be deducted from the agency's calculation of Gross Water Use for that year as found in column (4). This equates to a deduction of 147 AF.

The deductible amount of indirect recycled water increased from 66,152 AF in 2015 to approximately 94,235 AF in 2020 as a result of the full production from GWRS. OCWD has additional expansion plans for GWRS, which are expected to further increase the deductible amount of indirect recycled water up to approximately 145,600 AF, or 130 million gallons per day (MGD).

Table 5-4: Calculation of Annual Deductible Volume of Indirect Recycled Water Entering Distribution System

Deduct Recycled Water Used for IPR [1]						
Fiscal Year Ending	Total Groundwater Recharge	(1) 5-Year Average Recharge (AF)	(2) Loss Factor for Recharge & Recovery	(1) x (2) = (3) Volume Entering Distribution System (AF)	Total Basin Production (AF)	(4) Percent of Total Basin Production
1990	6,498	6,498	96.5%	6,271	229,878	2.73%
1991	6,634	6,498	96.5%	6,271	235,532	2.66%
1992	6,843	6,566	96.5%	6,336	244,333	2.59%
1993	8,161	6,658	96.5%	6,425	243,629	2.64%
1994	5,042	7,034	96.5%	6,788	237,837	2.85%
1995	2,738	6,636	96.5%	6,403	276,096	2.32%
1996	4,282	5,884	96.5%	5,678	302,273	1.88%
1997	4,389	5,413	96.5%	5,224	310,217	1.68%
1998	2,496	4,922	96.5%	4,750	297,726	1.60%
1999	3,489	3,789	96.5%	3,657	322,476	1.13%
2000	5,774	3,479	96.5%	3,357	320,250	1.05%
2001	2,067	4,086	96.5%	3,943	323,129	1.22%
2002	4,143	3,643	96.5%	3,515	322,590	1.09%
2003	3,867	3,594	96.5%	3,468	274,927	1.26%
2004	1,784	3,868	96.5%	3,733	272,954	1.37%
2005	4,156	3,527	96.5%	3,404	232,199	1.47%
2006	4,086	3,203	96.5%	3,091	215,172	1.44%
2007	218	3,607	96.5%	3,481	284,706	1.22%
2008	17,792	2,822	96.5%	2,723	351,622	0.77%
2009	54,261	5,607	96.5%	5,411	310,586	1.74%
2010	65,950	16,103	96.5%	15,539	273,889	5.67%

Deduct Recycled Water Used for IPR [1]						
Fiscal Year Ending	Total Groundwater Recharge	(1) 5-Year Average Recharge (AF)	(2) Loss Factor for Recharge & Recovery	(1) x (2) = (3) Volume Entering Distribution System (AF)	Total Basin Production (AF)	(4) Percent of Total Basin Production
2011	66,083	28,461	96.5%	27,465	251,622	10.92%
2012	71,678	40,861	96.5%	39,431	235,222	16.76%
2013	72,877	55,153	96.5%	53,223	298,175	17.85%
2014	66,167	66,170	96.5%	63,854	318,967	20.02%
2015	76,546	68,551	96.5%	66,152	293,903	22.51%
2016	100,347	70,670	96.5%	68,197	262,795	25.95%
2017	94,081	77,523	96.5%	74,810	282,257	26.50%
2018	103,990	82,004	96.5%	79,134	228,146	34.69%
2019	93,399	88,226	96.5%	85,138	290,749	29.28%
2020	94,235	93,673	96.5%	90,394	271,263	33.32%

NOTES:
[1] Indirect is recycled water for groundwater recharge through spreading and injection of GWRS and Water Factory 21. The yearly totals are apportioned among the OCWD Basin agencies on the basis of groundwater production over a five year rolling average.

[2] Loss factor provided by OCWD, includes loss over county lines to LA Basin.

6 WATER SUPPLY CHARACTERIZATION

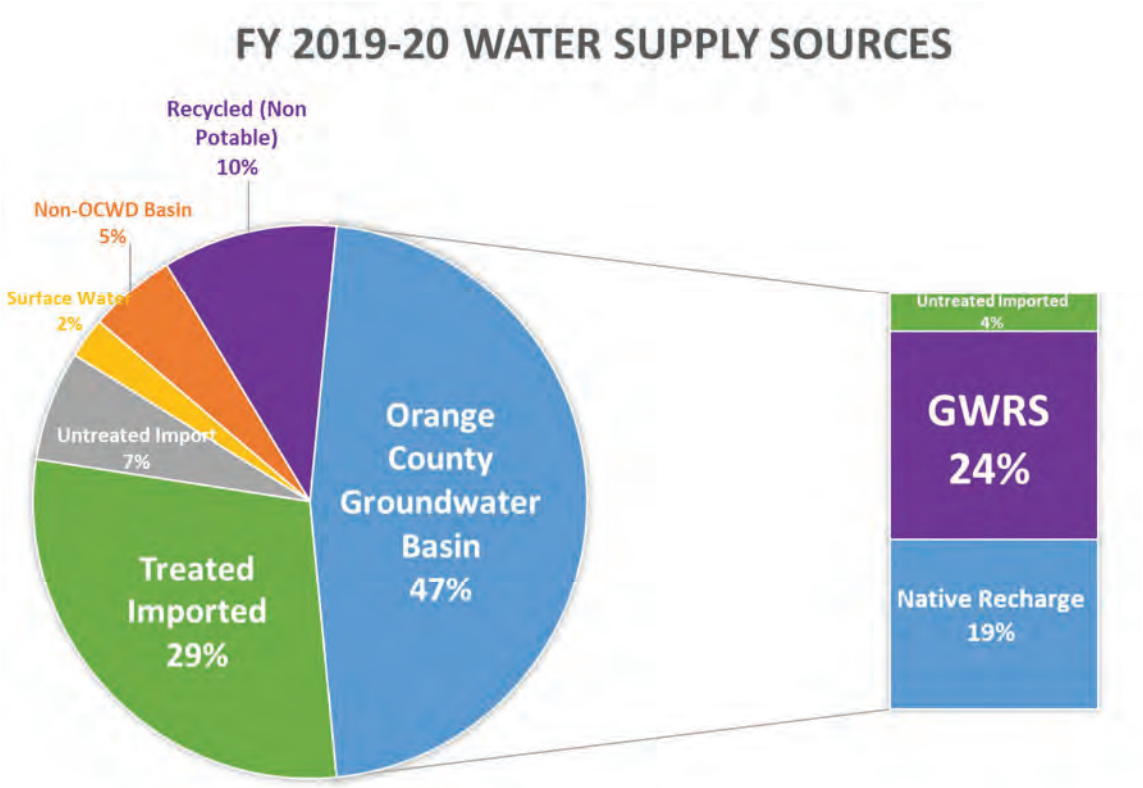
As a counterpart to Section 4's Water Use Characterization, this section characterizes MWDOC's water supply along with a description of the groundwater, wastewater and recycled water provided by other agencies. This section includes identification and quantification of water supply sources through 2045, descriptions of each water supply source and their management, opportunities for exchanges and transfers, and discussion regarding any planned future water supply projects. This section also includes the energy intensity of the water service, a new UWMP requirement.

6.1 Water Supply Overview

Water supplies within MWDOC's service area are from local and imported sources. MWDOC is the regional wholesaler of imported water purchased from MET, which is sourced from the CRA and SWP. Local retail agencies and one local wholesale agency purchase imported water through MWDOC to supplement their local supplies. In FY 2019-20, MWDOC supplied approximately 142,879 AFY of treated and untreated imported water to its retail agencies for M&I purposes and 18,675 AFY for groundwater replenishment (Cyclic Storage) and surface water purposes. In FY 2019-20, imported water represented 36 percent of total water supply in the MWDOC service area. However, imported water volume varies vary year to year; over the last 10 years, it has represented 39 percent of total M&I water supply.

Local supplies developed by other entities and retail agencies include groundwater, recycled water, and surface water. Local sources presently account for 65 percent of the service area's water supplies, whereby groundwater is the major source of local supply. The primary groundwater basin, OC Basin, is located in the northern portion of MWDOC's service area and is managed by OCWD. OCWD also provides advanced treatment to secondary treated wastewater from Orange County Sanitation District (OC San) to produce recycled water for various water agencies in north Orange County. In south Orange County, there are a number of water agencies that provide their own wastewater treatment, to produce recycled water. A relatively minimal amount of MWDOC's water supply portfolio – approximately two percent in FY 2019-20 – is attributed to surface water.

Figure 6-1 shows a breakdown of all sources within MWDOC's service area. Although MWDOC only delivers imported water to its retail agencies, other sources of water are obtained locally and are specific to each retail agency. Note that GWRS supplies are included as part of groundwater pumping numbers.

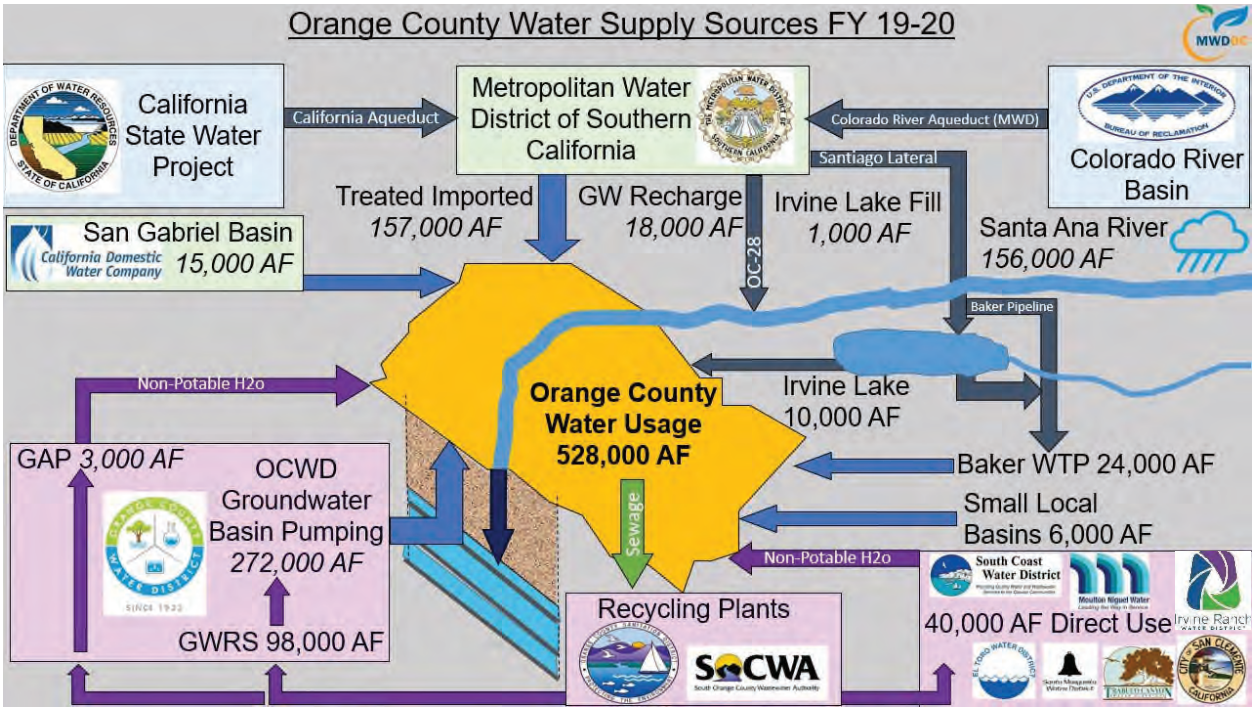


Note: Supplies are specific to the MWDOC Service Area. The Orange County Water Basin water supply can further be broken down by the sources of supply on the right and are intented to add up to the total 47% of water supplies that the Orange County Groundwater Basin represents.

Figure 6-1: FY 2019-20 Water Supply Sources within MWDOC's Service Area

MWDOC and its retail agencies collectively work together to improve the water reliability within the service area by developing additional local supplies, implementing water use efficiency efforts, and expanding local projects. MWDOC also works in collaboration with two primary agencies – MET and OCWD – to ensure a safe and high-quality water supply to Orange County.

Figure 6-2 illustrates the different water sources in MWDOC's service area and for all of Orange County.



Note: Supplies are for Orange County, which include MWDOC member agencies as well as the cities of Anaheim, Fullerton, and Santa Ana.

Figure 6-2: Orange County Water Supply Sources

Although MWDOC supports the various water supply sources for agencies within MWDOC's service area, MWDOC supplies only imported water. In FY 2019-20, MWDOC used its imported water supplies for M&I uses, groundwater recharge, and surface storage (Table 6-1).

MWDOC's projected water supply sources from MET for M&I are expected to increase through 2045, with the imported water for groundwater recharge and surface storage projected to remain the same (Table 6-2). The following subsections will provide a detailed discussion of the water supply sources in MWDOC's service area, as well as evaluate MWDOC's projected supply for the next 25 years.

Table 6-1: Wholesale: Water Supplies – Actual

DWR Submittal Table 6-8 Wholesale: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	**2020**	
		Actual Volume (AF)	Water Quality
Purchased or Imported Water	From MET for Municipal & Industrial	142,879	Drinking Water
Purchased or Imported Water	From MET for Groundwater Recharge	18,027	Other Non-Potable Water
Purchased or Imported Water	From MET for Surface Storage	649	Other Non-Potable Water
	Total:	161,555	
NOTES: Source: MWDOC UWMP Supply Projections, 2021			

Table 6-2: Wholesale: Water Supplies – Projected

DWR Submittal Table 6-9 Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	**Projected Water Supply (AF)**				
		2025	**2030**	**2035**	**2040**	**2045**
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Purchased or Imported Water	From MET for Municipal & Industrial	119,743	120,573	123,502	123,107	122,819
Purchased or Imported Water	From MET for Groundwater Recharge	51,600	51,600	51,600	51,600	51,600
Purchased or Imported Water	From MET for Surface Storage	4,017	4,017	4,017	4,017	4,017
	Total:	175,360	176,190	179,119	178,724	178,436
NOTES: Source: MWDOC UWMP Supply Projections and OCWD, 2021						

6.2 Imported Water

In FY 2019-20, 36 percent of MWDOC's water supply portfolio was attributed to treated and untreated imported water. MWDOC purchases water from MET and distributes this water to its 28 member agencies to supplement local supplies. MET's two principal sources of water are the Colorado River and the SWP. MET receives water from the Colorado River through the CRA and from the SWP through the California Aqueduct. For Orange County, the water obtained from these sources is treated at the Robert B. Diemer Filtration Plant located in Yorba Linda. Typically, the Diemer Filtration Plant receives a blend of Colorado River water from Lake Mathews through the MET Lower Feeder and SWP water through the Yorba Linda Feeder.

6.2.1 Metropolitan Water District of Southern California

MET is the largest water wholesaler for domestic and municipal uses in California, serving approximately 19 million customers. MET wholesales imported water supplies to 26 member cities and water districts in six southern California counties. Its service area covers the southern California coastal plain, extending approximately 200 miles along the Pacific Ocean from the City of Oxnard in the north to the international boundary with Mexico in the south. This encompasses 5,200 square miles and includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. Approximately 85 percent of the population from these counties reside within MET's boundaries.

MET is governed by a Board of Directors comprised of 38 appointed individuals with a minimum of one representative from each of MET's 26 member agencies. The allocation of directors and voting rights are determined by each agency's assessed valuation. Each member of the Board is entitled to cast one vote for each ten million dollars ($10,000,000) of assessed valuation of property taxable for district purposes, in accordance with Section 55 of the Metropolitan Water District Act. Directors can be appointed through the chief executive officer of the member agency or by a majority vote of the governing board of the agency. Directors are not compensated by MET for their service (The Metropolitan Water District Act, 1969).

MET is responsible for importing water into the region through its operation of the CRA and its contract with the State of California for SWP supplies. Major imported water aqueducts bringing water to southern California are shown in

Figure 6-3. Member agencies receive water from MET through various delivery points and pay for service through a rate structure made up of volumetric rates, capacity charges and readiness to serve charges. Member agencies provide estimates of imported water demand to MET annually in April regarding the amount of water they anticipate they will need to meet their demands for the next five years.

In Orange County, MWDOC and the cities of Anaheim, Fullerton, and Santa Ana are MET member agencies that purchase imported water directly from MET. Furthermore, MWDOC purchases both treated potable and untreated water from MET to supplement its retail agencies' local supplies. Figure 6-4 illustrates the MET feeders and major transmission pipelines that deliver water within Orange County.

Figure 6-3: Major Aqueducts that Supply Water to Southern California

Figure 6-4: MET Feeders and Transmission Mains that Serve Orange County

6.2.1.1 MET's 2020 Urban Water Management Plan

MET's 2020 UWMP reports on its water reliability and identifies projected supplies to meet the long-term demand within its service area. The MET 2020 UWMP discusses the current water supply conditions and long-term plans for supply implementation and continued development of a diversified resource mix. It describes the programs being implemented such as the CRA, SWP, Central Valley storage/transfer programs, water use efficiency programs, local resource projects, and in-region storage that will enable the region to meet its water supply needs. MET's 2020 UWMP also presents MET's supply capacities from 2025 through 2045 for average year, single dry-year, five consecutive dry-year, and more frequent and severe droughts, as specified in the UWMP Act.

Information concerning MET's UWMP, including the background, associated challenges, and long-term development of programs for each of MET's supply sources and capacities have been summarized and included in the following subsections. Additional information on MET can be found directly in MET's 2020 UWMP.

6.2.1.2 Colorado River Aqueduct

Background

The Colorado River was MET's original source of water after MET's establishment in 1928. The CRA, which is owned and operated by MET, transports water from the Colorado River to its terminus Lake Mathews, in Riverside County. The actual amount of water per year that may be conveyed through the CRA to MET's member agencies is subject to the availability of Colorado River water. Approximately 40 million people rely on the Colorado River and its tributaries for water with 5.5 million acres of land using Colorado River water for irrigation. The CRA includes supplies from the implementation of the Quantification Settlement Agreement and its related agreements to transfer water from agricultural agencies to urban uses. The 2003 Quantification Settlement Agreement enabled California to implement major Colorado River water conservation and transfer programs, in order to stabilize water supplies and reduce the state's demand on the river to its 4.4 million acre-feet (MAF) entitlement. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis. Water from the Colorado River or its tributaries is available to users in California, Arizona, Colorado, Nevada, New Mexico, Utah, Wyoming, and Mexico. California is apportioned the use of 4.4 MAF of water from the Colorado River each year plus one-half of any surplus that may be available for use collectively in Arizona, California, and Nevada. In addition, California has historically been allowed to use Colorado River water apportioned to, but not used by, Arizona or Nevada. MET has a basic entitlement of 550,000 AFY of Colorado River water, plus surplus water up to an additional 662,000 AFY when the following conditions exists (MET, 2021):

- Water is unused by the California holders of priorities 1 through 3
- Water is saved by the Palo Verde land management, crop rotation, and water supply program
- When the U.S. Secretary of the Interior makes available either one or both of the following:
    - Surplus water
    - Colorado River water that is apportioned to but unused by Arizona and/or Nevada.

Current Conditions and Supply

MET has not received surplus water for a number of years. The Colorado River supply faces current and future imbalances between water supply and demand in the Colorado River Basin due to long-term drought conditions. Analysis of historical records suggests a potential change in the relationship between precipitation and runoff in the Colorado River Basin. The past 21 years (1999-2020) have seen an overall drying trend, even though the period included several wet or average years. The river basin has substantial storage capacity, but the significant reduction in system reservoir storage in the last two decades is great enough to consider the period a drought (DWR, 2020a). At the close of 2020, system storage was at or near its lowest since 2000, so there is very little buffer to avoid a shortage from any future period of reduced precipitation and runoff (MET, 2021). Looking ahead, the long-term imbalance in the Colorado River Basin's future supply and demand is projected to be approximately 3.2 MAF by the year 2060 (USBR, 2012).

In light of declining reservoir levels, the Lower Basin Drought Contingency Plan (DCP) was signed in 2019. This agreement incentivizes storage in Lake Mead and requires certain volumes of water be stored in Lake Mead under certain Lake Mead elevation levels through 2026. MET is to store certain volumes of water in Lake Mead as DCP ICS once Lake Mead is below elevation 1,045 feet. This agreement also increases MET's flexibility to take delivery of water stored as ICS at Lake Mead elevations below 1,075 feet. The goal of this agreement is to keep Lake Mead above critical elevations, and overall it increases MET's flexibility to store water in Lake Mead in greater volumes and to take delivery of stored water to fill the CRA as needed.

Over the years, MET has helped fund and implement various programs to improve Colorado River supply reliability and help resolve the imbalance between supply and demand. Implementation of such programs have contributed to achievements like achieving a record low diversion of the Colorado River in 2019, a level not seen since the 1950s. Colorado River water management programs include:

- **Imperial Irrigation District / MET Conservation Program** – Under agreements executed in 1988 and 1989, this program allows MET to fund water efficiency improvements within Imperial Irrigation District's service area in return for the right to divert the water conserved by those investments. An average of 105,000 AFY of water has been conserved since the program's implementation.
- **Palo Verde Land Management, Crop Rotation, and Water Supply Program** – Authorized in 2004, this 35-year program allows MET to pay participating farmers to reduce their water use, and for MET to receive the saved water. Over the life of the program, an average of 84,500 AFY has been saved and made available to MET.
- **Bard Seasonal Fallowing Program** – Authorized in 2019, this program allows MET to pay participating farmers in Bard to reduce their water use between the late spring and summer months of selected years, which provides up to 6,000 AF of water to be available to MET in certain years.
- **Management of MET-Owned Land in Palo Verde** – Since 2001, MET has acquired approximately 21,000 acres of irrigable farmland that are leased to growers, with incentives to grow low water-using crops and experiment with low water-consumption practices. If long-term

water savings are realized, MET may explore ways to formally account them for Colorado River supplies.

- **Southern Nevada Water Authority (SNWA) and MET Storage and Interstate Release Agreement** – Entered in 2004, this agreement allows SNWA to store its unused, conserved water with MET, in exchange for MET to receive additional Colorado River water supply. MET has relied on the additional water during dry years, especially during the 2011-2016 California drought, and SNWA is not expected to call upon MET to return water until after 2026.
- **Lower Colorado Water Supply Projects** – Authorized in 1980s, this project provides up to 10,000 AFY of water to certain entities that do not have or have insufficient rights to use Colorado River water. A contract executed in 2007 allowed MET to receive project water left unused by the project contractors along the River – nearly 10,000 AF was received by MET in 2019 and is estimated for 2020.
- **Exchange Programs** – MET is involved in separate exchange programs with the United States Bureau of Reclamation, which takes place at the Colorado River Intake and with San Diego County Water Authority (SDCWA), which exchanges conserved Colorado River water.
- **Lake Mead Storage Program** – Executed in 2006, this program allows MET to leave excessively conserved water in Lake Mead, for exclusive use by MET in later years.
- **Quagga Mussel Control Program** – Developed in 2007, this program introduced surveillance activities and control measures to combat quagga mussels, an invasive species that impact the Colorado River's water quality.
- **Lower Basin Drought Contingency Plan** – Signed in 2019, this agreement incentivizes storage in Lake Mead through 2026 and overall, it increases MET's flexibility to fill the CRA as needed (MET, 2021).

Future Programs / Plans

The Colorado River faces long-term challenges of water demands exceeding available supply with additional uncertainties due to climate change. Climate change impacts expected in the Colorado River Basin include the following:

- More frequent, more intense, and longer lasting droughts, which will result in water deficits
- Continued dryness in the Colorado River Basin, which will increase the likelihood of triggering a first-ever shortage in the Lower Basin
- Increased temperatures, which will affect the percentage of precipitation that falls as rain or snow, as well as the amount and timing of mountain snowpack (DWR, 2020b)

Acknowledging the various uncertainties regarding reliability, MET plans to continue ongoing programs, such as those listed earlier in this section. Additionally, MET supports increasing water recycling in the Colorado River Basin and is in the process of developing additional transfer programs for the future (MET, 2021).

6.2.1.3 State Water Project

Background

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by DWR and is an integral part of the effort to ensure that business and industry, urban and suburban residents, and farmers throughout much of California have sufficient water. Water from the SWP originates at Lake Oroville, which is located on the Feather River in Northern California. Much of the SWP water supply passes through the Delta. The SWP is the largest state-built, multipurpose, user-financed water project in the United States. Nearly two-thirds of residents in California receive at least part of their water from the SWP, with approximately 70 percent of SWP's contracted water supply going to urban users and 30 percent to agricultural users. The primary purpose of the SWP is to divert and store water during wet periods in Northern and Central California and distribute it to areas of need in Northern California, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and Southern California (MET, 2021).

The Delta is key to the SWP's ability to deliver water to its agricultural and urban contractors. All but five of the 29 SWP contractors receive water deliveries below the Delta (pumped via the Harvey O. Banks or Barker Slough pumping plants). However, the Delta faces many challenges concerning its long-term sustainability such as climate change posing a threat of increased variability in floods and droughts. Sea level rise complicates efforts in managing salinity levels and preserving water quality in the Delta to ensure a suitable water supply for urban and agricultural use. Furthermore, other challenges include continued subsidence of Delta islands, many of which are below sea level, and the related threat of a catastrophic levee failure as the water pressure increases, or as a result of a major seismic event.

Current Conditions and Supply

"Table A" water is the maximum entitlement of SWP water for each water contracting agency. Currently, the combined maximum Table A amount is 4.17 million acre-feet per year (MAFY). Of this amount, 4.13 MAFY is the maximum Table A water available for delivery from the Delta. On average, deliveries are approximately 60% of the maximum Table A amount (DWR, 2020b).

SWP contractors may receive Article 21 water on a short-term basis in addition to Table A water if requested. Article 21 of SWP contracts allows contractors to receive additional water deliveries only under specific conditions, generally during wet months of the year (December through March). Because a SWP contractor must have an immediate use for Article 21 supply or a place to store it outside of the SWP, there are few contractors like MET that can access such supplies.

Carryover water is SWP water allocated to an SWP contractor and approved for delivery to the contractor in a given year, but not used by the end of the year. The unused water is stored in the SWP's share of San Luis Reservoir, when space is available, for the contractor to use in the following year.

Turnback pool water is Table A water that has been allocated to SWP contractors who have exceeded their demands. This water can then be purchased by another contractor depending on its availability.

SWP Delta exports are the water supplies that are transferred directly to SWP contractors or to San Luis Reservoir storage south of the Delta via the Harvey O. Banks pumping plant. Estimated average annual Delta exports and SWP Table A water deliveries have generally decreased since 2005, when Delta export regulations affecting SWP pumping operations became more restrictive due to federal biological

opinions (Biops). The Biops protect species listed as threatened or endangered under the federal and state Endangered Species Acts (ESAs) and affect the SWP's water delivery capability because they restrict SWP exports in the Delta and include Delta outflow requirements during certain times of the year, thus reducing the available supply for export or storage.

Before being updated by the 2019 Long-Term Operations Plan, the prior 2008 and 2009 Biops resulted in an estimated reduction in SWP deliveries of 0.3 MAF during critically dry years to 1.3 MAF in above normal water years as compared to the previous baseline. However, the 2019 Long-Term Operations Plan and Biops are expected to increase SWP deliveries by an annual average of 20,000 acre-feet as compared to the previous Biops (MET, 2021). Average Table A deliveries decreased in the 2019 SWP Final Delivery Capability Report compared to 2017, mainly due to the 2018 Coordinated Operation Agreement (COA) Addendum and the increase in the end of September storage target for Lake Oroville. Other factors that also affected deliveries included changes in regulations associated with the Incidental Take Permit (ITP) and the Reinitiation of Consultation for Long-Term Operations (RoC on LTO), a shift in Table A to Article 21 deliveries which occurred due to higher storage in SWP San Luis, and other operational updates to the SWP and federal Central Valley Project (CVP) (DWR, 2020b). Since 2005, there are similar decreasing trends for both the average annual Delta exports and the average annual Table A deliveries (Table 6-3).

Table 6-3: MET SWP Program Capabilities

Year	Average Annual Delta Exports (MAF)	Average Annual Table A Deliveries (MAF)
2005	2.96	2.82
2013	2.61	2.55
2019	2.52	2.41
Percent Change*	-14.8%	-14.3%

*Percent change is between the years 2019 and 2005.

Ongoing regulatory restrictions, such as those imposed by the Biops on the effects of SWP and the CVP operations on certain marine life, also contribute to the challenge of determining the SWP's water delivery reliability. In dry, below-normal conditions, MET has increased the supplies delivered through the California Aqueduct by developing flexible CVP/SWP storage and transfer programs. The goal of the storage/transfer programs are to access additional supplies to maximize deliveries during dry hydrologic conditions and regulatory restrictions. In addition, the California State Water Resources Control Board (SWRCB) has set water quality objectives that must be met by the SWP including minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity level. The following factors affect the ability to estimate existing and future water delivery reliability:

- **Water availability at the source:** Availability can be highly variable and depends on the amount and timing of rain and snow that fall in any given year. Generally, during a single-dry year or two, surface and groundwater storage can supply most water deliveries, but multiple-dry years can

result in critically low water reserves. Fisheries issues can also restrict the operations of the export pumps even when water supplies are available.

- **Water rights with priority over the SWP:** Water users with prior water rights are assigned higher priority in DWR's modeling of the SWP's water delivery reliability, even ahead of SWP Table A water.
- **Climate change:** Mean temperatures are predicted to vary more significantly than previously expected. This change in climate is anticipated to bring warmer winter storms that result in less snowfall at lower elevations, reducing total snowpack. From historical data, DWR projects that by 2050, the Sierra snowpack will be reduced from its historical average by 25 to 40 percent. Increased precipitation as rain could result in a larger number of "rain-on-snow" events, causing snow to melt earlier in the year and over fewer days than historically, affecting the availability of water for pumping by the SWP during summer. Furthermore, water quality may be adversely affected due to the anticipated increase in wildfires. Rising sea levels may result in potential pumping cutbacks on the SWP and CVP.
- **Regulatory restrictions on SWP Delta exports:** The Biops protect special-status species such as delta smelt and spring- and winter-run Chinook salmon and imposed substantial constraints on Delta water supply operations through requirements for Delta inflow and outflow and export pumping restrictions. Restrictions on SWP operations imposed by state and federal agencies contribute substantially to the challenge of accurately determining the SWP's water delivery reliability in any given year (DWR, 2020b).
- **Ongoing environmental and policy planning efforts:** Governor Gavin Newsom ended California WaterFix in May 2019 and announced a new approach to modernize Delta Conveyance through a single tunnel alternative. The EcoRestore Program aims to restore at least 30,000 acres of Delta habitat, with the near-term goal of making significant strides toward that objective by 2020 (DWR, 2020b).
- **Delta levee failure:** The levees are vulnerable to failure because most original levees were simply built with soils dredged from nearby channels and were not engineered. A breach of one or more levees and island flooding could affect Delta water quality and SWP operations for several months. When islands are flooded, DWR may need to drastically decrease or even cease SWP Delta exports to evaluate damage caused by salinity in the Delta.

Operational constraints will likely continue until a long-term solution to the problems in the Delta is identified and implemented. New Biops for listed species under the Federal ESA or by the California Department of Fish and Game's issuance of incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations.

Future Programs / Plans

MET's Board approved a Delta Action Plan in June 2007 that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between

water supply conveyance and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Delta while a long-term solution is implemented. Currently, MET is working towards addressing four elements: Delta ecosystem restoration, water supply conveyance, flood control protection, and storage development.

In May 2019, Governor Newsom ended California WaterFix, announced a new approach to modernize Delta Conveyance through a single tunnel alternative, and released Executive Order 10-19 that directed state agencies to inventory and assess new planning for the project. DWR then withdrew all project approvals and permit applications for California WaterFix, effectively ending the project. The purpose of the Delta Conveyance Project (DCP) gives rise to several project objectives (MET, 2021). In proposing to make physical improvements to the SWP Delta conveyance system, the project objectives are:

- To address anticipated rising sea levels and other reasonably foreseeable consequences of climate change and extreme weather events.
- To minimize the potential for public health and safety impacts from reduced quantity and quality of SWP water deliveries, and potentially CVP water deliveries, south of the Delta resulting from a major earthquake that causes breaching of Delta levees and the inundation of brackish water into the areas in which existing pumping plants operate.
- To protect the ability of the SWP, and potentially the CVP, to deliver water when hydrologic conditions result in the availability of sufficient amounts, consistent with the requirements of state and federal law.
- To provide operational flexibility to improve aquatic conditions in the Delta and better manage risks of further regulatory constraints on project operations.

6.2.1.4 Central Valley / State Water Project Storage and Transfer Programs

Storage is a major component of MET's dry year resource management strategy. MET's likelihood of having adequate supply capability to meet projected demands, without implementing its Water Supply Allocation Plan (WSAP), is dependent on its storage resources. Due to the pattern of generally drier hydrology, the groundwater basins and local reservoirs have dropped to low operating levels and remain below healthy storage levels. For example, the Colorado River Basin's system storage at the close of 2020, was at or near its lowest since 2000, so there is very little buffer to avoid a shortage from any future period of reduced precipitation and runoff (MET, 2021).

MET stores water in both DWR and MET surface water reservoirs. MET's surface water reservoirs are Lake Mathews, Lake Skinner, and Diamond Valley Lake, which have a combined storage capacity of over 1 MAF. Approximately 650,000 AF are stored for seasonal, regulatory, and drought use, while approximately 370,000 AF are stored for emergency use.

MET also has contractual rights to DWR surface Reservoirs, such as 65 TAF of flexible storage at Lake Perris (East Branch terminal reservoir) and 154 TAF of flexible storage at Castaic Lake (West Branch terminal reservoir) that provides MET with additional options for managing SWP deliveries to maximize the yield from the project. This storage can provide MET with up to 44 TAF of additional supply over multiple dry years, or up to 219 TAF to Southern California in a single dry year (MET, 2021).

MET endeavors to increase the reliability of water supplies through the development of flexible storage and transfer programs including groundwater storage (MET, 2021). These include:

- **Lake Mead Storage Program:** Executed in 2006, this program allows MET to leave excessively conserved water in Lake Mead, for exclusive use by MET in later years. MET created "Intentionally Created Surplus" (ICS) water in 2006-2007, 2009-2012, and 2016-2019, and withdrew ICS water in 2008 and 2013-2015. As of January 1, 2021, MET had a total of 1.3 MAF of Extraordinary Conservation ICS water.
- **Semitropic Storage Program:** The maximum storage capacity of the program is 350 TAF, and the minimum and maximum annual yields available to MET are 34.7 TAF and 236.2 TAF, respectively. The specific amount of water MET can expect to store in and subsequently receive from the program depends on hydrologic conditions, any regulatory requirements restricting MET's ability to export water for storage and demands placed by other program participants. During wet years, MET has the discretion to use the program to store portions of its SWP supplies which are in excess, and during dry years, the Semitropic Water Storage District returns MET's previously stored water to MET by direct groundwater pump-in or by exchange of surface water supplies.
- **Arvin-Edison Storage Program:** The storage program is estimated to deliver 75 TAF, and the specific amount of water MET can expect to store in and subsequently receive from the program depends on hydrologic conditions and any regulatory requirements restricting MET's ability to export water for storage. During wet years, MET has the discretion to use to program to store portions of its SWP supplies which are in excess, and during dry years, the Arvin-Edison Water Storage District returns MET's previously stored water to MET by direct groundwater pump-in or by exchange of surface water supplies.
- **Antelope Valley-East Kern (AVEK) Water Agency Exchange and Storage Program:** Under the exchange program, for every two AF MET receives, MET returns 1 AF back to AVEK, and MET will also be able to store up to 30 TAF in the AVEK's groundwater basin, with a dry-year return capability of 10 TAF.
- **High Desert Water Bank Program:** Under this program, MET will have the ability to store up to 280 TAF of its SWP Table A or other supplies in the Antelope Valley groundwater basin, and in exchange will provide funding for the construction of monitoring and production wells, turnouts from the California Aqueduct, pipelines, recharge basins, water storage, and booster pump facilities. The project is anticipated to be in operation by 2025.
- **Kern-Delta Water District Storage Program:** This groundwater storage program has 250 TAF of storage capacity, and water for storage can either be directly recharged into the groundwater basin or delivered to Kern-Delta Water District farmers in lieu of pumping groundwater. During dry years, the Kern-Delta Water District returns MET's previously stored water to MET by direct groundwater pump-in return or by exchange of surface water supplies.
- **Mojave Storage Program:** MET entered into a groundwater banking and exchange transfer agreement with Mojave Water Agency that allows for the cumulative storage of up to 390 TAF. The agreement allows for MET to store water in an exchange account for later return.

6.2.1.5 Untreated Imported Water - Baker Treatment Plant

The Baker Treatment Plant is a 28.1 MGD drinking water treatment plant at the site of the former Baker Filtration Plant in Lake Forest. The plant was a joint regional project by five South Orange County water districts: ETWD, IRWD, MNWD, SMWD, and TCWD, which have capacity rights of 3.2 MGD, 6.8 MGD, 8.4 MGD, 8.4 MGD, and 1.3 MGD, respectively. The project went online in early 2017 and is managed and run by IRWD.

The plant has multiple water supply sources that increase water supply reliability, including imported untreated water from MET through the Santiago Lateral and local surface water from Irvine Lake. It provides a reliable local drinking water supply during emergencies or extended facility shutdowns on the MET delivery system and increases operational flexibility by creating redundancy within the water conveyance system.

6.2.2 Supply Reliability Within MET

6.2.2.1 MET's Water Service Reliability Assessment Results

In MET's 2020 UWMP, MET evaluated supply reliability by projecting supply and demand under a normal year, single-dry year, and five-year consecutive dry years, based on conditions affecting the SWP (MET's largest and most variable supply). For this supply source, the average of historic years 1922-2017 most closely represents water supply conditions in a normal water year, the single driest year was 1977 and the five-year dry period was 1988-1992. The analyses also include Colorado River supplies under the same hydrological variations.

MET also incorporated the SWP and Colorado River's reliability factors, such as water quality objectives set by the SWRCB, Biops, and amendments to the COA for the SWP and Quantification Settlement Agreements for the Colorado River into their assessment.

MET has concluded that the region can provide reliable water supplies under normal, single-dry, and five-year consecutive dry conditions (Table 6-4, Table 6-5, Table 6-6, respectively). MWDOC is a MET member agency, and MET's projections take into account the imported demands from Orange County. As so, MET's water reliability assessments are used to determine that demands within MWDOC can be met for all three hydrological conditions.

Table 6-4: MET's Projected Supply Capability and Demands through 2045 for a Normal Year

Normal Water Year
Supply Capability[1] and Projected Demands
Average of 1922-2017 Hydrologies
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	875,000	876,000	875,000	875,000	872,000
California Aqueduct[2]	1,774,000	1,766,000	1,763,000	1,762,000	1,761,000
Colorado River Aqueduct					
Total Supply Available[3]	1,214,000	1,290,000	1,283,000	1,230,000	1,250,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,214,000	1,250,000	1,250,000	1,230,000	1,250,000
Capability of Current Programs	**3,863,000**	**3,892,000**	**3,888,000**	**3,867,000**	**3,883,000**
Demands					
Total Demands on Metropolitan	1,191,000	1,142,000	1,101,000	1,116,000	1,140,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,469,000**	**1,420,000**	**1,379,000**	**1,394,000**	**1,418,000**
Surplus	**2,394,000**	**2,472,000**	**2,509,000**	**2,473,000**	**2,465,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	13,000	13,000	13,000	13,000	13,000
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*36,000*	*0*	*0*	*20,000*	0
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**13,000**	**13,000**	**13,000**	**13,000**	**13,000**
Potential Surplus	**2,407,000**	**2,485,000**	**2,522,000**	**2,486,000**	**2,478,000**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

Table 6-5: MET's Projected Supply Capability and Demands through 2045 for a Single Dry Year

Single Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	875,000	876,000	875,000	875,000	872,000
California Aqueduct[2]	647,000	634,000	633,000	634,000	633,000
Colorado River Aqueduct					
Total Supply Available[3]	1,174,000	1,403,500	927,500	1,327,500	974,500
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,174,000	1,250,000	927,500	1,250,000	974,500
Capability of Current Programs	**2,696,000**	**2,760,000**	**2,435,500**	**2,759,000**	**2,479,500**
Demands					
Total Demands on Metropolitan	1,319,000	1,270,000	1,227,000	1,246,000	1,273,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,597,000**	**1,548,000**	**1,505,000**	**1,524,000**	**1,551,000**
Surplus	**1,099,000**	**1,212,000**	**930,500**	**1,235,000**	**928,500**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*76,000*	*0*	*322,500*	*0*	*275,500*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**1,099,000**	**1,212,000**	**930,500**	**1,235,000**	**928,500**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

Table 6-6: MET's Projected Supply Capability and Demands through 2045 for a Normal Water Year

Drought Lasting Five Consecutive Water Years
Supply Capability[1] and Projected Demands
Repeat of 1988-1992 Hydrology
(Acre-feet per year)

Forecast Year	2025	2030	2035	2040	2045
Current Programs					
In-Region Supplies and Programs	191,000	196,000	197,000	197,000	197,000
California Aqueduct[2]	730,800	768,000	789,000	812,000	792,000
Colorado River Aqueduct					
Total Supply Available[3]	1,240,000	1,466,000	1,466,000	1,415,000	1,437,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,240,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,161,800**	**2,214,000**	**2,236,000**	**2,259,000**	**2,239,000**
Demands					
Total Demands on Metropolitan	1,351,000	1,332,000	1,297,000	1,290,000	1,313,000
Exchange with SDCWA	278,000	278,000	278,000	278,000	278,000
Total Metropolitan Deliveries[5]	**1,629,000**	**1,610,000**	**1,575,000**	**1,568,000**	**1,591,000**
Surplus	**532,800**	**604,000**	**661,000**	**691,000**	**648,000**
Programs Under Development					
In-Region Supplies and Programs	0	0	0	0	0
California Aqueduct	0	0	0	0	0
Colorado River Aqueduct					
Total Supply Available[3]	0	0	0	0	0
Aqueduct Capacity Limit[4]	*10,000*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	*0*	*0*	*0*	*0*	*0*
Capability of Proposed Programs	**0**	**0**	**0**	**0**	**0**
Potential Surplus	**532,800**	**604,000**	**661,000**	**691,000**	**648,000**

[1] Represents Supply Capability for resource programs under listed year type.
[2] California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct.
[3] Colorado River Aqueduct includes programs and Exchange with SDCWA conveyed by the aqueduct.
[4] Maximum CRA deliveries limited to 1.25 MAF including Exchange with SDCWA.
[5] Total demands are adjusted to include Exchange with SDCWA.

6.2.2.2 MET's Drought Risk Assessment Results

For its DRA, MET assessed the reliability of each individual water supply source over the five consecutive year drought through a modeling method using the same historical hydrologic conditions as the water service reliability assessment: 1922 to 2017. MET used the five-consecutive years of 1988 to 1992 to complete its DRA, because this represents the driest five-consecutive year historic sequence for MET's supply. Even without activating WSCP actions, according to MET's UWMP Table 2-7, MET's water supply from the SWP and CRA can reliably meet the demands of a five-year drought from FY 2020-21 through FY 2024-25 (Table 6-7).

Table 6-7: MET's Projected Supply Capability and Demands during a Five-Year Drought

Metropolitan's Drought Risk Assessment
Water Use, Supply, and Risk Assessment for 2021 – 2025
(also included as Appendix 12 DWR Submittal Table 7-5)

Based on DWR DRA Optional Planning Tool (Annual totals in AF)

Water Use Worksheet	
Historic and Actual	
2016	1,663,599
2017	1,449,015
2018	1,560,487
2019	1,327,928
Customer Water Use Subtotal	1,394,261
Losses[1]	48,520
2020 Total Gross Water Use	**1,442,781**
Five Consecutive Water Years	
Change from 2020	186,219
2021 Gross Water Use	**1,629,000**
Change from 2021	68,000
2022 Gross Water Use	**1,697,000**
Change from 2022	23,000
2023 Gross Water Use	**1,720,000**
Change from 2023	(192,000)
2024 Gross Water Use	**1,528,000**
Change from 2024	101,000
2025 Gross Water Use	**1,629,000**

[1] Losses include treated system losses and surface reservoir evaporation.

Supply Worksheet [1]	
2021 (1st year)	**1,499,000**
2022 (2nd year)	**2,297,000**
2023 (3rd year)	**1,563,000**
2024 (4th year)	**1,731,000**
2025 (5th year)	**1,636,000**
Supply 1 - Colorado River Aqueduct supplies [2]	
2021 (1st year)	1,250,000
2022 (2nd year)	1,250,000
2023 (3rd year)	1,250,000
2024 (4th year)	1,250,000
2025 (5th year)	1,250,000
Supply 2 - State Water Project supplies	
2021 (1st year)	249,000
2022 (2nd year)	1,047,000
2023 (3rd year)	313,000
2024 (4th year)	481,000
2025 (5th year)	386,000
Supply 3 - In-Region supplies	
2021 (1st year)	0
2022 (2nd year)	0
2023 (3rd year)	0
2024 (4th year)	0
2025 (5th year)	0

DRAFT Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Gross Water Use	1,629,000
Total Supplies	1,499,000
Surplus/Shortfall w/o WSCP Action	(130,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	130,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2022	Total
Gross Water Use (Use Worksheet)	1,697,000
Total Supplies (Supply Worksheet)	2,297,000
Surplus/Shortfall w/o WSCP Action	600,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	600,000
Resulting % Use Reduction from WSCP action	0%

2023	Total
Gross Water Use (Use Worksheet)	1,720,000
Total Supplies (Supply Worksheet)	1,563,000
Surplus/Shortfall w/o WSCP Action	(157,000)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	157,000
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2024	Total
Gross Water Use (Use Worksheet)	1,528,000
Total Supplies (Supply Worksheet)	1,731,000
Surplus/Shortfall w/o WSCP Action	203,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	203,000
Resulting % Use Reduction from WSCP action	0%

2025	Total
Gross Water Use (Use Worksheet)	1,629,000
Total Supplies (Supply Worksheet)	1,636,000
Surplus/Shortfall w/o WSCP Action	7,000
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	7,000
Resulting % Use Reduction from WSCP action	0%

1. Includes Metropolitan's core supplies as defined in WSCP in Appendix 4. Detailed Supply Worksheets are included in Appendix 3 Table A.3-8.
2. Maximum CRA deliveries limited to 1.25 MAF, including Exchange with SDCWA and US.

6.2.3 Planned Future Sources

Beyond the programs highlighted in Sections 6.2.1, MET continues to invest in efforts to meet its goal of long-term regional water supply reliability, focusing on the following:

- Continuing water conservation
- Developing water supply management programs outside of the region
- Developing storage programs related to the Colorado River and the SWP
- Developing storage and groundwater management programs within the Southern California region
- Increasing water recycling, groundwater recovery, stormwater and seawater desalination
- Pursuing long-term solutions for the ecosystem, regulatory and water supply issues in the California Bay-Delta (MET, 2021)

6.3 Groundwater

Among all local supplies available to MWDOC's service area, groundwater supplies make up the majority. The water supply resources within MWDOC's service area are enhanced by the existence of groundwater basins, which provide a reliable local source and, additionally, are used as reservoirs to store water during wet years and draw from storage during dry years.

MWDOC does not provide nor sell any groundwater to its retail agencies. However, its retail agencies do extract groundwater locally to diversify their portfolio. Table 6-8 shows a breakdown of historical groundwater production by the retail agencies from all groundwater basins within MWDOC's service area.

This section describes the five groundwater basins used by MWDOC's retail agencies and provides a 25-year projection of the service area's groundwater supply.

Table 6-8: Groundwater pumped in the Past 5 Years within MWDOC's Service Area (AF)

Groundwater Basin	Fiscal Year Ending				
	2016	2017	2018	2019	2020
OC Basin[1]	195,319	205,262	155,658	204,989	192,652
San Juan Basin	1,640	1,661	2,817	2,395	3,010
La Habra Basin	3,540	3,296	2,921	2,183	2,751
Main San Gabriel Basin	11,753	12,434	14,059	14,790	14,870
San Mateo Basin	433	462	620	411	390
Total Groundwater[2]:	**212,595**	**223,116**	**176,076**	**224,769**	**213,674**

NOTES:
[1] Includes only the MWDOC member agencies' groundwater production. Does not include the groundwater production of Anaheim, Fullerton, and Santa Ana.
[2] Total volumes are +/- 1 AF due to rounding

6.3.1 Orange County Groundwater Basin

This section describes the medium-priority OC Basin and the management measures taken by OCWD, the basin manager to optimize local supply and minimize overdraft.

The OCWD was formed in 1933 by a special legislative act of the California State Legislature to protect and manage the County's vast, natural, groundwater supply using the best available technology and defend its water rights to the OC Basin. This legislation is found in the State of California Statutes, Water – Uncodified Acts, Act 5683, as amended. The OC Basin is managed by OCWD under the Act, which functions as a statutorily-imposed physical solution. The OCWD Management Area includes approximately 89 percent of the land area of the OC Basin, and 98 percent of all groundwater production occurs within the area. Approximately 2.5 million residents live within OCWD's boundaries and rely upon the basin for their primary water supply. OCWD manages water resource monitoring programs, land use elements related to basin management, groundwater elevation, groundwater quality, and coastal area monitoring through a number of monitoring programs. OCWD monitors the basin by collecting groundwater elevation and quality data from approximately 400 District-owned wells and manages an electronic database that stores water elevation, water quality, production, recharge, and other data on over 2,000 wells and facilities within and outside OCWD boundaries (City of La Habra et al., 2017). For detailed monitoring programs and management information, refer to the 2017 Basin 8-1 Alternative (Appendix D).

Groundwater levels are managed within a safe basin operating range to protect the long-term sustainability of the OC Basin and to protect against land subsidence. OCWD regulates groundwater levels in the OC Basin by regulating the annual amount of pumping and setting the Basin Production Percentage (BPP) for the water year. As defined in the District Act, the BPP is the ratio of water produced

from groundwater supplies within the OCWD service area to all water produced within the area from both supplemental sources and groundwater within the OCWD (OCWD, 2020a).

6.3.1.1 Basin Characteristics

The OC Basin underlies the northern half of Orange County beneath broad lowlands. The OC Basin, managed by OCWD, covers an area of approximately 350 square miles, bordered by the Coyote and Chino Hills to the north, the Santa Ana Mountains to the northeast, and the Pacific Ocean to the southwest. The OC Basin boundary extends to the Orange County-Los Angeles Line to the northwest, where groundwater flows across the county line into the Central Groundwater Basin of Los Angeles County. A map of the OC Basin is shown on Figure 6-5. The total thickness of sedimentary rocks in the OC Basin is over 20,000 feet, with only the upper 2,000 to 4,000 feet containing fresh water. The OC Basin's full volume is approximately 66 MAF.

There are three major aquifer systems that have been subdivided by OCWD, the Shallow Aquifer System, the Principal Aquifer System, and the Deep Aquifer System. These three aquifer systems are hydraulically connected as groundwater is able to flow between each other through intervening aquitards or discontinuities in the aquitards. The Shallow Aquifer system occurs from the surface to approximately 250 feet below ground surface. Most of the groundwater from this aquifer system is pumped by small water systems for industrial and agricultural use. The Principal Aquifer system occurs at depths between 200 and 1,300 feet below ground surface. Over 90 percent of groundwater production is from wells that are screened within the Principal Aquifer system. Only a minor amount of groundwater is pumped from the Deep Aquifer system, which underlies the Principal Aquifer system and is up to 2,000 feet deep in the center of the OC Basin.

Per- and polyfluoroalkyl substances (PFAS) are a group of thousands of manmade chemicals that includes perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). PFAS compounds were once commonly used in many products including, among many others, stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams. Beginning in the summer of 2019, the California State Division of Drinking Water (DDW) began requiring testing for PFAS compounds in some groundwater production wells in the OCWD area.

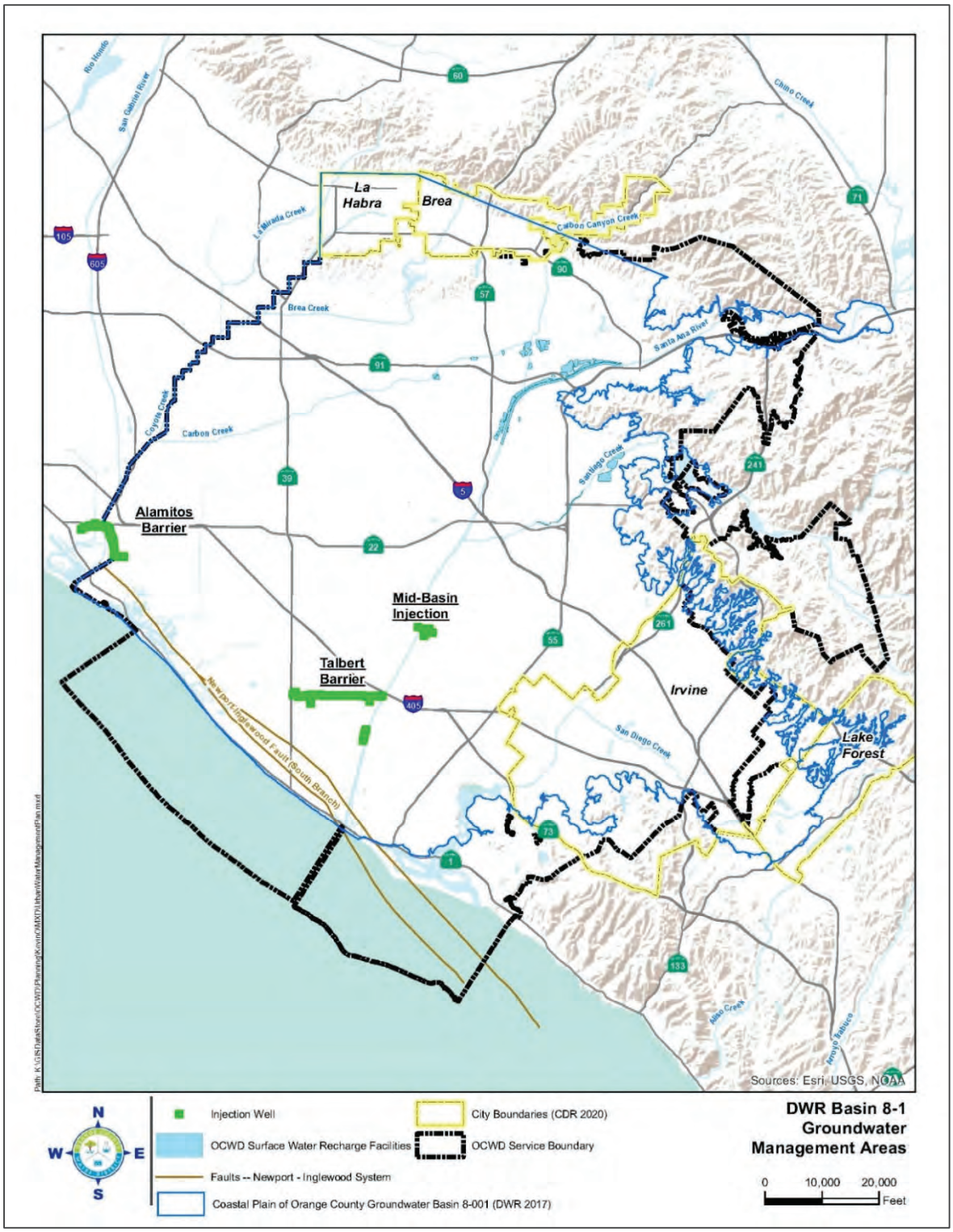


Figure 6-5: Map of the OC Basin

Groundwater production in FY 2019-20 was expected to be approximately 325,000 acre-feet but declined to 286,550 acre-feet primarily due to PFAS impacted wells being turned off around February 2020. OCWD expects groundwater production to be in the area of 245,000 acre-feet in FY 2020-21 due to the currently idled wells and additional wells being impacted by PFAS and turned off. As PFAS treatment systems are constructed, OCWD expects total annual groundwater production to slowly increase back to normal levels (310,000 to 330,000 acre-feet) (OCWD, 2020a).

6.3.1.2 Sustainable Groundwater Management Act

In 2014, the State of California adopted the Sustainable Groundwater Management Act (SGMA) to help manage its groundwater sustainably, and limit adverse effects such as significant groundwater-level declines, land subsidence, and water quality degradation. SGMA requires all high- and medium-priority basins, as designated by DWR, be sustainably managed. DWR designated the Coastal Plain of OC Basin as a medium-priority basin, primarily due to heavy reliance on the OC Basin's groundwater as a source of water supply. Compliance with SGMA can be achieved in one of two ways (City of La Habra et al., 2017):

1. A Groundwater Sustainability Agency (GSA) is formed and a GSP is adopted, or
2. Special Act Districts created by statute, such as OCWD, and other agencies may prepare and submit an Alternative to a GSP

Led by OCWD, the agencies within Basin 8-1, including La Habra, collaborated to submit an Alternative to a GSP in 2017, titled the "Basin 8-1 Alternative" to meet SGMA compliance. This document will be updated every five years. The current (2017) version is included in Appendix D.

6.3.1.3 Basin Production Percentage

Background

The OC Basin is not adjudicated and as such, pumping from the OC Basin is managed through a process that uses financial incentives to encourage groundwater producers to pump a sustainable amount of water. The framework for the financial incentives is based on establishing the BPP, the percentage of each Producer's total water supply that comes from groundwater pumped from the OC Basin. Groundwater production at or below the BPP is assessed the Replenishment Assessment (RA). While there is no legal limit as to how much an agency pumps from the OC Basin, there is a financial disincentive to pump above the BPP. The BPP is set uniformly for all Producers by OCWD on an annual basis. Agencies that pump above the BPP are charged the RA plus the Basin Equity Assessment (BEA). The BEA is presently calculated so that the cost of groundwater production is equivalent to the cost of importing potable water supplies. This approach serves to discourage, but not eliminate, production above the BPP, and the BEA can be increased to discourage production above the BPP if necessary.

The BPP is set based on groundwater conditions, availability of imported water supplies, and Basin management objectives. The supplies available for recharge must be estimated for a given year. The supplies of recharge water that are estimated are: 1) Santa Ana River stormflow, 2) Natural incidental recharge, 3) Santa Ana River baseflow, 4) GWRS supplies, and 5) other supplies such as imported water and recycled water purchased for the Alamitos Barrier. The BPP is a major factor in determining the cost of groundwater production from the OC Basin for that year. The BPP set for Water Year 2021-22 is 77%.

BPP Adjustments for Basin Management

OCWD has established management guidelines that are used to establish future BPPs, as seen in Table 6-9. Raising or lowering the BPP allows OCWD to manage the amount of pumping from the basin. OCWD has a policy to manage the groundwater basin within a sustainable range to avoid adverse impacts to the basin. OCWD seeks to maintain some available storage space in the basin to maximize surface water recharge when such supplies are available, especially in relatively wet years. By keeping the basin relatively full during wet years, and for as long as possible in years with near-normal recharge, the maximum amount of groundwater could be maintained in storage to support pumping in future drought conditions. During dry hydrologic years when less water would be available for recharge, the BPP could be lowered to maintain groundwater storage levels. A component of OCWD's BPP policy is to manage the groundwater basin so that the BPP will not fluctuate more that 5 percent from year to year.

Based on most recent modeling of water supplies available for groundwater recharge and water demand forecasts, OCWD anticipates being able to sustain the BPP at 85% starting in 2025. The primary reasons for the higher BPP are the expected completion of the GWRS Final Expansion (GWRSFE) in 2023 and the relatively low water demands of approximately 400,000 afy.

Modeling and forecasts generate estimates based on historical averages. Consequently, forecasts use average hydrologic conditions which smooth the dynamic and unpredictable local hydrology. Variations in local hydrology are the most significant impact to supplies of water available to recharge the groundwater basin. The BPP projection of 85% is provided based upon average annual rainfall weather patterns. If OCWD were to experience a relatively dry period, the BPP could be reduced to maintain water storage levels, by as much as five percent.

Table 6-9: Management Actions Based on Changes in Groundwater Storage

Available Storage Space (amount below full basin condition, AF)	Basin Management Action to Consider
Less than 100,000	Raise BPP
100,000 to 300,000	Maintain and / or raise BPP towards 75% goal
300,000 to 350,000	Seek additional supplies to refill basin and / or lower the BPP
Greater than 350,000	Seek additional supplies to refill basin and lower the BPP

BPP Exemptions

In some cases, OCWD encourages treating and pumping groundwater that does not meet drinking water standards in order to protect water quality. This is achieved by using a financial incentive called the BEA Exemption. A BEA Exemption is used to promote beneficial uses of poor-quality groundwater and reduce or prevent the spread of poor-quality groundwater into non-degraded aquifer zones. OCWD uses a partial or total exemption of the BEA to compensate a qualified participating agency or Producer for the costs of treating poor quality groundwater, which typically include capital, interest and operations and maintenance costs for treatment facilities. (City of La Habra et al., 2017). Similarly, for proactive water quality management, OCWD exempts a portion of the BEA for their Coastal Pumping Transfer Program

(CPTP). The CPTP encourages inland groundwater producers to increase pumping and coastal producers to decrease pumping in order to reduce the groundwater basin drawdown at the coast and protect against seawater intrusion. Inland pumpers can pump above the BPP without having to pay the full BEA for the amount pumped above the BPP (OCWD, 2015). Coastal pumpers receive BEA revenue from OCWD to assist in offsetting their additional water supply cost from taking less groundwater.

6.3.1.3.1 OCWD Groundwater Reliability Plan

In order to adapt to the substantial growth in water demands in OCWD's management area, it is paramount to anticipate and understand future water demands and develop projects to increase future water supplies proactively to match demands. The GRP is a continuation of these planning efforts that estimates the OC Basin's sustainable average annual production and extrapolates water needs of the OC Basin by combining recently completed water demand projections and modeling of Santa Ana River flows available for recharge. These data will be used to evaluate future water supply projects and guide management of the OC Basin. OCWD is currently developing the GRP, and the first public draft is expected to be available May 2021.

Current water demand projections show a relatively slow increase over the 25-year planning horizon, which is generally of similar magnitude as the additional production from the GWRSFE in early 2023. Once complete, the GWRSFE will increase capacity from 100,000 to 134,000 AFY of high-quality recycled water. This locally controlled, drought proof supply of water reduces the region's dependance on imported water.

Historically, the Santa Ana River has served as the primary source of water to recharge the OC Basin. To determine the availability of future Santa Ana River flows, OCWD utilized surface water flow modeling of the upper watershed. Modeling was developed to predict the impacts future stormwater capture and wastewater recycling projects in the upper watershed would have on future Santa Ana River flow rates at Prado Dam. Santa Ana River base flows are expected to decrease as more water recycling projects are built in the upper watershed. OCWD continues to work closely with the US Army Corps of Engineers to temporarily impound and slowly release up to approximately 20,000 AF of stormwater in the Prado Dam Conservation Pool. To some extent, the losses in baseflow are partially offset through the capture of additional stormwater held in the Prado Dam Conservation Pool. When available, OCWD will continue to augment groundwater recharge through the purchase of imported water through MET. OCWD will diligently monitor and evaluate future water supply projects to sustainably manage and protect the OC Basin for future generations.

6.3.1.3.2 OCWD Engineer's Report

The OCWD Engineer's Report reports on the groundwater conditions and investigates information related to water supply and groundwater basin usage within OCWD's service area.

The overall BPP achieved in the 2019 to 2020 water year within OCWD for non-irrigation use was 75.9 percent. The achieved pumping was less than the BPP established for the 2019 to 2020 water year primarily due to the water quality impacts of PFAS. A BPP of 77 percent will be used for water year 2021-22. Analysis of the OC Basin's projected accumulated overdraft, the available supplies to the OC Basin (assuming average hydrology) and the projected pumping demands indicate that this level of pumping can be sustained for 2021-22 without detriment to the OC Basin (OCWD, 2021).

In FY 2021-22 additional production of approximately 22,000 AF above the BPP will be undertaken by the City of Tustin, City of Garden Grove, City of Huntington Beach, Mesa Water, and IRWD. These agencies use the additional pumping allowance in order to accommodate groundwater quality improvement projects. As in prior years, production above the BPP from these projects would be partially or fully exempt from the BEA as a result of the benefit provided to the OC Basin by removing poor-quality groundwater and treating it for beneficial use (OCWD, 2021).

6.3.1.4 Recharge Management

Recharging water into the OC Basin through natural and artificial means is essential to support pumping from the OC Basin. Active recharge of groundwater began in 1949, in response to increasing drawdown of the OC Basin and, consequently, the threat of seawater intrusion. The OC Basin's primary source of recharge is flow from the Santa Ana River, which is diverted into recharge basins and its main Orange County tributary, Santiago Creek. Other sources of recharge water include natural infiltration, recycled water, and imported water. Natural recharge consists of subsurface inflow from local hills and mountains, infiltration of precipitation and irrigation water, recharge in small flood control channels, and groundwater underflow to and from Los Angeles County and the ocean.

Recycled water for the OC Basin recharge is from two sources. The main source of recycled water is from the GWRS, which is injected into the Talbert Seawater Barrier and recharged in the Kraemer, Miller, Miraloma and La Palma Basins (City of La Habra et al., 2017). The second source of recycled water is water purified at the Water Replenishment District's Leo J. Vander Lans Treatment Facility, which supplies water to the Alamitos Seawater Barrier (owned and operated by the Los Angeles County Department of Public Works). OCWD's share of the Alamitos Barrier injection total for water year 2018-19 was less than half of the total injection, based on barrier wells located within Orange County. The Water Replenishment District of Southern California (WRD) also works closely with OCWD to ensure that the water demands at the Alamitos Barrier are fulfilled through the use of recycled water as opposed to imported water, however the recycled portion was less than 33 percent for the last six years due to operational issues and wastewater supply interruptions (OCWD, 2020a). Injection of recycled water into these barriers is an effort by OCWD to control seawater intrusion into the OC Basin. Operation of the injection wells forms a hydraulic barrier to seawater intrusion.

OCWD purchases imported water for recharge from MWDOC. Untreated imported water can be used to recharge the OC Basin through the surface water recharge system in multiple locations, such as Anaheim Lake, Santa Ana River, Irvine Lake, and San Antonio Creek. Treated imported water can be used for in-lieu recharge, as was performed extensively from 1977 to 2007 (City of La Habra et al., 2017).
For detailed recharge management efforts from OCWD, refer to OCWD's 2017 Basin 8-1 Alternative (Appendix D).

6.3.1.5 MET Imported Water for Groundwater Replenishment

In the past OCWD, MWDOC, and MET have coordinated water management to increase storage in the OC Basin when imported supplies are available for this purpose. MET's groundwater replenishment program was discontinued on January 1, 2013, and currently MET via MWDOC sells replenishment water to OCWD at the full-service untreated MET rate. Figure 6-6 shows MWDOC's imported water sales to OCWD since FY 1990-91, which averages approximately 31,200 AF per year. Recently, due to low Santa

Ana River flows as a result of low precipitation and increased use along the river, OCWD has needed to purchase more imported replenishment water per year than the average of 31,200 AFY over the last 25 years (this does not include water amounts from MET's Conjunctive Use Program (CUP) or its Cyclic Storage Account). However, with the emergence of PFAS affecting groundwater production, the need of purchasing imported water has been temporary suspended. Until PFAS treatment is in place for most groundwater producers, imported replenishment water will be significantly reduced.

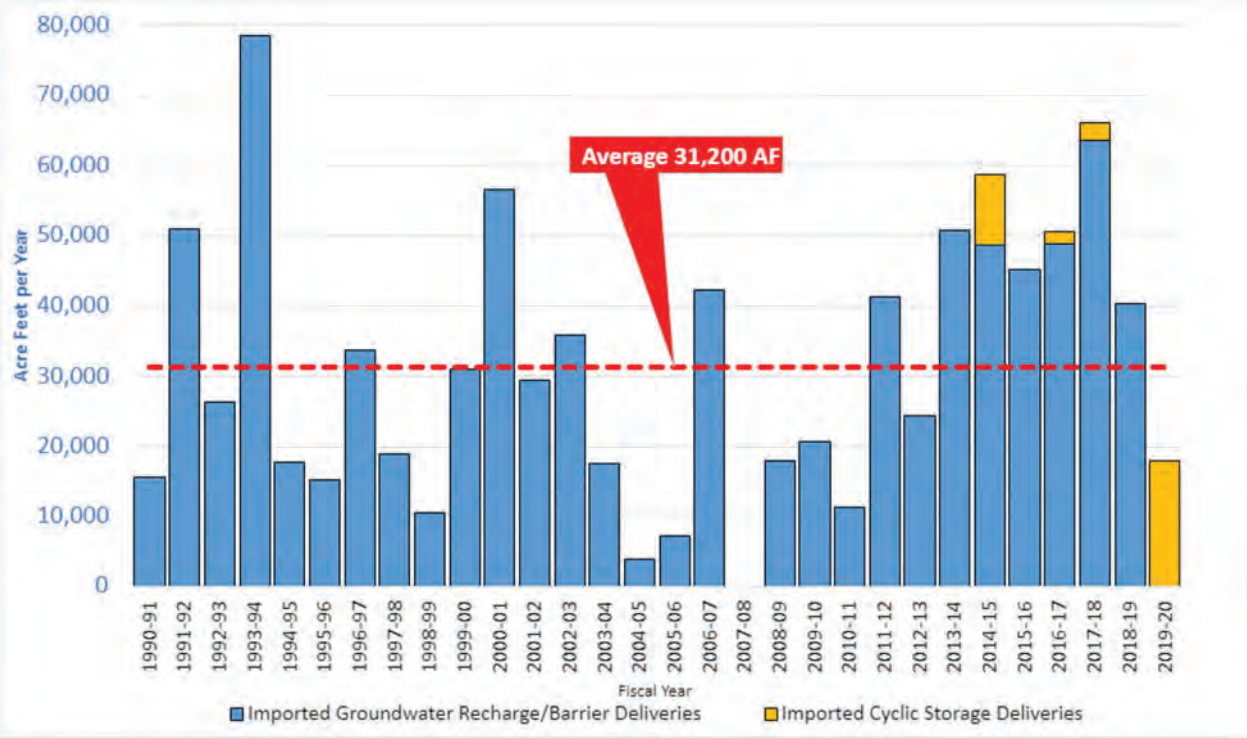


Figure 6-6: MWDOC Imported Water Sales for Groundwater Replenishment

6.3.1.6 MET Conjunctive Use/Cyclic Storage Program with OCWD

Since 2004, OCWD, MWDOC, and certain groundwater producers have participated in MET's CUP. This program allows for the storage of MET water in the OC Basin. The existing MET program provides storage of up to 66,000 AF of water in the OC Basin to be pumped by participating producers in place of receiving imported supplies during dry years or water shortage events. In exchange, MET contributed to improvements in basin management facilities and to an annual administrative fee. These improvements included eight new groundwater production wells, improvements to the seawater intrusion barrier, and construction of the Diemer Bypass Pipeline. The water is accounted for via the CUP program administered by the wholesale agencies and is controlled by MET such that it can be withdrawn over a three-year time period (OCWD, 2020a).

The CUP account was filled in the wet years of 2007 & 2013 and withdrawn to near-zero during the dry-years of 2010 & 2016. MET has not stored water in the CUP account since 2014, and the CUP account has been withdrawn to zero and is projected to remain at 0 AF by the end of 2021. The CUP contract with MET ends in 2028.

As so, the values in Figure 6-7 from 2015 onwards, represent only volumes from the MET Cyclic Storage Agreement. The Cyclic Storage account is an alternative storage account with MET. However, unlike the CUP program, OCWD controls when the water is used. The Cyclic Water Storage Program allows MET to store water in a local groundwater basin during surplus conditions, where MET has limited space in its regional storage locations. Once the water is stored via direct delivery or In-lieu the groundwater agency has the ability to purchase this water at a future date or over a 5-year period.

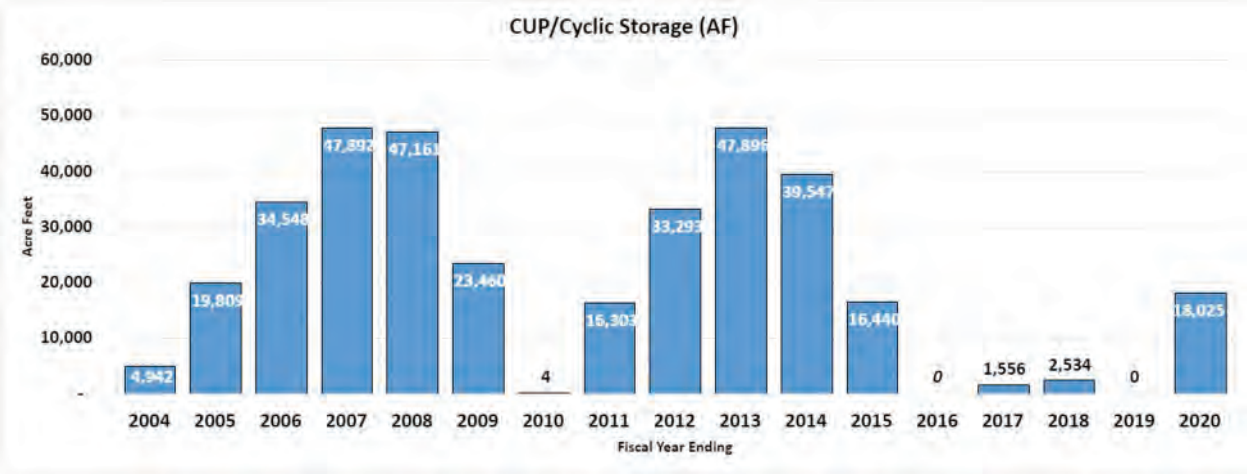


Figure 6-7: MWDOC Conjunctive Use Program Historical Storage Balance

6.3.2 Other Groundwater Basins

6.3.2.1 San Juan Groundwater Basin

Basin Characteristics

Per DWR's designation, the San Juan Basin is a non-adjudicated, very low-priority basin (DWR, 2019). The San Juan Basin is located in the San Juan Creek Watershed and is comprised of four principal groundwater basins: 1) Lower Basin, 2) Middle Basin, 3) Upper Basin, and 4) Arroyo Trabuco. A map of the four principal groundwater basins is shown in Figure 6-8. The Middle Basin, Lower Basin, and Lower Trabuco consists of approximately 5.9 square miles of water bearing alluvium. Groundwater occurs in the relatively thin alluvial deposits along the valley floors and within the major stream channels. The younger alluvial deposits within the San Juan Basin consists of a heterogeneous mixture of sand, silts, and gravel.

Water quality in the San Juan Basin ranges from good to poor, as the deep lower basins contain brackish water that requires treatment, while the shallower upper subbasin has lower total dissolved solids (TDS) concentration. Groundwater production occurs primarily within the Lower Arroyo Trabuco, the Middle Basin, and the Lower Basin due to lack of storage and production capacity in the Upper Basin. Groundwater production within the San Juan Basin faces additional challenges including shallow bedrock conditions, elevated dissolved solids content of the water, riparian habitat constraints on groundwater level drawdown, permit limits, and climate changes or drought conditions.

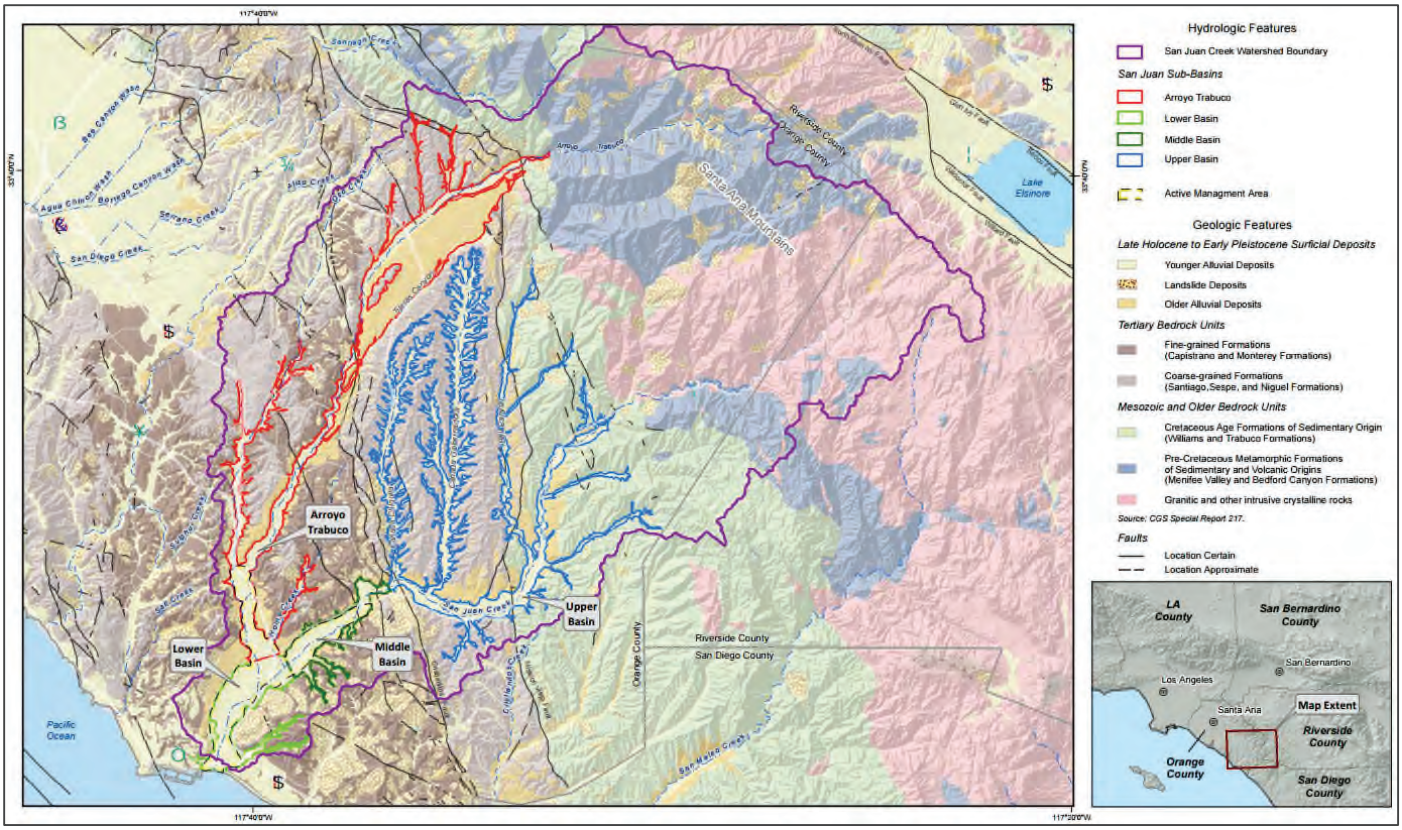


Figure 6-8: Principal Groundwater Basins for the San Juan Groundwater Basin

The physical boundaries of the San Juan Basin include the Santa Ana Mountain to the north, sedimentary rock formations to the sides of the Upper Basin and Arroyo Trabuco, and the Pacific Ocean to the south.

The San Juan Basin is recharged through a variety of sources such as:

- Streambed infiltration in San Juan Creek, Horno Creek, Oso Creek, and Arroyo Trabuco.
- Subsurface inflows along boundaries at the head of the tributaries upstream and other minor subsurface inflows from other boundaries.
- Precipitation and applied water.
- Flow from fractures and springs.

Discharge of groundwater from the San Juan Basin occurs from a variety of sources such as:

- Groundwater production
- Rising groundwater
- Evapotranspiration
- Outflow to Pacific Ocean

Currently, three agencies, have groundwater rights to the San Juan Basin and use this water for either municipal purposes or for irrigation. The agencies with groundwater rights to the Basin and their 2020 pumping allocations are listed below (Wildermuth Environmental, Inc., 2020):

- South Coast Water District: 1,300 AFY
- San Juan Basin Authority (SJBA): 12,500 AFY
- City of San Juan Capistrano: 6,150 AFY of SJBA's water rights, including 5,800 AFY at the Alipaz well field and Tirador well and up to 350 AFY for the San Juan Hills Golf Club

Basin Management

The SWRCB has determined that the San Juan Creek watershed is not a groundwater basin but is rather a surface and underground flowing stream. Therefore, it is subject to SWRCB jurisdiction and its processes with respect to the appropriation and use of waters within the watershed. The SJBA is a joint powers agency comprised of representatives from four local jurisdictions formed in 1971 to manage the watershed. Member agencies include SCWD, City of San Juan Capistrano, MNWD, and SMWD. Both the SJBA and SCWD have their own SWRCB Permit for Diversion and Use of Water: Permit No. 21074 and Permit No. 21138, respectively (Wildermuth Environmental, Inc., 2020).

The San Juan Basin differs from many adjudicated groundwater basins as it does not strictly follow the term "safe yield" in preventing undesirable results occurring as a result of over-production of groundwater. The SJBA adopted the concept of "adaptive management" of the Basin to vary pumping from year to year based on actual basin conditions derived from monitoring efforts, with the groundwater management implication that during dry periods groundwater pumping will be lower than in wet periods. SJBA serves as the "Basin Manager" responsible for annually determining the amounts of adapted "available safe yield" so that SJBA and SCWD can pump pursuant to their water rights, so that 80% of water available for pumping goes to SJBA (up to a maximum of 12,500 AFY), and 20% goes to SCWD (up to a maximum of 1,300 AFY) (Wildermuth Environmental, Inc., 2020).

Following the recommendations of the San Juan Basin Groundwater and Facilities Management Plan (Appendix E), SJBA began developing adaptive pumping management (APM) plans to annually determine the water available for pumping. The first APM plan was the 2016 plan and the most current at the time of this writing is the 2020 plan. The plans are updated each April, after most of the rainy season has passed, to define and initial pumping allocation for the subsequent 12-month period (May to April) based on current Basin conditions. Adjustments to the initial allocation are made as appropriate. Based on climate conditions and groundwater levels in the Inland and Stonehill management zones, the Basin is near full, indicating that the initial 2020 pumping allocations may be set at the maximum limits (Wildermuth Environmental, Inc., 2020).

The APM plan also discusses the various efforts SJBA leads in order to support the continued sustainable production from the Basin. Examples of such efforts include aquifer testing to better understand Basin characteristics and monthly water quality and water level monitoring programs (Wildermuth Environmental, Inc., 2020). For the full text of the 2020 APM plan, refer to Appendix F.

The storage in the groundwater basin is small, at an estimated 41,400 AF, relative to recharge and production. The range of natural yield of the San Juan Basin is 7,000 AFY to 11,000 AFY. Instream recharge along both San Juan Creek and Arroyo Trabuco Creek is the only viable largescale recharge

method for the San Juan Basin due to the lack of suitable off-stream sites for stormwater storage and recharge, and the inability of the basin to accept large amounts of recharge at a specific site (SJBA, 2016).

6.3.2.2 La Habra Groundwater Basin

Basin Characteristics

The unadjudicated La Habra Groundwater Basin covers parts of Los Angeles County and Orange County and is part of both the Central Basin, and the OC Basin, which are both medium-priority basins. The Basin lies entirely within the Coyote Creek Watershed and the La Habra Basin area is shown on Figure 6-9. A portion of the La Habra Basin is located within Central Basin as well as the northern tip of the OC Basin.

The City of La Habra has been deemed the exclusive GSA under SGMA for the La Habra-Brea Management Area. This management area is part of Basin 8-1 but is hydrogeologically distinct from the OCWD Management Area and is not under the jurisdiction of OCWD. La Habra adopted a resolution to establish the La Habra Basin as a separate basin from Basin 8-1. OCWD adopted a resolution to support the City's request to DWR for an internal jurisdictional boundary modification in the OC Basin that follows the city limits of La Habra and Brea as it is outside of the OCWD's jurisdictional boundary.

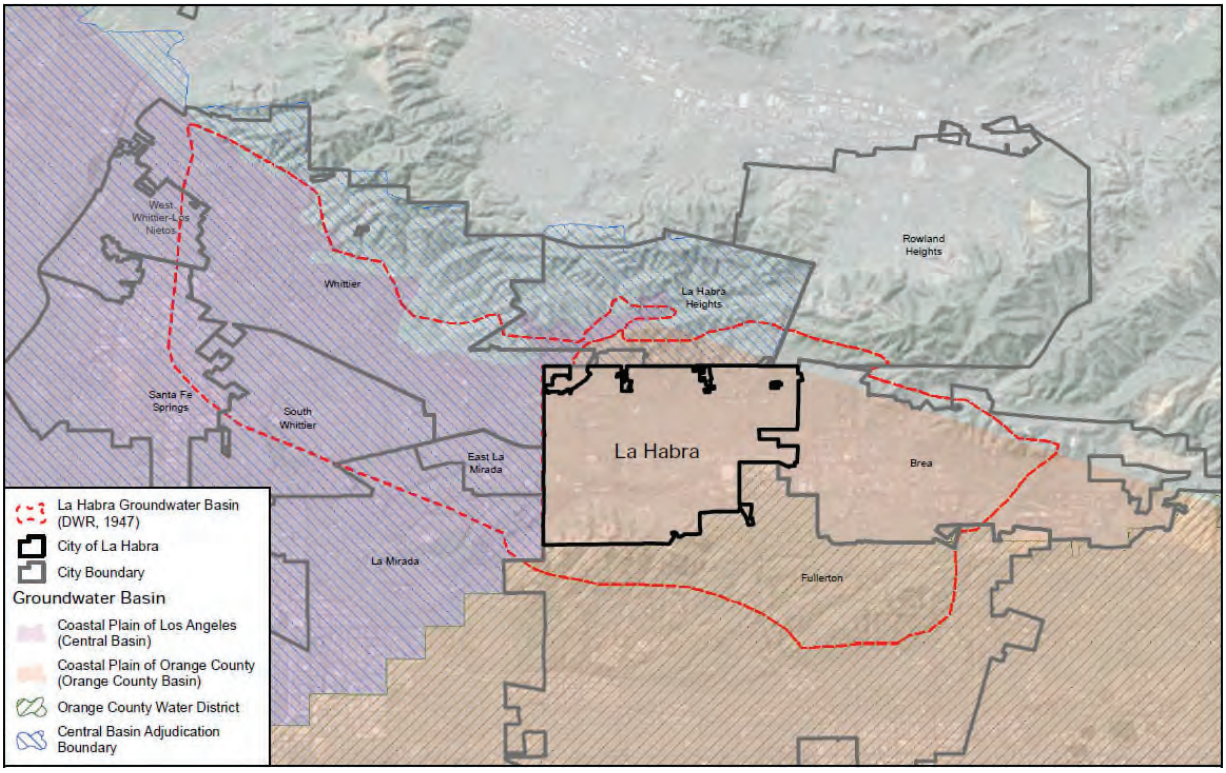


Figure 6-9: La Habra Groundwater Basin

From a structural geological standpoint, the La Habra Basin area is dominated by the northwest trending La Habra Syncline (a U–shaped down–fold) which is bounded on the north by the Puente Hills and on the south by the Coyote Hills. The fold is a naturally occurring trough, or valley, where significant quantities of groundwater have accumulated over the past 150,000 years. The La Habra Basin consists of three water-bearing zones: 1) the Alluvium, 2) the La Habra Formation (including the Coyote Hills Formation), and 3) the San Pedro Formation.

The Alluvium is comprised of young and old alluvium. The deposits are found along the surface stream courses and is composed of unconsolidated silt, clay, sand, and gravel. Alluvium thickness ranges from a few feet to over 100 feet. Generally, the La Habra Formation lies below the Alluvium, consisting of the La Habra and Coyote Hills Formations. However, in the Coyote Hill and Puente Hills, the Alluvium is uplifted and exposed. The La Habra Formation consists of non-marine mudstone, siltstone, sandstone, and conglomerate. It ranges in thickness from 300 to nearly 1,200 feet. Water levels of wells in the La Habra Formation have been measured between 100 and 200 feet below ground surface across the Basin.

Underneath the La Habra Formation lies the San Pedro Formation. As the deepest water bearing unit, the San Pedro Formation is comprised of sand, gravel, sandstone, conglomerate, and shale. The San Pedro Formation ranges between 200 and 400 feet in thickness and produces the best quality groundwater of all the water bearing zones. Pressure levels of confined groundwater in wells of the San Pedro aquifer zone range from about 100 to 200 feet below ground surface (La Habra, Groundwater Study, August 2014).

Basin Management and Safe Yield

As stated in Section 6.3.1.1, the agencies within Basin 8-1, such as the City of La Habra, collaborated to submit an Alternative to a GSP in 2017, titled the “Basin 8-1 Alternative” to meet SGMA compliance. This document supersedes the Groundwater Management Plan from 2014 and will be updated every five years. The current (2017) version of the SGMA-compliant document is included in Appendix D.

The La Habra Basin is not adjudicated. Instead, the City of La Habra follows a “safe yield” which is used for the management and future planning of the La Habra Basin for sustained beneficial use. The safe yield is the volume of groundwater that can be pumped without depleting the aquifer to a point where it cannot recover through natural recharge over a reasonable period of time.

The safe yield for the La Habra Basin was estimated to be approximately 4,500 AFY. This safe yield was determined through an average from two separate studies that took into account natural groundwater recharge and natural groundwater discharge. The La Habra Basin continues to be managed sustainably by maintaining and coordinating groundwater production within the estimated safe yield. The City of La Habra is also evaluating its existing monitoring program with the intent to develop a more robust groundwater elevation and water quality monitoring program (La Habra, 2020).

Historical and Current Groundwater Extraction

From 1922 to the early 1940’s water levels in the La Habra Basin declined markedly because of increased water extraction and deficient rainfall. Water levels rose in the mid 1940’s and then declined again in the late 1940’s reaching the lowest recorded levels in the middle to late 1950’s. From 1960 to 1977, water levels increased in elevation because of a significant decrease in water extraction. Based upon recorded stream runoff yields, it is estimated that approximately 2,100 AF of water would percolate during the average year. For direct percolation of rainfall and resulting runoff within the valley itself, it is

estimated that an average of 1,600 AFY would percolate. Thus, the groundwater recharge is estimated at approximately 3,700 AFY. Subsurface flow estimates are about 5,500 AFY. Therefore, it is estimated that the average long–term supply that can be extracted without severe or sustained changes in the amount of groundwater in storage, is approximately 4,500 AFY (an average of the two values).

The City of La Habra pumps local groundwater from the La Habra Basin from three production wells for drinking water purposes and one non-potable groundwater well used for irrigation. Groundwater production in the La Habra Basin has ranged from 3,295 AF in FY 2016-17 to 2,245 AF in FY 2018-19 (La Habra, 2020).

6.3.2.3 Main San Gabriel Groundwater Basin

California Domestic Water Company (CDWC) has water rights, production, treatment and conveyance facilities in the adjudicated Main San Gabriel Groundwater Basin that serve customers overlying the basin within Suburban Water Systems as well as serving the cities of Brea and La Habra in Orange County. Based on the ten-year average from FY 2010-11 through 2019-20, Brea and La Habra purchase approximately 13,261 AFY of Main San Gabriel Groundwater Basin groundwater from CDWC, but this volume varies from year to year.

There is not a limit or cap on the amount of water CDWC can produce from the basin. CDWC owns approximately 12,363 AF of prescriptive pumping rights in the Main San Gabriel Basin. Prescriptive pumping rights are adjusted based on the determination of the Operating Safe Yield (OSY) annually. Based on the FY 2020-21 OSY set at 150,000 AF, CDWC's prescriptive pumping rights total 9,383.24 AF. Currently, this is the amount of groundwater CDWC can produce from the basin before incurring replacement water assessments, further described in Section 6.3.2.3.1.

The Main San Gabriel Basin and its operations are described below.

Basin Characteristics

The Main San Gabriel Basin lies in eastern Los Angeles County and occupies most of San Gabriel Valley. The hydrologic basin or watershed coincides with a portion of the upper San Gabriel River watershed, and the aquifer or groundwater basin underlies most of the San Gabriel Valley. It is bounded on the north by the San Gabriel Mountains, on the northwest by Raymond Basin, on the southeast by Puente Basin, and on the south by Central Basin. The Main San Gabriel Basin encompasses approximately 107,000 acres and has a storage of 8.9 MAF when the groundwater elevation at the Baldwin Park Key Well is 316 feet. Generally speaking, one foot of groundwater elevation is equivalent to approximately 8,000 AF of storage.

The hydrogeological San Gabriel Basin is divided between three sub-basins, Main Basin, Puente Basin, and portions of Six Basins area. A portion of Six Basins area is tributary to the Main Basin. Each of the sub-basins are adjudicated and managed separately.

Major sources of recharge to the Main San Gabriel Basin are infiltration of rainfall on the valley floor and runoff from the nearby mountains. The Main San Gabriel Basin is the first of a series of basins to receive the water from mountain runoff. The Main San Gabriel Basin interacts hydrogeologically and institutionally with adjoining basins, including Puente Basin, Central Basin, and West Coast Basin (Main San Gabriel Basin Watermaster, 2020a).

Figure 6-10 depicts the boundaries of the Main San Gabriel Basin.

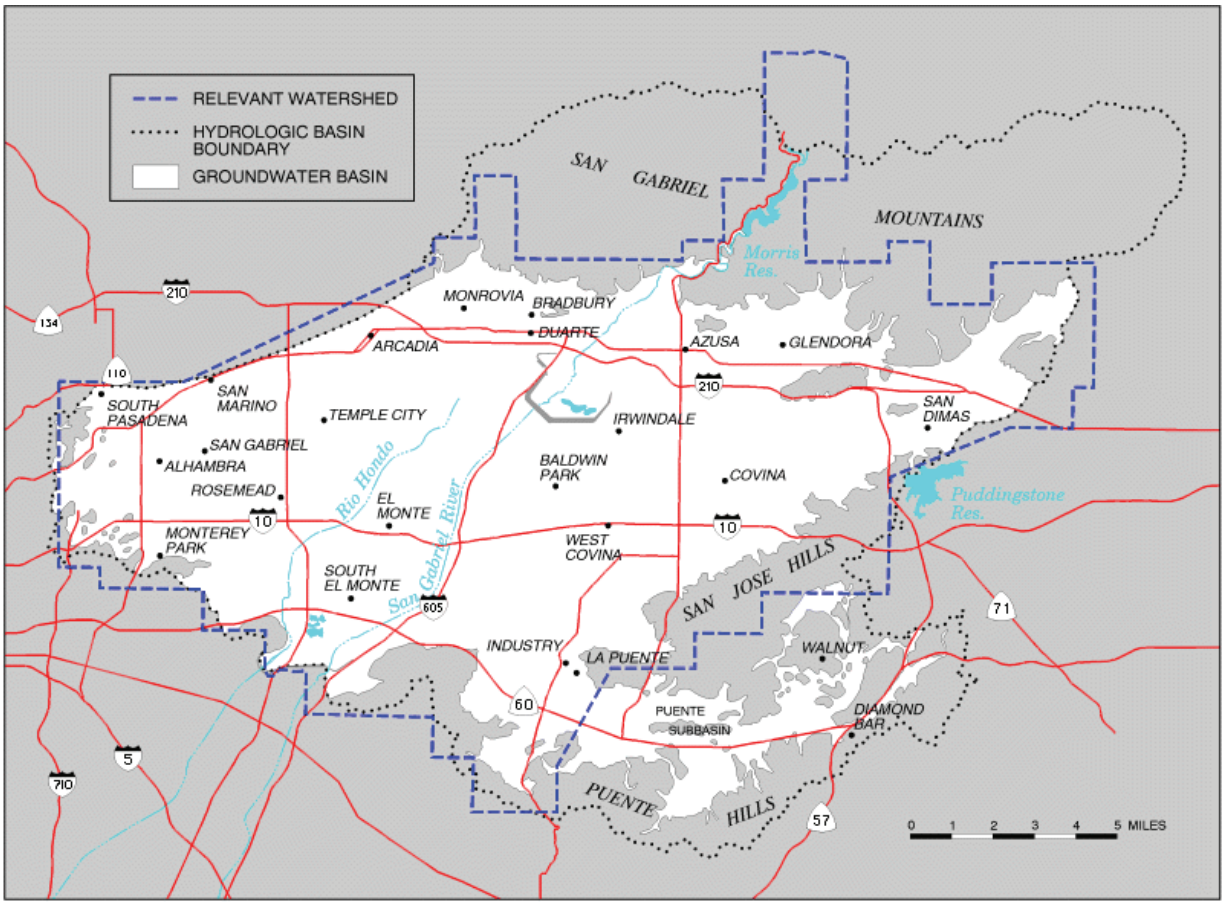


Figure 6-10: Main San Gabriel Groundwater Basin

6.3.2.3.1 Basin Judgment

Rapid urbanization in the San Gabriel Valley in the 1940s resulted in an increased demand for groundwater drawn from the Upper Area users in Main San Gabriel Basin. Consequently, the Main San Gabriel Basin was in a state of overdraft and the available water supply for the Lower Area and downstream users decreased. In 1968, at the request of producers, the Upper San Gabriel Municipal Water District filed a complaint that would adjudicate water rights in the Basin and would bring all Basin producers under control of one governing body. The final result was the entry of the Main San Gabriel Basin Judgment in 1973.

The Judgment defined the water rights of 190 original parties to the legal action. It created a new governing body, the Main San Gabriel Basin Watermaster, and described a program for management of water in the Basin. Under the terms of the Main San Gabriel Basin Judgment all rights to the diversion of surface water and production of groundwater within the Main Basin and its relevant watershed were adjudicated. The Main Basin Judgment does not restrict the quantity of water agencies may extract from the Main Basin. Rather, it provides a means for replacing with Supplemental Water all annual extractions in excess of an agency's annual right to extract water. The Main Basin Watermaster annually establishes

an OSY for the Main Basin that is then used to allocate to each agency its portion of the OSY that can be produced free of a Replacement Water Assessment. If a producer extracts water in excess of his right under the annual OSY, it must pay an assessment for Replacement Water that is sufficient to purchase one AF of Supplemental Water to be spread in the basin for each AF of excess production. All water production is metered and is reported quarterly to the Main Basin Watermaster. The OSY is set at 150,000 AF for FY 2020-21.

In addition to Replacement Water Assessments, the Main Basin Watermaster levies an Administration Assessment to fund the administration of the Main Basin management program under the Main Basin Judgment and a Make-up Obligation Assessment in order to fulfill the requirements for any Make-Up Obligation under the Long Beach Judgment and to supply fifty percent of the administration costs of the River Watermaster service. The Main Basin Watermaster levies an In-lieu Assessment and may levy special Administration Assessments.

Water rights under the Main Basin Judgment are transferable by lease or purchase so long as such transfers meet the requirements of the Main Basin Judgment. There is also provision for Cyclic Storage Agreements that allow parties and non-parties to store imported supplemental water in the Main San Gabriel Basin under such agreements with the Main Basin Watermaster pursuant to uniform rules and conditions and Court approval (Main San Gabriel Basin Watermaster, 2020a).

The Main Basin Watermaster has entered into a Cyclic Storage Agreement with three municipal water districts, MET, Three Valleys Municipal Water District (TVMWD), and Upper San Gabriel Valley Municipal Water District (USGVMWD). The first agreement with MET and USGVMWD permits MET to deliver and store imported water in the Main Basin in an amount not to exceed 100,000 AF for future Replacement Water use. The second Cyclic Storage Agreement is with TVMWD and permits MET to deliver and store 40,000 AF for future Replacement Water use. The third is with San Gabriel Valley Municipal Water District. The Amended Main San Gabriel Basin Judgment contains more detailed information on the agreements and management of water rights to the basin (Appendix G).

The Main San Gabriel Basin is currently in an extended period of drought-like conditions, with 18 out of the most recent 25 years having below-average rainfall, as well as minimal runoff and limited recharge. As a result, Basin recovery is dependent on the Main Basin Watermaster's management actions. Long-term water demand has fallen steadily over the last decade, and in FY 2019-20, the demand was approximately 30% below the peak in 2006. The Key Well also rose 6.3 feet in FY 2019-20 due to increases in Cyclic Storage and local and Resource Development Assessment (RDA) water.

6.3.2.4 San Mateo Valley Groundwater Basin

Basin Characteristics

Per DWR's designation, the San Mateo Valley Basin is a non-adjudicated, very low-priority basin located to the south of the Orange County boundary, within the boundary of the Marine Corps Base (Base), Camp Pendleton, in San Diego County. The basin covers an area of 4.7 square miles (DWR, 2019a). Historically, the Base utilized groundwater from the basin for Base use and for irrigation of agricultural lease lands on Base property. Recent data have not been obtained on use of water from the basin by the Base.

Marine terrace deposits characterized as predominantly fine to coarse sand and gravel in the southern part of San Clemente are underlain by the San Mateo and Capistrano Formations. These deposits are in direct hydraulic contact with the ocean and are subject to seawater intrusion. The San Mateo Formation consists of marine sands and conglomerates, while the Capistrano Formation that underlies it consists of interbedded sandstone and shale zones, with nested turbidite-filled channels that are conducive to groundwater production (Dudek, 2015).

Confined groundwater in the San Mateo Valley Basin is produced from a deep-lying series of semi-consolidated sandstone beds with numerous coarse gravel lenses. The majority of the soils have slow or very slow infiltration rates. The usable surface area of the Basin was identified to be 107 acres with a hypothetical usable depth ranging from 10 to 110 feet (Boyle Engineering Corporation, 1987).

San Clemente operates two water supply wells, Well 6 and Well 8, to augment it's water supply.

Basin Management

Due to the unadjudicated, very low-priority designation of the San Mateo Valley Basin, a formal management plan does not exist.

The Basin has recharge areas along San Mateo Creek, downgradient from drinking water supply wells (DWR, 2019b).

6.3.2.5 Impaired Groundwater

The combined yield from the seven projects described below, was 25,443 AF in FY 2019-20. This supply is expected to increase substantially to over 30,000 AF at ultimate development of these projects. Since these projects use groundwater, a similar amount must either be replenished on an average annual basis to maintain water balance or be salvaged from water that otherwise would flow into the ocean as subsurface outflow. The benefit of these projects is to provide a firm base supply, restore use of groundwater storage impaired by natural causes and/or agricultural drainage, improve conjunctive use storage operations, and provide a drought supply by the additional capacity to tap groundwater in storage.

Huntington Beach Well 9: This project would restore the 3,000 gpm well capacity by removing nuisance odor from dissolved Hydrogen Sulfide. The City is pursuing assistance from OCWD to help fund both capital and operational costs for this project. Upon completion of the treatment system, Well 9 will be able to produce high quality water at full design capacity (Psomas, 2016).

Tustin Main Street Desalter - The City of Tustin currently operates two desalter plants. The Main Street Treatment plant began operating in 1989 with a capacity of 2 MGD. The Main Street Desalter reduces nitrate levels from the groundwater produced by Tustin's Main Street wells. The untreated groundwater undergoes either Reverse Osmosis (RO) or Ion Exchange treatment.

Tustin 17th Street Desalter - The Tustin 17th Street Desalter began operating in 1996 with a capacity of 3 MGD. The Tustin 17th Street Desalter reduces high nitrate and TDS concentrations from the groundwater pumped by Tustin's 17th Street wells. The 17th Street Desalter plant uses two RO membrane trains to treat the groundwater.

Mesa Water Reliability Facility (MWRF) – Mesa currently owns and operates MWRF with a capacity of 5.8 MGD that removes color from the water using microfiltration (MF).

IRWD Deep Aquifer Treatment System – IRWD's Deep Aquifer Treatment System (DATS) purifies drinking water from the lower aquifer of the OC Basin. The water in this aquifer is very high quality, but has a brownish tint imparted from the remains of ancient vegetation. The DATS facility went on-line in 2002 and can treat up to 7.4 MGD from two wells that pump water from 2000 feet below ground level.

IRWD Wells 21 & 22 Desalter Treatment plant - The Wells 21 and 22 Rehabilitation, Pipelines and Water Treatment Plant project recovers and treats local groundwater to remove nitrates using reverse osmosis. The treated water is used in the potable water system. Adding this new source of drinking water helps to satisfy increasing demand for water and provides a sustainable infrastructure with long-term benefits. The Wells 21 and 22 project will produce approximately 6,300 acre-feet per year of drinking water for the IRWD service area.

IRWD Irvine Desalter Project - The Irvine Desalter Project was completed in 2006 and purifies water found in the Irvine sub-basin of the larger OC Basin. It is a two-part endeavor, with recycled water and drinking water components. The Irvine Desalter Potable Treatment Facility uses two reverse osmosis trains to produce 2.7 MGD by removing salts that are caused by natural geology and past agricultural use.

San Juan Basin Desalter - The GWRP came on-line in 2004, also known as the San Juan Basin Desalter, is a 5 MGD plant that is owned and operated by the City of San Juan Capistrano. The GWRP takes groundwater high in iron, manganese, and TDS using RO and makes it suitable for potable water uses. The plant has never operated continuously at the 5 MGD rate, but prior to the drought restrictions in the basin, had been producing water at the rate of about 3 MGD.

SCWD Groundwater Desalter - SCWD currently owns and operates a 1 MGD GRF that came on-line in 2007, also known as the Capistrano Beach Desalter. The plant extracts brackish groundwater from an aquifer in the San Juan Basin and goes through iron and manganese removal due to high mineral content.

6.3.3 Planned Future Sources

The agencies that manage the OC, Main San Gabriel, La Habra, and San Juan basins regularly evaluate potential projects and conduct studies to review the feasibility of new projects or sources. A few groundwater basin-related projects that are planned or in progress are described below.

OC Basin

GWRSFE **–** The final expansion of the GWRS is currently underway and is the third and final phase of the project. When the Final Expansion is completed in early 2023, the plant's treatment capacity will increase from 100 to 130 MGD. To produce 130 MGD, additional treated wastewater from OC San's Treatment Plant 2 is required. This recycled water represents a high quality, drought-proof source of water to protect and enhance the OC Basin. The Final Expansion project will include expanding the existing GWRS treatment facilities, constructing new conveyance facilities at OC San Plant 2, and rehabilitating an existing pipeline between OC San Plant 2 and the GWRS. Once completed, the GWRS plant will recycle 100% of OC San's reclaimable sources and produce enough water to meet the needs of over one million people.

Forecast Informed Reservoir Operations (FIRO) at Prado Dam – Stormwater represents a significant source of water used by OCWD to recharge the OC Basin. Much of this recharge is made possible by the capture of Santa Ana River stormflows behind Prado Dam in the Conservation Pool. FIRO represents the next generation of operating water reservoirs using the best available technology. Advances in weather and stormwater runoff forecasting hold promise to allow USACE to safety impound more stormwater while maintaining equivalent flood risk management capability behind Prado Dam. Preliminary modeling show that by expanding the Conservation Pool from elevation 505 to 512 ft msl, annual recharge to the groundwater basin could increase by as much as 4,500 to 7,000 AFY.

Main San Gabriel Groundwater Basin

Involvement in MET's Regional Recycled Water Project **–** The Main San Gabriel Basin is listed in Phase I of this project, which is expected to deliver approximately 40,000 AF of recharge water to the basin for spreading and groundwater replenishment. The Main San Gabriel Basin Watermaster Board of Directors authorized a letter of intent that was provided to MET expressing the basin's intent to continue cooperating and working with MET on the project.

San Juan Basin

San Juan Watershed Project – The San Juan Watershed Project is a multi-phase project proposed by SMWD and project partners. If implemented, this project would enhance water reliability by capturing local stormwater runoff as well as directing recycled water into temporary storage and using it to recharge the San Juan Creek Watershed. A final Environmental Impact Report (EIR) was submitted by SMWD in 2019 (SMWD, 2021a)

6.4 Surface Water

In FY 2019-20, two percent of MWDOC's water supply portfolio was attributed to surface water captured in local reservoirs. The largest surface water reservoir in Orange County is Santiago Reservoir (Irvine Lake), which is further discussed in Section 6.4.1. In other areas, surface water runoff percolates into alluvial materials or groundwater basins. IRWD, SMWD, and SCWD capture and manage surface water supplies at certain locations. Surface water is managed by MWDOC's member agencies (Orange County Local Agency Formation Commission, 2020).

6.4.1 Irvine Lake

Santiago Reservoir, or Irvine Lake, is the largest surface water reservoir in Orange County. Irvine Lake was built in 1931 and captures runoff from the upper Santiago Creek Watershed, as well as stores imported water (Orange County Local Agency Formation Commission, 2020). The 700-acre Irvine Lake is co-owned by IRWD and Serrano Water. The lake holds more than 9 billion gallons of water and is contained by the 810-foot-tall Santiago Dam. IRWD uses water from Irvine Lake as a source of water for non-drinking purposes such as irrigation and as a source of water for the Baker Treatment Plant (Section 6.2.1.5). Serrano Water District (Serrano) also uses Irvine Lake to provide treated drinking water to its customers in the City of Villa Park and parts of the City of Orange. Both agencies balance the benefits of storing water in Irvine Lake with minimizing evaporation and preserving the ability to capture rainwater from the surrounding hills. During years with less rainfall, IRWD and Serrano also add imported water from MET to the lake (IRWD, 2021a).

6.5 Stormwater

MWDOC does not own or operate stormwater facilities. This section describes existing and planned stormwater sources in the region that benefit Orange County.

6.5.1 Existing Sources

Costly and limited imported water availability from the CRA and SWP has heightened the need to enhance water supply by increasing local stormwater capture. The Prado Dam in Riverside, California captures approximately 52 TAF of stormwater annually, on average, for recharge in Orange County. During times of minimal flood threat, the dam can be regulated to control runoff in order to supply water to OCWD. The current agreement between the US Army Corps of Engineers and OCWD allows for the capture of stormwater up to an elevation of 498 feet above sea level during flood season and up to 505 feet above sea level during non-flood season behind Prado Dam (OCWD, 2016).

6.5.2 Planned Future Sources

The Prado Basin Feasibility Study evaluates the alternatives to restore environmental resources within the Prado Basin and Santa Ana River and increase the existing volume of water conservation potential. Increasing stormwater capture by an additional 7 feet during the flood season, to 505 ft above sea level, can provide up to an additional 30 TAFY of water (OCWD, 2016). The proposed Water Conservation Plan includes re-operation of the Prado Dam for controlled release of water for reduced discharge rates from the Prado Dam and reducing sediment deposition in the Basin to increase the effective yield of water from the Santa Ana River for diversion and infiltration at OCWD's facilities downstream of the dam. The final EIR was published in 2021 and OCWD anticipates that the Prado Dam Water Control Manual will be updated by the US Army Corps of Engineers in 2021 to include stormwater capture to elevation 505 feet year-round (OCWD, 2021).

6.6 Wastewater and Recycled Water

MWDOC is not directly involved in wastewater services and does not own or operate the wastewater collection system in its service area. Additionally, MWDOC does not own or operate wastewater treatment facilities. Some local agencies provide wastewater collection and treatment as well as potable water services, while other agencies send their wastewater to large regional facilities. Wastewater is not collected by MWDOC and MWDOC does not treat or discharge wastewater.

MWDOC is indirectly involved in recycled water production, through its supply to systems whose wastewater is sent for IPR. MWDOC does not produce or manage recycled water, but supports, encourages, and partners in recycled water efforts within its service area. Recycled water planning within MWDOC's service area requires close coordination with multiple agencies that often have overlapping jurisdictional boundaries. As imported water supplies have become increasingly challenged, the local agencies, including OCWD have continued working to identify opportunities for the use of recycled water for irrigation purposes, groundwater recharge and some non-irrigation applications. The following sections expand on the existing agency collaboration involved in these efforts as well as MWDOC's member agencies projected recycled water use over the next 25 years.

6.6.1 Agency Coordination

MWDOC does not own or operate wastewater treatment facilities and the individual agencies that MWDOC supplies often send collected wastewater to either OC San in North County or SOCWA in South County for treatment and disposal. OCWD is the manager of the OC Basin and strives to maintain and increase the reliability of the OC Basin through replenishment with imported water, stormwater, and advanced treated wastewater.

6.6.1.1 Orange County Sanitation District

OC San collects wastewater from residential, commercial, and industrial customers in 21 cities, three special districts, and portions of unincorporated Orange County, totaling 479 square miles that serves more than 2.5 million residents. These flows include dry weather urban runoff collected from 15 diversion points and discharged into the sewer system for treatment and Santa Ana River Interceptor flows from the upper Santa Ana watershed.

OC San operates and maintains two treatment plants: Reclamation Plant No. 1, located in Fountain Valley with a capacity of 320 MGD, and Treatment Plant No. 2 located in Huntington Beach with a capacity of 312 MGD. OC San also operates 572 miles of collection system pipelines along with 15 offsite pump stations. Treated wastewater is discharged to the Pacific Ocean via an ocean outfall in compliance with state and federal requirements as set forth in OC San's National Pollutant Discharge Elimination System (NPDES) permit. Approximately 100 MGD of secondary effluent undergoes advanced treatment at the GWRS facility operated by the OCWD and 7 MGD undergoes tertiary treatment at OCWD's Green Acres Project (GAP) facility. OC San's ocean outfall is 120-inch diameter and extends four miles off the coast of Huntington Beach. A 78-inch diameter emergency outfall also exists that extends 1.3 miles off the coast.

OC San Reclamation Plant No. 1 - Reclamation Plant No. 1 treats raw wastewater and has a maximum treatment capacity of 320 MGD. The plant provides primary and secondary treatment and supplies secondary effluent to OCWD for further tertiary treatment at their GAP facility and advanced treatment at their GWRS. Reclamation Plant No. 1 is the only plant that provides water to OCWD for additional treatment and recycling. An interplant pipeline allows flows to be conveyed to Treatment Plant No. 2.

OC San Treatment Plant No. 2 - Treatment Plant No. 2 provides primary and secondary treatment to raw wastewater and has a maximum treatment capacity of 312 MGD. All secondary effluent from their plant is discharged to the ocean through the ocean outfall.

6.6.1.2 Orange County Water District

OCWD is the manager of the OC Basin and provides water to 19 municipal water agencies and special districts. A full description of the OC Basin is available in Section 6.3.1. OCWD and OC San have jointly constructed and expanded two water recycling projects that include: 1) OCWD GAP and 2) OCWD GWRS.

OCWD GAP

OCWD owns and operates the GAP, a water recycling system that provides up to 8,400 AFY of recycled water for irrigation and industrial uses. GAP provides an alternate source of water that is mainly delivered

to parks, golf courses, greenbelts, cemeteries, and nurseries in the cities of Costa Mesa, Fountain Valley, Newport Beach, and Santa Ana. Approximately 100 sites use GAP water, current recycled water users include Mile Square Park and Golf Courses in Fountain Valley, Costa Mesa Country Club, Chroma Systems carpet dyeing, Kaiser Permanente, and Caltrans.

OCWD GWRS

OCWD's GWRS allows southern California to decrease its dependency on imported water and creates a local and reliable source of water. OCWD's GWRS purifies secondary treated wastewater from OC San to levels that meet and exceed all state and federal drinking water standards. The GWRS Phase 1 plant has been operational since January 2008 and uses a three-step advanced treatment process consisting of MF, RO (RO), and ultraviolet (UV) light with hydrogen peroxide. A portion of the treated water is injected into the seawater barrier to prevent seawater intrusion into the groundwater basin. The other portion of the water is pumped to ponds where the water percolates into deep aquifers and becomes part of Orange County's water supply. The treatment process is described on OCWD's website. (OCWD, GWRS, 2020).

The GWRS first began operating in 2008 producing 70 million gallons of water per day (MGD) and in 2015, it underwent a 30 MGD expansion. Approximately 39,200 AFY of the highly purified water is pumped into the injection wells and 72,900 AFY is pumped to the percolation ponds in the City of Anaheim where the water is naturally filtered through sand and gravel to deep aquifers of the groundwater basin. The OC Basin provides approximately 77 percent of the potable water supply for north and central Orange County. The design and construction of the first phase (78,500 AFY) of the GWRS project was jointly funded by OCWD and OC San; Phase 2 expansion (33,600 AFY) was funded solely by OCWD.

The Final Expansion of the GWRS is currently underway and is the third and final phase of the project. When the Final Expansion is completed in 2023, the plant will produce 130 MGD. To produce 130 MGD, additional treated wastewater from OC San is required. This additional water will come from OC San's Treatment Plant 2, which is in the City of Huntington Beach approximately 3.5 miles south of the GWRS. The Final Expansion project will include expanding the existing GWRS treatment facilities, constructing new conveyance facilities at OC San Plant 2 and rehabilitating an existing pipeline between OC San Plant 2 and the GWRS. Once completed, the GWRS plant will recycle 100 percent of OC San's reclaimable sources and produce enough water to meet the needs of over one million people.

6.6.1.3 South Orange County Wastewater Authority

SOCWA is a Joint Powers Authority created on July 1, 2001 to facilitate and manage the collection, transmission, treatment, and discharge of wastewater for more than 500,000 homes and businesses across South Orange County. It was formed as the legal successor to the Aliso Water Management Agency, South East Regional Reclamation Authority, and South Orange County Reclamation Authority. SOCWA has ten member agencies that include: City of Laguna Beach, City of San Clemente, City of San Juan Capistrano, ETWD, EBSD, IRWD, MNWD, SMWD, SCWD, and TCWD. All these service areas receive wholesale water through MWDOC. The service area encompasses approximately 220 square miles including the Aliso Creek, Salt Creek, Laguna Canyon Creek, and San Juan Creek Watersheds.

Within its service area, SOCWA operates four wastewater treatment plants, with an additional eight wastewater treatment plants operated by SOCWA member agencies. Wastewater in the service area is collected at the local and regional level through a series of interceptors that convey influent to the wastewater treatment plants. Treated effluent throughout the service area is conveyed to two gravity flow ocean outfalls operated by SOCWA the Aliso Creek Outfall and the San Juan Creek Outfall. The Aliso Creek outfall has a capacity of 33.2 MGD and extends 1.5 miles offshore near Aliso Beach in the City of Laguna Beach. The San Juan Creek outfall has a nominal capacity of 36.8 MGD which can be increased by pumping and extends 2.2 miles offshore near Doheny Beach in the City of Dana Point. Full secondary treatment is provided at SOCWA wastewater treatment plants, with most plants exceeding this level of treatment when the water is beneficially reused.

SOCWA Coastal Treatment Plant - SOCWA's Coastal Treatment Plant (CTP) in Aliso Canyon, Laguna Niguel has a 6.7 MGD capacity and treats wastewater received from the City of Laguna Beach, EBSD, MNWD, and SCWD to secondary effluent standards. Effluent from the CTP is treated to secondary or tertiary levels depending on the discharge method, ocean outfall or beneficial reuse. Recycled water is treated to Title 22 standards at the Advanced Water Treatment Plant (AWTP) owned by SCWD, but operated by SOCWA, located adjacent to the CTP. During the summer months, over 2 MGD of recycled water can be produced by the AWTP. Treated effluent that is not recycled is discharged through the Aliso Creek Ocean Outfall. Waste sludge is sent to the Regional Treatment Plant (RTP) in Laguna Niguel.

SOCWA Regional Treatment Plant – SOCWA's RTP in Laguna Niguel has a 12 MGD liquid capacity and 24.6 MGD solids handling capacity. The RTP treats wastewater from MNWD's service area to secondary or tertiary levels depending on discharge method, ocean outfall or reuse such as landscape irrigation. Recycled water is treated to applicable Title 22 standards. Secondary effluent is conveyed to the Aliso Creek Ocean Outfall via the SOCWA Effluent Transmission Main.

SOCWA Plant 3A – SOCWA's Plant 3A located in the City of Mission Viejo has a maximum capacity of 6 MGD and treats wastewater received from MNWD and SMWD. Effluent is treated to secondary or tertiary levels depending on the discharge method, ocean outfall or beneficial reuse. Recycled water is treated to applicable Title 22 standards and used to irrigate parks and greenbelts. Secondary effluent is conveyed to the San Juan Creek Outfall via the 3A Effluent Transmission Main.

SOCWA J. B. Latham Treatment Plant - SOCWA's J. B. Latham Treatment Plant located in the City of Dana Point has a 13 MGD capacity and treats wastewater from MNWD, City of San Juan Capistrano, SMWD, and SCWD to secondary effluent standards. The secondary effluent is conveyed directly to the San Juan Creek Outfall as the plant does not have tertiary treatment.

6.6.2 Current Recycled Water Uses

MWDOC does not produce or manage recycled water, but supports, encourages, and partners in recycled water efforts within its service area. Recycled water planning within MWDOC's service area requires close coordination with multiple agencies that many times have overlapping jurisdictional boundaries. As imported water supplies have become more challenged, the local agencies, including OCWD have continued working to identify opportunities for the use of recycled water for irrigation purposes, groundwater recharge and some non-irrigation applications. A list of agencies that provide wholesale or retail recycled water within MWDOC's service area are below.

Recycled water is widely accepted as a water supply source throughout MWDOC's service area. In the past, recycled water was mainly used for landscape irrigation, but large recycled water projects including OCWD's GAP and GWRS, and IRWD's recycled water projects have significantly expanded and increased uses. GWRS uses include injection for sea water barriers and percolation for groundwater recharge. IRWD is at the forefront of using recycled water not only for irrigation, but for other uses such as toilet flushing and commercial applications. Other agencies in south Orange County, such as MNWD and SMWD use a significant amount of recycled water. Recycled water in Orange County is treated to various levels depending on the end use and in accordance with Title 22 regulations as described below. For information on OCWD's GAP and GWRS, refer to Section 6.6.1.2.

ETWD Water Recycling Plant – ETWD's Water Recycling Plant (WRP) located in the City of Lake Forest has a maximum influent capacity of 6 MGD. Wastewater is treated to secondary or tertiary levels depending on the discharge method, ocean outfall or beneficial reuse. Recycled water is treated to Title 22 standards with the expansion completed in 2014. Treated effluent that is not recycled is discharged of through the Aliso Creek Ocean Outfall.

SMWD Chiquita Water Reclamation Plant – SMWD's Chiquita Water Reclamation Plant (CWRP) located in Chiquita Canyon treats wastewater to a tertiary level for recycled water use meeting Title 22 standards. CWRP has a maximum design capacity of 8 MGD with plans to increase its size to 10 MGD by 2025. Effluent that is not beneficially reused is discharged via the Chiquita Land Outfall that connects to the San Juan Creek Ocean Outfall.

SMWD Oso Creek Water Reclamation Plant – SMWD's Oso Creek Water Reclamation Plant (OCWRP) located along Oso Creek. Wastewater is treated to a secondary or tertiary depending on the method of discharge, ocean outfall or beneficial reuse. Recycled water is treated to Title 22 standards. A bypass facility allows excess wastewater to be sent to SOCWA's J.B. Latham Treatment Plant as OCWRP does not have an outfall. Without the ability to discharge treated effluent, excess flows beyond recycled water demands are sent to J.B. Latham Treatment Plant. OCWRP has a maximum design capacity of 3 MGD and is considered a scalping plant as it intercepts flows from a large trunkline.

SMWD Nichols Institute Water Reclamation Plant – the Nichols Institute Water Reclamation Plant is operated by SMWD but owned by a private company that owns property within SMWD's service area. This small facility treats approximately 34 AFY and does not have an outfall. All wastewater is treated to Title 22 standards for recycling purposes. Since this facility is remote from existing water and wastewater facilities, SMWD is not obligated to provide an alternate source of water in the event the facility becomes inoperable.

San Clemente Water Reclamation Plant - The City of San Clemente owns and operates the San Clemente Water Reclamation Plant located within San Clemente. The plant has a design capacity of 7 MGD and treats wastewater to secondary or tertiary levels depending on the discharge method, ocean outfall or beneficial reuse. Any secondary effluent in excess of the plant's recycling limit is conveyed to the San Juan Creek Ocean Outfall via the San Clemente Land Outfall. Recycling capacity is currently 4.4 MGD after the expansion was completed in 2014 and included 9 miles of pipelines, conversion of a domestic water reservoir to recycled water storage, and a pressure reducing station as well as an interconnection with SMWD.

IRWD Los Alisos Water Recycling Plant – Los Alisos Water Recycling Plant (LAWRP) is operated by IRWD and is located in the City of Lake Forest. LAWRP has a capacity of 7.5 MGD and wastewater is treated to a secondary or tertiary level depending on the use, ocean outfall or beneficial reuse such as landscape irrigation and other non-potable uses. When excess secondary effluent beyond the plant's tertiary treatment capacity is received, it is conveyed to the SOCWA Effluent Transmission Main for discharge via the Aliso Creek Ocean Outfall.

IRWD Michelson Water Recycling Plant – Michelson Water Recycling Plant is located in the City of Irvine and is operated by IRWD. MWRP has a maximum influent capacity of 28 MGD. Wastewater is treated to a tertiary level with advanced treatment in the form of UV disinfection meeting Title 22 standards. All effluent is conveyed to the recycled water distribution system for landscape irrigation, toilet flushing, and industrial uses.

IRWD UCI's Cooling Towers - IRWD partnered with the University of California, Irvine (UCI) by constructing approximately 3,000 feet of pipeline to bring recycled water to the campus's central plant where recycled water is used as make-up water in the cooling towers. This project conserves more than 250 acre-feet of potable water each year and helps UCI achieve its sustainability goals.

IRWD Great Park Ice and Five Point Arena - In 2017, the Irvine Ice Foundation constructed the Great Park Ice and Five Point Arena. This 280,000 square foot facility located at the Great Park in Irvine is considered the largest ice facility in California and one of the largest in the United States. This facility also serves as the official practice facility of the National Hockey League's Anaheim Ducks. IRWD provides the facility's recycled water which is used to make and maintain the ice at the four indoor ice rinks.

IRWD Dual Plumbed Buildings Initiative - IRWD was the first agency to work with a customer to construct a dual plumbed commercial building to use recycled water for flushing toilets and urinals in 1991. Today IRWD serves 127 dual plumbed commercial buildings ranging from a restroom at a park to 20-story high-rise office buildings. From 2015 to 2020, IRWD added 65 commercial buildings to its customer roles and more are on the way.

IRWD Dual Plumbed Hyatt House - This seven-story hotel is fully dual plumbed, using recycled water in all the restrooms including the 149 guest rooms. It is the first fully dual plumbed hotel in the United States.

IRWD Irvine Lake Pipeline (ILP) Conversion Project - The Irvine Lake Pipeline (ILP) Conversion Project was designed to convert the northern section of the ILP from an untreated water system to a recycled water system. This conversion was designed to provide recycled water to approximately 80 landscape and agricultural irrigation customers, offsetting imported water demands and reducing evaporation losses at Irvine Lake. Prior to the recycled water conversion, the ILP delivered imported untreated water that IRWD purchased from MET and stored in Irvine Lake, with subsequent conveyance to irrigation sites. By constructing the ILP Conversion Project, existing irrigation demands that once relied on imported water were converted to recycled water, reducing imported water needs, eliminating evaporation losses, and enhancing water supply reliability. The ILP North Conversion Project includes capacity for both existing and future planned recycled water demands.

TCWD Robinson Ranch Water Reclamation Plant - TCWD owns and operates the Robinson Ranch Wastewater Treatment Plant (RRWTP) located in the Robinson Ranch development in Trabuco Canyon, an unincorporated area of Orange County. RRWTP has a treatment capacity of 0.85 MGD, and the

wastewater is treated to a tertiary level meeting Title 22 standards. All of the wastewater is recycled as the plant is not permitted to have stream discharges and is infeasible to connect to the existing outfalls in the SOCWA service area.

MNWD RTP Advanced Wastewater Treatment Plant – MNWD's RTP AWTP is operated by SOCWA and is located in the City of Laguna Niguel. The AWTP has a total capacity of 11.4 MGD and the secondary effluent from RTP is treated to a disinfected tertiary level that meets Title 22 requirements for landscape irrigation use.

MNWD Plant 3A Advanced Wastewater Treatment Plant - MNWD's Plant 3A AWTP is operated by SOCWA and is located within the City of Laguna Niguel. The Plant 3A AWTP has a capacity of 2.4 MGD and the secondary effluent from 3A is treated to a disinfected tertiary level that meets Title 22 requirements for landscape irrigation use.

SCWD CTP Advanced Wastewater Treatment Plant - SCWD's CTP AWTP is operated by SOCWA and is located in the City of Laguna Niguel. The CTP AWTP has a capacity of 2.6 MGD and the secondary effluent from CTP is treated to a disinfected tertiary level that meets Title 22 requirements for landscape irrigation use.

SCWD Aliso Creek Water Reclamation Facility - SCWD completed construction on the Aliso Creek Water Reclamation Facility (ACWRF) in 2014 that intercepts and treats a portion of the urban runoff in lower Aliso Creek to supplement the advanced water treatment facility at CTP. The ACWRF has a capacity of 800 gallons per day (GPD) and the creek water is treated using ultrafiltration and RO to improve the quality of the recycled water supply to make it more attractive for irrigation users.
The ACWRF has not been able to be used as the Aliso Creek water level is below what regulation allows. MWDOC does not directly treat or distribute recycled water within their service area.

6.6.3 Projected Recycled Water Uses

As of April 2019, the State of California amended its recycled water policy to expand its numeric goal 2.5 million AFY by 2030 and added annual required reporting requirements for wastewater and recycled water. Specific to the MWDOC's service area, most agencies within the service area have already maximized their recycled water use. Most are projecting a consistent use through to 2045 and are not expecting for recycled water use to grow. However, a few agencies in South Orange County do expect moderate growth in recycled water production and customers. Collectively, the MWDOC's service area is projected to see an increase in recycled water uses grow from 42,330 AF in 2020 to 57,094 in 2045 (see Section 4).

6.6.4 Potential Recycled Water Uses

Potential recycled water use within MWDOC's service area hinges upon many variables including, but not limited to, economics of treatment and distribution system extension (as well as site retrofits and conversions), water quality, public acceptance, infrastructure requirements, and reliability.

Even though demands exist, it is not necessarily economically feasible to provide recycled water to all potential users. Expansion of recycled water systems eventually reach a point where returns diminish and higher investments for expansion are not cost effective. Water recycling projects involve collecting and treating wastewater to applicable standards depending on the end use, providing seasonal storage,

pipeline construction, pump station installation, and conversions for existing potable water users or dual plumbing systems for new users. Creative solutions to secure funding, and overcome regulatory requirements, institutional arrangements, and public acceptance are required to offset existing potable demands with potential recycled water demands.

SMWD Chiquita Water Reclamation Plant Expansion - CWRP currently has a capacity of 5 MGD. SMWD plans to expand the plant to 10 MGD by 2015. The expansion will increase total production and reduce dependency on imported water. SMWD is planning to expand the CWRP tertiary capacity from 5 MGD to 10 MGD by 2015, increasing its recycled water supply to 11,200 AFY. The expansion would reduce SMWD's dependency on imported water and provide additional recycled water for irrigation purposes. Because RMV holds riparian water rights for its ranching, agriculture and tenants' uses; RMV and SMWD are looking into an agreement for RMV to potentially provide water in areas of the Ranch Plan to supplement recycled water in the event recycled water is unavailable.

MNWD Plant 3A Expansion - The 3A Treatment Plant Tertiary Expansion Project will provide an additional 3,000 AFY of capacity for recycled water use. The expansion includes the following components: increase the reliability of the aeration system, expand and/or replacing the existing filters with more effective tertiary filters, expand the disinfection system, expand the tertiary effluent pumps, possible upsizing of the discharge pipeline where it connects to SMWD's recycled water distribution system, modification to various in-plant piping and electrical systems, and addition of a standby generator to maintain operation during a power outage. The expansion will increase the local water supply reliability by producing an additional 3,000 AFY of recycled water, reducing dependence on imported water. The expansion will conserve approximately 5,653,000 kWh of energy per year and 3,448,330 pounds of carbon dioxide by producing and distributing recycled water in lieu of imported water. The expansion also benefits MNWD, the project partner.

6.6.5 Optimization Plan

MET and MWDOC support research efforts to encourage development and use of recycled water. These include conducting studies and research to address public concerns, developing new technologies, and assessing health effects. Addressing public concerns is required to gain the support of stakeholders early in the planning process. Education is required to inform the public of the treatment processes. Developing new technologies is a prerequisite to help reduce the cost of producing recycled water. Health effects assessments have a two-fold purpose of alleviating public concerns and ensuring the protection of public health and the environment. Further research supported by MET and others (such as the National Water Research Institute) will have the benefit of reducing risks for MWDOC's member agencies.

To assist in meeting projections, MWDOC plans to take numerous actions to facilitate the use and production of recycled water within its service area. However, MWDOC is a wholesaler and does not impose development requirements or enact ordinances that mandate the use of recycled water. In many cases, additional recycled water production and use is economically infeasible given the current cost of potable water supplies in comparison to recycled water costs. MWDOC has taken the following actions to facilitate further production and use of recycled water:

- Sponsoring and supporting its member agencies in obtaining Local Resources Program (LRP) incentives from MET;

- Assisting and supporting member agencies in applications made for bond funds such as Proposition 84;
- Encouraging MET to participate in studies that will benefit recycled water production in the service area;
- Supporting MET in deriving solutions to regulatory issues;
- Participating in regional plan such as the South Orange County IRWMP;
- Working cooperatively with retail agencies, MET and its member agencies, and other Orange County water and wastewater agencies to encourage recycled water use and develop creative solutions to increase recycled water use;
- Assisting and supporting its member agencies to participate in MET's Future Supply Program, which provides funding for research and studies needed to set the state standards for Direct Potable Reuse (DPR) on American Water Works Association's (AWWA) research Foundation Project.

The MWDOC public education and Choice School Programs have reached millions of residents, businesses, and students with valuable, trusted water-centric information and education. One of the topics covered includes an introduction to water quality and water recycling as a critical component to the health and reliability of a more extensive Orange County water supply portfolio. MWDOC's multi-agency approach to public information includes collaboration with education, environmental, and utility agencies throughout the county. MWDOC reaches the public with essential information regarding present and future water supplies, the importance of sufficient quantity and quality of water – including recycled water – and the significance of implementing water use efficiency practices in daily life. Through MWDOC, water education programs have reached millions of residents, businesses, and students with information and education on recycled water.

Dealing with needed additional funding and other implementation barriers for recycled water at the state and regional level would assist in increasing recycled water production within MWDOC's service area. State funding assistance could reduce the overall cost per AF of recycled water so that it is comparable to the cost of potable water and would allow the development of more expensive recycled water projects in an earlier timeframe. There are numerous barriers to increasing water recycling that could be addressed at the State level. These barriers include establishment of uniform Regional Water Quality Control Board (RWQCB) requirements for recycled water, especially in areas where water and wastewater agency jurisdictions cross RWQCB jurisdictions resulting in varying requirements; partnering in health studies to illustrate the safety of recycled water; increasing public education; and establishing uniform requirements for retrofitting facilities to accept recycled water.

6.7 Desalination Opportunities

In 2001, MET developed a Seawater Desalination Program (SDP) to provide incentives for developing new seawater desalination projects in MET's service area. In 2014, MET modified the provisions of their LRP to include incentives for locally produced seawater desalination projects that reduce the need for imported supplies. To qualify for the incentive, proposed projects must replace an existing demand or prevent new demand on MET's imported water supplies. In return, MET offers three incentive formulas under the program:

- Sliding scale incentive up to $340 per AF for a 25-year agreement term, depending on the unit cost of seawater produced compared to the cost of MET supplies.
- Sliding scale incentive up to $475 per AF for a 15-year agreement term, depending on the unit cost of seawater produced compared to the cost of MET supplies.
- Fixed incentive up to $305 per AF for a 25-year agreement term.

Developing local supplies within MET's service area is part of their IRP goal of improving water supply reliability in the region. Creating new local supplies reduce pressure on imported supplies from the SWP and Colorado River.

On May 6th, 2015, the SWRCB approved an amendment to the state's Water Quality Control Plan for the Ocean Waters of California (California Ocean Plan) to address effects associated with the construction and operation of seawater desalination facilities (Desalination Amendment). The amendment supports the use of ocean water as a reliable supplement to traditional water supplies while protecting marine life and water quality. The California Ocean Plan now formally acknowledges seawater desalination as a beneficial use of the Pacific Ocean and the Desalination Amendment provides a uniform, consistent process for permitting seawater desalination facilities statewide.

If the following projects are developed, MET's imported water deliveries to Orange County could be reduced. These projects include the Huntington Beach Seawater Desalination Project and the Doheny Desalination Project.

6.7.1 Ocean Water Desalination

6.7.1.1 Huntington Beach Seawater Desalination Plant

Poseidon Resources LLC (Poseidon), a private company, is developing the Huntington Beach Seawater Desalination Project to be co-located at the AES Power Plant in the City of Huntington Beach along Pacific Coast Highway and Newland Street. The proposed project would produce up to 50 MGD (56,000 AFY) of drinking water to provide approximately 10 percent of Orange County's water supply needs.

Over the past several years, Poseidon has been working with OCWD on the general terms and conditions for selling the water to OCWD. Three general distribution options have been discussed with the agencies in Orange County. The northern option proposes the water be distributed to the northern agencies closer to the plant within OCWD's service area with the possibility of recharging/injecting a portion of the product water into the OC Basin. The southern option builds on the northern option by delivering a portion of the product water through the existing OC-44 pipeline for conveyance to the south Orange County water agencies. A third option is also being explored that includes all of the product water to be recharged into the OC Basin. Currently, a combination of these options could be pursued.

The Huntington Beach Seawater Desalination project plant capacity of 56,000 AFY would be the single largest source of new, local drinking water available to the region. In addition to offsetting imported demand, water from this project could provide OCWD with management flexibility in the OC Basin by augmenting supplies into the Talbert Seawater Barrier to prevent seawater intrusion.

In May 2015, OCWD and Poseidon entered into a non-binding Term Sheet that provided the overall partner structure in order to advance the project. Based on the initial Term Sheet, which was updated in 2018, Poseidon would be responsible for permitting, financing, design, construction, and operations of the treatment plant while OCWD would purchase the production volume, assuming the product water quality and quantity meet specific contract parameters and criteria. Furthermore, OCWD would then distribute the water in Orange County using one of the proposed distribution options described above.

Currently, the project is in the regulatory permit approval process with the Regional Water Quality Control Board and the California Coastal Commission. Once all of the required permits are approved, Poseidon will then work with OCWD and interested member agencies in developing a plan to distribute the water. Subsequent to the regulatory permit approval process, and agreement with interested parties, Poseidon estimates that the project could be online as early as 2027.

Under guidance provided by DWR, the Huntington Beach Seawater Desalination Plant's projected water supplies are not considered in either Table 4-1 or Table 6-2 due to its current status within the criteria established by State guidelines (DWR, 2020c).

6.7.1.2 Doheny Desalination Plant

SCWD is proposing to develop an ocean water desalination facility in Dana Point. SCWD intends to construct a facility with an initial capacity of up to 5 million gallons per day (MGD). The initial up to 5 MGD capacity would be available for SCWD and potential partnering water agencies to provide a high quality, locally-controlled, drought-proof water supply. The desalination facility would also provide emergency backup water supplies, should an earthquake, system shutdown, or other event disrupt the delivery of imported water to the area. The Project would consist of a subsurface slant well intake system (constructed within Doheny Beach State Park), raw (sea) water conveyance to the desalination facility site (located on SCWD owned property), a seawater reverse osmosis (SWRO) desalination facility, brine disposal through an existing wastewater ocean outfall, solids handling facilities, storage, and potable water conveyance interties to adjacent local and regional distribution infrastructure.

The Doheny Ocean Desalination Project has been determined as the best water supply option to meet reliability needs of SCWD and south Orange County. SCWD is pursuing the Project to ensure it meets the water use needs of its customers and the region by providing a drought-proof potable water supply, which diversifies SCWD's supply portfolio and protects against long-term imported water emergency outages and supply shortfalls that could have significant impact to our coastal communities, public health, and local economy. Phase I of the Project (aka, the "Local" Project) will provide SCWD and the region with up to 5 MGD of critical potable water supply that, together with recycled water, groundwater, and conservation, will provide the majority of SCWD's water supply through local reliable sources. An up to 15 MGD capacity project has been identified as a potential future "regional" project that could be phased incrementally, depending on regional needs.

On June 27, 2019, SCWD certified the final EIR and approved the Project. The Final EIR included considerable additional information provided at the request of the Coastal Commission and the Regional Board, including an updated coastal hazard analysis, updated brine discharge modeling, and updated groundwater modeling, updated hydrology analysis. The approval of the Project also included a commitment to 100 percent carbon neutrality through a 100 percent offset of emissions through the expansion of Project mitigation and use of renewable energy sources. SCWD is currently in the

permitting process and finalizing additional due diligence studies. If implemented, SCWD anticipates an online date of 2025.

Under guidance provided by DWR, the Doheny Seawater Desalination Project's projected water supplies are not considered in either Table 4-1 or Table 6-2 due to its current status within the criteria established by State guidelines (DWR, 2020c).

6.7.2 Groundwater Desalination

In an effort to improve groundwater production, MET provides financial incentives to local agencies to treat brackish groundwater which has been impaired from either natural causes or from agricultural drainage. Through MET's LRP, the goal is to increase usage of groundwater storage within the region for firm local production, conjunctive use storage, and drought supply. In MWDOC's service area, five groundwater recovery brackish water projects have LRP contracts with MET.

MWRF Expansion - The MWRF, owned and operated by Mesa Water, pumps colored water from a deep colored water aquifer and removes the color MF. Due to increased color and bromide in the source water, Mesa Water upgraded the facility to include Nano filtration membrane treatment. In 2012, the MWRF's capacity was increased from 5.8 MGD to 8.6 MGD.

SCWD Capistrano Beach GRF Expansion - SCWD constructed a 1 MGD GRF that came online in FY 2007-08 in Dana Point. SCWD plans to expand the GRF with the addition of new wells. Treating in excess of 1,300 AFY will require expansion of the GRF and agreement with SJBA or confirmation of water rights from the SWRCB.

Garden Grove Nitrate Blending Project - The Garden Grove Nitrate Blending Project was active during the years of 1990 to 2005. The project is located at the Lampson Reservoir site, where groundwater pumped from two wells is blended in order to meet the maximum contaminant level (MCL) for nitrate. The blending project was shut down in 2005, but the City retrofitted Well 28 with a variable frequency drive and reinstated the blending operation.

San Juan Desalter GWRP Expansion – The City of San Juan Capistrano has operated the GWRP since about 2005. A number of issues have impacted the reliability of production from the facility including iron bacteria in the wells, the discovery of a plume of Methyl Tert-Butyl Ether (MTBE) that required a reduction in production in half to about 2 MGD or less since the spring of 2008 until the responsible party contributed to provide Granular Activated Carbon (GAC) Filter for removal of the MTBE to allow increased production. The drought then struck, reducing the amount of water that could be pumped from the San Juan groundwater basin, requiring a large reduction in production from the groundwater basin in 2014, 2015, and initially in 2016.

Tustin Nitrate Removal Project - The Tustin Nitrate Removal Project consists of two groundwater treatment facilities that are allowed above the BPP and the charges are BEA-exempt. The first facility is the Main Street Treatment Plant, operating since 1989 to reduce nitrate levels from the groundwater produced by Wells No. 3 and 4 by blending untreated groundwater with treatment plant product water which undergoes RO and ion exchange treatment processes. The second facility is the Tustin Seventeenth Street Desalter, operating since 1996 to reduce high nitrate and TDS concentration from groundwater produced by Wells No. 2 and 4 and the Newport well using RO (OCWD, 2015 Groundwater Management Plan, June 2015).

6.8 Water Exchanges and Transfers

6.8.1 Existing Exchanges and Transfers

A few MWDOC member agencies have expressed interests in pursuing exchanges and/or transfers of water from outside of the region. MWDOC will continue to help its member agencies in developing these opportunities to enhance their reliability. In fulfilling this role, MWDOC will help its member agencies navigate the operational and administrative issues of wheeling or exchanging water through the MET water distribution system or by examining other delivery options.

Santa Margarita Water District - SMWD has actively pursued additional water supply reliability through water transfers, and successfully completed water transfers in the late 1990's through the MET system. At present, the future of such transfers as a reliable and cost-effective means of providing the basic supply remain uncertain. However, transfer with specific purposes, such as supplementing dry year supplies can be effective. SMWD continues to explore opportunities for water transfers and exchanges as an alternative water supply and has worked with MWDOC and other agencies to investigate possible transfers. SMWD has a transfer agreement with Cucamonga Valley Water District of 4,250 AFY, both short term and long term. SMWD also has a short-term transfer agreement with GSWC of 2,000 AFY.

IRWD Water Banking Program - IRWD developed their Water Banking Program in Kern County and initiated the first delivery of water under the program to their service territory of 1,000 AF in June 2015 as a demonstration effort. The delivered water was determined by MET to meet the definition of an "extraordinary supply"; meaning that IRWD received full credit for the water and that it counts essentially 1:1 during a drought/water shortage condition under MET's WSAP. The banking program has been implemented via agreements with MET to wheel the water through their system, when requested. IRWD has also entered into a 30-year water banking partnership with the Rosedale-Rio Bravo Water Storage District in Kern County in which IRWD can store up to 126,000 AF in the water bank and recover up to approximately 29,000 AF in any single year. IRWD has purchased high quality groundwater recharge land and constructed more than 700 acres of groundwater recharge ponds to allow available surface water to percolate into the basin for later use, in which IRWD has priority rights when Rosedale is not recharging Kern River floodwaters (IRWD, 2021b). There is an approved coordinated operating and exchange agreement between IRWD, MET and MWDOC that will facilitate the recovery and delivery of State Water Project water from the water bank in Kern County into IRWD's service area in Orange County (IRWD, 2021b).

6.8.2 Planned and Potential Exchanges and Transfers

Interconnections with other agencies result in the ability to share water supplies during short term emergency situations or planned shutdowns of major imported water systems. Transfers of water can help with short-term outages but can also be involved with longer term water exchanges to deal with droughts or long-term emergency situations. MWDOC helps its retail agencies develop both local and regional transfer and exchange opportunities that promote reliability within their systems. Examples of these types of projects that might occur in the future are discussed below.

IRWD Water Banking Program – As noted in Section 6.9.1, IRWD has developed its Water Banking Program and it has about 50,000 AF stored for IRWD's benefit.

IRWD and Rosedale were conditionally awarded funds by the California Water Commission (CWC) to develop a regional water bank, the Kern Fan Groundwater Storage Project, to store and capture unallocated Article 21 water from the SWP during periods when surface water is abundant, and they are now completing additional requirements outlined in the program regulations to receive funds.

IRWD is also pursuing various additional sources of water supply for the water bank, including long term agreements with Antelope Valley-East Kern Water Agency and Buena Vista Water Storage District that can provide water supplies for banking and the acquisition of the Jackson Ranch in the Dudley Ridge Water District in Kings County.

During wet years, water surplus to the Jackson Ranch farming operations will be banked in the Strand Ranch Project for future use in IRWD (IRWD, 2021b).

In addition, IRWD and MWDOC have entered into discussions to provide a portion of this banked water to other MWDOC member agencies during shortages. A proposed pilot program between IRWD and MWDOC would allow for up to 5,000 AFY of water in Strand Ranch to be delivered to MWDOC as extraordinary supply with varying reservation costs. MWDOC is currently studying the terms and conditions to determine if this pilot program meets the needs of its agencies (CDM Smith, 2019).

Santa Margarita Water District – SMWD has actively pursued additional water supply reliability through water transfers. They are currently involved in the analysis and evaluation of the Cadiz water storage project. The Cadiz Project includes an average yield of 50,000 AF per year for 50 years that could be produced from the Fenner Valley Groundwater Basin. Cadiz is authorized to pump as much as 75,000 AF per year as long as the average yield over 50 years is 50,000 AF and assuming they are meeting all of the monitoring requirements imposed on the project. If not produced, the water would evaporate from the nearby dry lakes and be lost to productive use. The water would require treatment for Chromium VI and would be conveyed via a pump station and pipeline about 40 miles to MET's CRA. SMWD has an option for 5,000 AF per year, expandable to 15,000 AF per year; OCWD is considering the water supply. Work is underway to develop the terms and conditions for conveying the water via the CRA into southern California. The water would have to be wheeled through the MET system.

Santa Ana River Conservation and Conjunctive Use Project (SARCCUP) – The Santa Ana River Conservation and Conjunctive Use Project (SARCCUP) is a joint project established by five regional water agencies within the Santa Ana River Watershed (Eastern Municipal Water District, Inland Empire Utilities Agency, Western Municipal Water District, OCWD, and San Bernardino Valley Municipal Water District.

In 2016, SARCCUP was successful in receiving $55 million in grant funds from Proposition 84 through DWR. The overall SARCCUP program awarded by Proposition 84, consists of three main program elements:

- Watershed-Scale Cooperative Water Banking Program
- Water Use Efficiency: Landscape Design and Irrigation Improvements and Water Budget Assistance for Agencies
- Habitat Creation and *Arundo Donax* Removal from the Santa Ana River

The Watershed-Scale Cooperative Water Banking Program is the largest component of SARCCUP and since 2016, Valley, MET, and the four SARCCUP-MWD Member Agencies, with MWDOC representing

OCWD, have been discussing terms and conditions for the ability to purchase surplus water from Valley to be stored in the Santa Ana River watershed. With the Valley and MET surplus water purchase agreement due for renewal, it was the desire of Valley to establish a new agreement with MET that allows a portion of its surplus water to be stored within the Santa Ana River watershed.

An agreement between MET and four SARCCUP-MWD Member Agencies was approved earlier this year that gives the SARCCUP agencies the ability to purchase a portion (up to 50%) of the surplus water that San Bernardino Valley Municipal Water District (Valley), a SWP Contractor, sells to MET. Such water will be stored in local groundwater basins throughout the Santa Ana River watershed and extract during dry years to reduce the impacts from multiyear droughts. In Orange County, 36,000 AF can be stored in the OC Basin for use during dry years. More importantly, this stored SARCCUP water can be categorized as "extraordinary supplies", if used during a MET allocation, and can enhance a participating agencies' reliability during a drought. Moreover, if excess water is available MWDOC can purchase additional water for its service area.

Further details remain to be developed between OCWD, retail agencies, and MWDOC in how the water will be distributed in Orange County and who participates.

6.9 Future Water Projects

MWDOC has identified the following future regional projects (CDM Smith, 2019):

Poseidon Huntington Beach Ocean Desalination Project – Poseidon proposes to construct and operate the Huntington Beach Ocean Desalination Plant on a 12-acre parcel adjacent to the AES Huntington Beach Generating Station. The facility would have a capacity of 50 MGD and 56,000 AFY, with its main components consisting of a water intake system, a desalination facility, a concentrate disposal system, and a product water storage tank. This project would provide both system and supply reliability benefits to the SOC, the OC Basin, and Huntington Beach. The capital cost in the initial year for the plant is $1.22 billion.

Doheny Ocean Desalination Project – SCWD is proposing to construct an ocean water desalination facility in Dana Point at Doheny State Beach. The facility would have an initial up to 5 MGD capacity, with the potential for future expansions up to 15 MGD. The project's main components are a subsurface water intake system, a raw ocean water conveyance pipeline, a desalination facility, a seawater reverse osmosis (SWRO) desalination facility, a brine disposal system, and a product water storage tank.

San Juan Watershed Project – SMWD and other project partners have proposed a multi-phased project within the San Juan Creek Watershed to capture local stormwater and develop, convey, and recharge recycled water into the San Juan Groundwater Basin and treat the water upon pumping it out of the basin. The first phase includes the installation of three rubber dams within San Juan Creek to promote in-stream recharge of the basin, with an anticipated production of 700 AFY on average. The second phase would develop additional surface water and groundwater management practices by using stormwater and introducing recycled water for infiltration into the basin and has an anticipated production of 2,660 to 4,920 AFY. The third phase will introduce recycled water directly into San Juan Creek through live stream recharge, with an anticipated production of up to 2,660 AFY (SMWD, 2021b).

Cadiz Water Bank – SMWD and Cadiz, Inc. are developing this project to create a new water supply by conserving groundwater that is currently being lost to evaporation and recovering the conserved water by

pumping it out of the Fenner Valley Groundwater Basin to convey to MET's CRA. The project consists of a groundwater pumping component that includes an average of 50 TAFY of groundwater that can be pumped from the basin over a 50-year period, and a water storage component that allows participants to send surplus water supplies to be recharged in spreading basins and held in storage.

South Orange County Emergency Interconnection Expansion – MWDOC has been working with the South Orange County (SOC) agencies on improvements for system reliability primarily due to the risk of earthquakes causing outages of the MET imported water system as well as extended grid outages. Existing regional interconnection agreements between IRWD and SOC agencies provides for the delivery of water through the IRWD system to participating SOC agencies in times of emergency. MWDOC and IRWD are currently studying an expansion of the program, including the potential East Orange County Feeder No. 2 pipeline and an expanded and scalable emergency groundwater program, with a capital cost of $867,451.

SARCCUP Water Storage Program – SARCCUP is a joint project established between MET, MWDOC, Eastern MWD, Western MWD, Inland Empire Utilities Agency, and OCWD that can provide significant benefits in the form of additional supplies during dry years for Orange County. Surplus SWP water from San Bernardino Valley Water District (SBVMWD) can be purchased and stored for use during dry years. This water can even be considered an extraordinary supply under MET allocation Plan, if qualified under MET's extraordinary supply guidelines. OCWD has the ability to store 36,000 AF of SARCCUP water and if excess water is available MWDOC has the ability to purchase additional water. Further details remain to be developed between OCWD, retail agencies, and MWDOC in how the water will be distributed in Orange County and who participates.

MNWD/OCWD Pilot Storage Program - OCWD entered into an agreement with MNWD to develop a pilot program to explore the opportunity to store water in the OC Basin. The purpose of such a storage account would provide MNWD water during emergencies and/or provide additional water during dry periods. As part of the agreement, OCWD hired consultants to evaluate where and how to extract groundwater from the OC Basin with several options to pump the water to MNWD via the East Orange County Feeder No. 2; as well as a review of existing banking/exchange programs in California to determine what compensation methodologies could OCWD assess for a storage/banking program.

6.10 Energy Intensity

As discussed throughout this report, MWDOC is a wholesale agency that provides imported water to coastal and inland areas of Orange County. MWDOC does not own or operate any water, wastewater, or recycled water facilities. As such, it does not have operational control over the upstream portion of the water system. After water has been delivered to member agencies, these agencies are responsible for final treatment, delivery, and any pumping needed to extract groundwater in their service area.

Although MWDOC does not have operational control over the downstream portions of the water system, the energy efficiency of these systems is important to MWDOC's focus on sound planning and appropriate investments in water supply, water use efficiency, regional delivery infrastructure and emergency preparedness. To this end, awareness of the energy intensity of retail agencies helps with planning for future system needs. By setting a baseline, agencies can better understand and manage their operational expenditures. Several factors will affect the energy intensity of water delivery over time

and agencies should be aware of these factors. A decrease in water demand in a service area may create a situation where the energy intensity of each AF delivered actually increases as agencies operate the same pumps and water treatment facilities as before. When tracking energy intensity over time, agencies should keep factors such as these in mind and focus on the efficiency of each facility they operate.

Each agency has a unique geography and customer set that they serve so energy intensities of different agencies can be compared for informational purposes, but operational needs and constraints should be considered. For example, agencies with hills in their service area will inherently have higher pumping energy demands than agencies without hills. Additionally, some agencies have water treatment within their operational control while others deliver already treated water – leading to wide ranges in the energy demand among different agencies. Therefore, each agency should come up with their own energy management plan based on their unique needs and challenges. By tracking energy use as a whole, MWDOC can help member agencies prepare for the future and maintain reliability. Overall, from a subset of 19 MWDOC member agencies together with the cities of Fullerton and Santa Ana, the energy intensity for water operations range between 5.5 and 1681 kilowatt hour per AF (kWH/AF). For North OC agencies within the OC Basin, the energy intensity for water operations range from 5.5 to 1681 kWh/AF. For South OC agencies which rely predominantly on imported water for potable use, the energy intensity for water operations range from 177 to 1336 kWh/AF.

7 WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Building upon the water supply identified and projected in Section 6, this key section of the UWMP examines MWDOC's water supplies, water uses, and the resulting water supply reliability. Water service reliability reflects MWDOC's ability to meet the water needs of its customers under varying conditions. For the UWMP, water supply reliability is evaluated in two assessments: 1) the Water Service Reliability Assessment and 2) the DRA. The Water Service reliability assessment compares projected supply to projected demand for three long-term hydrological conditions: a normal year, a single dry year, and a drought period lasting five consecutive years. The DRA, a new UWMP requirement, assesses water supply reliability under a severe drought period lasting for the next five consecutive years, from 2021 to 2025. Factors affecting reliability, such as climate change and regulatory impacts, are considered to prepare more realistic assessments.

7.1 Water Service Reliability Overview

Every urban water supplier is required to assess the reliability of their water service to its customers under a normal year, a single dry year, and multiple dry water years. MWDOC's service area depends on a combination of imported and local supplies to meet its service area water demands and MWDOC has taken numerous steps to ensure its member agencies have adequate supplies. Development of numerous local sources augment the reliability of the imported water system. There are various factors that may impact reliability of supplies such as legal, environmental, water quality and climatic, which are discussed below. The water supplies available to the MWDOC service area are projected to meet full-service demands based on the findings by MET in its 2020 UWMP starting 2025 through 2045 during normal years, single dry year, and five consecutively dry years.

MWDOC is a MET member agency, and MET's projections take into account the imported demands from Orange County. As so, MET's water reliability assessments are used to determine that demands within MWDOC can be met for all three hydrological conditions. As summarized in Section 6.2.2, MET's 2020 UWMP concludes that MET's water supply is able to meet projected demands under normal, single-dry, and five-year consecutive dry conditions.

MET's 2020 IRP update describes the core water resources that will be used to meet full-service demands at the retail level under all foreseeable hydrologic conditions from 2025 through 2045. The foundation of MET's resource strategy for achieving regional water supply reliability has been to develop and implement water resources programs and activities through its IRP preferred resource mix. This preferred resource mix includes conservation, local resources such as water recycling and groundwater recovery, Colorado River supplies and transfers, SWP supplies and transfers, in-region surface reservoir storage, in-region groundwater storage, out-of-region banking, treatment, conveyance and infrastructure improvements.

Table 7-1 shows the basis of water year data used to predict drought supply availability. The average (normal) hydrologic condition for the MWDOC service area is represented by FY 2017-18 and FY 2018-19 and the single-dry year hydrologic condition by FY 2013-14. The five consecutive years of

FY 2011-12 to FY 2015-16 represent the driest five-consecutive year historic sequence for MWDOC's service area. Locally, Orange County rainfall for the five-year period totaled 36 inches, the driest on record.

Table 7-1: Wholesale: Basis of Water Year Data (Reliability Assessment)

DWR Submittal Table 7-1 Wholesale: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year**	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available (AF)	**% of Average Supply**
Average Year	2018-2019	-	100%
Single-Dry Year	2014	-	106%
Consecutive Dry Years 1st Year	2012	-	106%
Consecutive Dry Years 2nd Year	2013	-	106%
Consecutive Dry Years 3rd Year	2014	-	106%
Consecutive Dry Years 4th Year	2015	-	106%
Consecutive Dry Years 5th Year	2016	-	106%

NOTES:
Assumes an increase of six percent above average year demands in dry and multiple dry years based on the Demand Forecast TM (CDM Smith, 2021). 106% represents the percent of average supply needed to meet demands of a single-dry and multiple-dry years. Since all of MWDOC's supply comes from MET, the percent of average supply value reported is equivalent to the percent of average demand under the corresponding hydrologic condition.

7.2 Factors Affecting Reliability

In order to prepare realistic water supply reliability assessments, various factors affecting reliability were considered. These include climate change and environmental requirements, regulatory changes, water quality impacts, and locally applicable criteria.

7.2.1 Climate Change and the Environment

Changing climate patterns are expected to shift precipitation patterns and affect water supply availability. Unpredictable weather patterns will make water supply planning more challenging. Although climate change impacts are associated with exact timing, magnitude, and regional impacts of these temperature and precipitation changes, researchers have identified several areas of concern for California water planners (MET, 2021). These areas include:

- A reduction in Sierra Nevada Mountain snowpack.
- Increased intensity and frequency of extreme weather events.
- Prolonged drought periods.
- Water quality issues associated with increase in wildfires.
- Changes in runoff pattern and amount.
- Rising sea levels resulting in:
    - Impacts to coastal groundwater basins due to seawater intrusion.
    - Increased risk of damage from storms, high-tide events, and the erosion of levees.
    - Potential pumping cutbacks to the SWP and CVP.

Other important issues of concern due to global climate change include:

- Effects on local supplies such as groundwater.
- Changes in urban and agricultural demand levels and patterns.
- Increased evapotranspiration from higher temperatures.
- Impacts to human health from water-borne pathogens and water quality degradation.
- Declines in ecosystem health and function.
- Alterations to power generation and pumping regime.
- Increases in ocean algal blooms affected seawater desalination supplies.

The major impact in California is that without additional surface storage, the earlier and heavier runoff (rather than snowpack retaining water in storage in the mountains), will result in more water being lost to the oceans. A heavy emphasis on storage is needed in California.

In addition, the Colorado River Basin supplies have been inconsistent since about the year 2000, with precipitation near normal while runoff has been less than average in two out of every three years. Climate models are predicting a continuation of this pattern whereby hotter and drier weather conditions will result in continuing lower runoff, pushing the system toward a drying trend that is often characterized as long-term drought.

Dramatic swings in annual hydrologic conditions have impacted water supplies available from the SWP over the last decade. The declining ecosystem in the Delta has also led to a reduction in water supply

deliveries, and operational constraints will likely continue until a long-term solution to these problems is identified and implemented (MET, 2021).

Legal, environmental, and water quality issues may have impacts on MET supplies. It is felt, however, that climatic factors would have more of an impact than legal, water quality, and environmental factors. Climatic conditions have been projected based on historical patterns, but severe pattern changes are still a possibility in the future (MET, 2021).

7.2.2 Regulatory and Legal

Ongoing regulatory restrictions, such as those imposed by the Biops on the effects of SWP and the federal CVP operations on certain marine life, also contributes to the challenge of determining water delivery reliability. Endangered species protection and conveyance needs in the Delta have resulted in operational constraints that are particularly important because pumping restrictions impact many water resources programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, and in-region groundwater and surface water storage. Biops protect special-status species listed as threatened or endangered under the ESAs and imposed substantial constraints on Delta water supply operations through requirements for Delta inflow and outflow and export pumping restrictions.

In addition, the SWRCB has set water quality objectives that must be met by the SWP including minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity level. SWRCB plans to fully implement the new Lower San Joaquin River (LSJR) flow objectives from the Phase 1 Delta Plan amendments through adjudicatory (water rights) and regulatory (water quality) processes by 2022. These LSJR flow objectives are estimated to reduce water available for human consumptive use. New litigation, listings of additional species under the ESAs, or regulatory requirements imposed by the SWRCB could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage, or other operational changes impacting water supply operations.

The difficulty and implications of environmental review, documentation, and permitting pose challenges for multi-year transfer agreements, recycled water projects, and seawater desalination plants. The timeline and roadmap for getting a permit for recycled water projects are challenging and inconsistently implemented in different regions of the state. IPR projects face regulatory restraints such as treatment, blend water, retention time, and Basin Plan Objectives, which may limit how much recycled water can feasibly be recharged into the groundwater basins. New regulations and permitting uncertainty are also barriers to seawater desalination supplies, including updated Ocean Plan Regulations, Marine Life Protected Areas, and Once-Through Cooling Regulations (MET, 2021).

7.2.3 Water Quality

The following sub-sections include narratives on water quality issues experienced in various water supplies, and the measures being taken to improve the water quality of these sources.

7.2.3.1 Imported Water

MET is responsible for providing high quality potable water throughout its service area. Over 300,000 water quality tests are performed per year on MET's water to test for regulated contaminants and

additional contaminants of concern to ensure the safety of its waters. MET's supplies originate primarily from the CRA and from the SWP. A blend of these two sources, proportional to each year's availability of the source, is then delivered throughout MET's service area.

MET's primary water sources face individual water quality issues of concern. The CRA water source contains higher TDS and the SWP contains higher levels of organic matter, lending to the formation of disinfection byproducts. To remediate the CRA's high level of salinity and the SWP's high level of organic matter, MET blends CRA and SWP supplies and has upgraded all of its treatment facilities to include ozone treatment processes. In addition, MET has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium VI while also investigating the potential water quality impact of the following emerging contaminants: N-nitrosodimethylamine (NDMA), pharmaceuticals and personal care products (PPCP), microplastics, PFAS, and 1,4-dioxane (MET, 2021). While unforeseeable water quality issues could alter reliability, MET's current strategies ensure the delivery of high-quality water.

The presence of quagga mussels in water sources is a water quality concern. Quagga mussels are an invasive species that was first discovered in 2007 at Lake Mead, on the Colorado River. This species of mussels forms massive colonies in short periods of time, disrupting ecosystems and blocking water intakes. They can cause significant disruption and damage to water distribution systems. MET has had success in controlling the spread and impacts of the quagga mussels within the CRA, however the future could require more extensive maintenance and reduced operational flexibility than current operations allow. It also resulted in MET eliminating deliveries of CRA water into Diamond Valley Lake (DVL) to keep the reservoir free from quagga mussels (MET, 2021).

7.2.3.2 Groundwater

7.2.3.2.1 OCWD

OCWD is responsible for managing the OC Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin's groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 wells provides OCWD a source for samples, which are tested for a variety of purposes. OCWD collects samples each month to monitor Basin water quality. The total number of water samples analyzed varies year-to-year due to regulatory requirements, conditions in the basin, and applied research and/or special study demands. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols (City of La Habra et al., 2017).

PFAS are of particular concern for groundwater quality, and since the summer of 2019, DDW requires testing for PFAS compounds in some groundwater production wells in the OCWD area. In February 2020, the DDW lowered its Response Levels (RL) for PFOA and PFOS to 10 and 40 parts per trillion (ppt) respectively. The DDW recommends Producers not serve any water exceeding the RL – effectively making the RL an interim MCL while DDW undertakes administrative action to set a MCL. In response to DDW's issuance of the revised RL, as of December 2020, approximately 45 wells in the OCWD service area have been temporarily turned off until treatment systems can be constructed. As additional wells are tested, OCWD expects this figure may increase to at least 70 to 80 wells. The state has begun the

process of establishing MCLs for PFOA and PFOS and anticipates these MCLs to be in effect by the Fall of 2023. OCWD anticipates the MCLs will be set at or below the RLs.

In April 2020, OCWD as the groundwater basin manager, executed an agreement with the impacted Producers to fund and construct the necessary treatment systems for production wells impacted by PFAS compounds. The PFAS treatment projects includes the design, permitting, construction, and operation of PFAS removal systems for impacted Producer production wells. Each well treatment system will be evaluated for use with either GAC or ion exchange (IX) for the removal of PFAS compounds. These treatment systems utilize vessels in a lead-lag configuration to remove PFOA and PFOS to less than 2 ppt (the current non-detect limit). Use of these PFAS treatment systems are designed to ensure the groundwater supplied by Producer wells can be served in compliance with current and future PFAS regulations. With financial assistance from OCWD, the Producers will operate and maintain the new treatment systems once they are constructed.

To minimize expenses and provide maximum protection to the public water supply, OCWD initiated design, permitting, and construction of the PFAS treatment projects on a schedule that allows rapid deployment of treatment systems. Construction contracts were awarded for treatment systems for production wells in the City of Fullerton and Serrano in Year 2020. Additional construction contracts will likely be awarded in the first and second quarters of 2021. OCWD expects the treatment systems to be constructed for most of the initial 45 wells above the RL within the next 2 to 3 years.

As additional data are collected and new wells experience PFAS detections at or near the current RL, and/or above a future MCL, and are turned off, OCWD will continue to partner with the affected Producers and take action to design and construct necessary treatment systems to bring the impacted wells back online as quickly as possible.

Groundwater production in FY 2019-20 was expected to be approximately 325,000 acre-feet but declined to 286,550 acre-feet primarily due to PFAS impacted wells being turned off around February 2020. OCWD expects groundwater production to be in the area of 245,000 acre-feet in FY 2020-21 due to the currently idled wells and additional wells being impacted by PFAS and turned off. As PFAS treatment systems are constructed, OCWD expects total annual groundwater production to slowly increase back to normal levels (310,000 to 330,000 acre-feet) (OCWD, 2020a).

Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water including both TDS and nitrates.

OCWD continuously monitors the levels of TDS in wells throughout the OC Basin. TDS currently has a California Secondary MCL of 500 mg/L. The portions of the OC Basin with the highest levels are generally located in the cities of Irvine, Tustin, Yorba Linda, Anaheim, and Fullerton. There is also a broad area in the central portion of the OC Basin where TDS ranges from 500 to 700 mg/L. Sources of TDS include the water supplies used to recharge the OC Basin and from onsite wastewater treatment systems, also known as septic systems. The TDS concentration in the OC Basin is expected to decrease over time as the TDS concentration of GWRS water used to recharge the OC Basin is approximately 50 mg/L (City of La Habra et al., 2017).

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The MCL for nitrate in drinking water is set at 10 mg/L. OCWD regularly monitors nitrate levels in groundwater and works with

producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater. This includes the operation of the Prado Wetlands, which was designed to remove nitrogen and other pollutants from the Santa Ana River before the water is diverted to be percolated into OCWD's surface water recharge system.

Although water from the Deep Aquifer System is of very high quality, it is amber-colored and contains a sulfuric odor due to buried natural organic material. These negative aesthetic qualities require treatment before use as a source of drinking water. The total volume of the amber-colored groundwater is estimated to be approximately 1 MAF.

There are other potential contaminants that are of concern to and are monitored by OCWD. These include:

- **MTBE –** MTBE is an additive to gasoline that increases octane ratings but became a widespread contaminant in groundwater supplies. The greatest source of MTBE contamination comes from underground fuel tank releases. The primary MCL for MTBE in drinking water is 13 µg/L.
- **Volatile Organic Compounds (VOC) –** VOCs come from a variety of sources including industrial degreasers, paint thinners, and dry-cleaning solvents. Locations of VOC contamination within the OC Basin include the former El Toro marine Corps Air Station, the Shallow Aquifer System, and portions of the Principal Aquifer System in the Cities of Fullerton and Anaheim.
- **NDMA –** NDMA is a compound that can occur in wastewater that contains its precursors and is disinfected via chlorination and/or chloramination. It is also found in food products such as cured meat, fish, beer, milk, and tobacco smoke. The California Notification Level for NDMA is 10 ng/L and the Response Level is 300 ng/L. In the past, NDMA has been found in groundwater near the Talbert Barrier, which was traced to industrial wastewater dischargers.
- **1,4-Dioxane –** 1,4-Dioxane is a suspected human carcinogen. It is used as a solvent in various industrial processes such as the manufacture of adhesive products and membranes.
- **Constituents of Emerging Concern (CEC) –** CECs are either synthetic or naturally occurring substances that are not currently regulated in water supplies or wastewater discharged but can be detected using very sensitive analytical techniques. The newest group of CECs include pharmaceuticals, personal care products, and endocrine disruptors. OCWD's laboratory is one of a few in the state of California that continuously develops capabilities to analyze for new compounds (City of La Habra et al., 2017).

7.2.3.2.2 San Juan Groundwater Basin

Groundwater quality from the San Juan Basin was determined through the analyses of available data from production and monitoring wells. Constituents of concern within the San Juan Basin include TDS, nitrate nitrogen, manganese, and iron. SJBA performs monthly water quality tests to ensure the safety of the water.

TDS consists of inorganic salts dissolved in water, with the major ions being sodium, potassium, calcium, magnesium, bicarbonates, chlorides, and sulfates under Title 22. The California secondary maximum contaminant level (MCL) for TDS is 500 mg/L. Four wells were tested for TDS and all of the wells

exceeded the secondary MCL for TDS. The lower portion of the San Juan Basin exhibits relatively higher TDS levels due to irrigation return flows, fertilizer use, consumptive use, and dissolution of ions from weathered rock surfaces and salts (Wildermuth Environmental, Inc., 2013).

Chloride concentration levels vary across the basin. As of March 2020, concentrations at 220 mg/L, which is at the bottom of the range of observed concentrations since water quality returned to pre-seawater intrusion conditions in 2017 whereas others have concentrations at 1,600 mg/L, which is higher than the maximum observed chloride concentration of 1,200 mg/L at the seawater intrusion event in 2014. Based on available information, it is not possible to know if the high chloride concentrations currently observed are from a prior seawater intrusion event or representative of an active occurrence of seawater intrusion following adifferent preferential path than was observed in 2014. (Wildermuth Environmental, Inc., 2020).

Nitrate within groundwater can be both naturally occurring and can also be associated with agriculture and other synthetic production. The primary MCL for nitrate in drinking water is 10 mg/L. Most groundwater wells monitored for nitrate exhibited levels below MCL except for two wells.

Manganese is a naturally occurring inorganic constituent dissolved in water. Manganese is an essential micronutrient at low concentrations, but at higher concentrations in drinking water, manganese may lead to objectionable aesthetic qualities such as bitter taste and staining of clothes. The California secondary MCL for manganese is 0.5 mg/L. Most wells monitored for manganese exceeded the secondary MCL for manganese by as much as 40 times with the exception of two wells in the Oso and Lower Trabuco area (Wildermuth Environmental, Inc., 2013).

Iron is a naturally occurring inorganic constituent dissolved in water. Similar to manganese, iron in low concentrations is an essential micronutrient, but iron in higher concentrations in drinking water leads to the same objectionable aesthetic qualities as those of manganese. The California secondary drinking water MCL for iron is 0.3 mg/L. With the exception of one groundwater well in the Oso area, all wells exceeded the secondary MCL for iron by as much as 60 times (Wildermuth Environmental, Inc., 2013).

7.2.3.2.3 La Habra Groundwater Basin

TDS, hydrogen sulfide, iron, and manganese impair La Habra Groundwater's water supply. Investigations of water quality within the La Habra Basin have determined that the quality is extremely variable. Shallow regions within the central portion of the basin and areas recharged by surface water along the basin boundary are of a bicarbonate and chloride character. Historically, TDS concentrations have remained relatively stable, and in 2017, TDS concentration in La Habra wells was approximately 960 mg/L (City of La Habra et al., 2017).

The La Habra Basin has water quality concerns that require treatment or blending with higher quality water to meet the State's health standards. The quality of Idaho Street Well raw water requires treatment before entering the City of La Habra's distribution system. The treatment system includes chlorination, air-stripping to remove hydrogen sulfide and ammonia that may be present, and the addition of sodium hexametaphosphate to sequester iron and manganese. Water from the La Bonita Well and the Portola Well is chlorinated and then blended with CDWC purchased water in a 250,000-gallon forebay to reduce mineral concentration (La Habra, Groundwater Study, 2014).

7.2.3.2.4 Main San Gabriel Groundwater Basin

VOCs and nitrates are the most prevalent contaminants found in the Main San Gabriel Basin. As a result, the location and treatment methods are generally well understood. During FY 2019-20, 30 treatment plants treated approximately 75,000 AF of VOC-contaminated water from the Main San Gabriel Basin. Although VOC contamination is substantial, it is centered in just a few areas, leaving a large portion of the Main San Gabriel Basin unaffected.

The DDW lowered the notification level of perchlorate from 18 to 4 parts per billion (ppb) in January 2002. Subsequently, a total of 22 wells from the Main San Gabriel Basin were removed from service due to unacceptable levels of perchlorate. In October 2007, the DDW established an MCL of 6 ppb. Efforts to treat perchlorate by the Watermaster resulted in ion-exchange technology treatment facilities at five sites in the Baldwin Park Operable Unit (BPOU) and at two facilities in other parts of the Main San Gabriel Basin during FY 2019-20. In April 2020, DDW issued a Notice of Proposed Rulemaking to consider lowering the perchlorate Detection Limit for Purposes of Reporting (DLR) to 2 ppb, and in anticipation of this possible revision, Watermaster coordinated with Producers to conduct “low-level” detection sampling at a level of 0.1 ppb.

During 1998, eight local wells within the Main San Gabriel Basin had levels of NDMA above the notification level of 2 ppt at the time. Five of the wells with measurable levels of NDMA had already been taken out of service for other reasons, and the other three were taken offline as a direct result of NDMA levels above notification level. The Watermaster played a key role in the construction of NDMA treatment facilities within the Main San Gabriel Basin. Five facilities were operational during FY 2019-20.

1,2,3-TCP is a degreasing agent that has been detected in the BPOU during the winter of 2006. Its presence delayed the use of one treatment facility for potable purposes. The DDW determined 1,2,3-TCP is best treated through liquid phase GAC. Facilities to treat 1,2,3-TCP were operational during FY 2019-20.

The DDW required specific water systems to conduct water quality tests for PFAS and PFOS during 2019 and established the notification level at 5.1 ppt and 6.5 ppt for PFOA and PFOS, respectively. Watermaster is conducting PFAS sampling and monitoring as required by the SWRCB and working with the DDW to characterize the extent of PFAS in the Main San Gabriel Basin (Main San Gabriel Basin Watermaster, 2020b).

7.2.4 Locally Applicable Criteria

Within Orange County, there are no significant local applicable criteria that directly affect reliability. Through the years, the water agencies in Orange County have made tremendous efforts to integrate their systems to provide flexibility to interchange with different sources of supplies. There are emergency agreements in place to ensure all parts of the County have an adequate supply of water. In the northern part of the County, agencies have the ability to meet a majority of their demands through groundwater with very little limitation, except for the OCWD BPP. For the agencies in southern Orange County, most of their demands are met with imported water where their limitation is based on the capacity of their system, which is very robust.

However, if a major earthquake on the San Andreas Fault occurs, it will be damaging to all three key regional water aqueducts and disrupt imported supplies for up to six months. The region would likely

impose a water use reduction ranging from 10-25% until the system is repaired. However, MET has taken proactive steps to handle such disruption, such as constructing DVL, which mitigates potential impacts. DVL, along with other local reservoirs, can store a six to twelve-month supply of emergency water (MET, 2021).

7.3 Water Service Reliability Assessment

This Section assesses the reliability of MWDOC's water service to its customers. This is completed by comparing the projected long-term water demand (Section 4), to the projected water supply sources available to MWDOC (Section 6), in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years.

7.3.1 Normal Year Reliability

The water demand forecasting model developed for the Demand Forecast TM (described in Section 4.3.1), to project the 25-year demand for Orange County water agencies, also isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The explanatory variables of population, temperature, precipitation, unemployment rate, drought restrictions, and conservation measures were used to create the statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition. The average (normal) demand is represented by the average water demand of FY 2017-18 and FY 2018-19 (CDM Smith, 2021).

MWDOC is 100 percent reliable for normal year demands from 2025 through 2045. MWDOC receives imported water from MET via connection to MET's regional distribution system. Although pipeline and connection capacity rights do not guarantee the availability of water, they do guarantee the ability to convey water into the local system when it is available to the MET distribution system.

A comparison between the supply and demand for projected years between 2025 and 2045 is shown in Table 7-2. As stated above, the available supply will meet projected demands due to a diversified supply and conservation measures limiting and reducing imported demands in the later years.

Table 7-2: Wholesale: Normal Year Supply and Demand Comparison

DWR Submittal Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045
Supply totals	175,360	176,190	179,119	178,724	178,436
Demand totals	175,360	176,190	179,119	178,724	178,436
Difference	0	0	0	0	0
NOTES: Includes treated and untreated water from MET for M&I and non-M&I demands.					

7.3.2 Single Dry Year Reliability

A single dry year is defined as a single year of minimal to no rainfall within a period where average precipitation is expected to occur. The water demand forecasting model developed for the Demand Forecast TM (described in Section 4.3.1), isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the normal year condition (average of FY 2017-18 and FY 2018-19). For a single dry year condition (FY 2013-14), the model projects a six percent increase in demand for the MWDOC's service area (CDM Smith, 2021). Detailed information of the model is included in Appendix H.

MWDOC has documented that it is 100 percent reliable for single dry year demands from 2025 through 2045 with a demand increase of six percent from normal demand with significant reserves held by MET and conservation. A comparison between the supply and the demand in a single dry year is shown in Table 7-3.

Table 7-3: Wholesale: Single Dry Year Supply and Demand Comparison

DWR Submittal Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045
Supply totals (AF)	182,545	183,425	186,530	186,110	185,806
Demand totals (AF)	182,545	183,425	186,530	186,110	185,806
Difference	0	0	0	0	0
NOTES: Includes treated and untreated water from MET for M&I and non-M&I demands. The single dry year projections estimate a 6% increase on imported M&I demand. Non-M&I demand (Irvine Lake and groundwater storage and replenishment) remain constant at 55,617AFY for all years because					

7.3.3 Multiple Dry Years Reliability

Multiple dry years are defined as five or more consecutive dry years with minimal rainfall within a period of average precipitation. The water demand forecasting model developed for the Demand Forecast TM (described in Section 4.3.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the normal year condition (average of FY2017-18 and FY2018-19). For a single dry year condition (FY2013-14), the model projects a six percent increase in demand for the MWDOC's service area (CDM Smith, 2021). It is conservatively assumed that a five-year multi dry year scenario is a repeat of the single dry year over five consecutive years.

Even assuming a conservative demand increase of six percent each year for five consecutive years, MWDOC is capable of meeting all customers' demands from 2025 through 2045 (Table 7-4), with significant reserves held by MET and conservation.

Table 7-4: Wholesale: Multiple Dry Years Supply and Demand Comparison

DWR Submittal Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison (AF)						
		2025	2030	2035	2040	2045
First year	Supply totals	172,611	176,121	177,446	179,846	179,449
	Demand totals	172,611	176,121	177,446	179,846	179,449
	Difference	0	0	0	0	0
Second year	Supply totals	175,094	176,297	178,067	179,762	179,389
	Demand totals	175,094	176,297	178,067	179,762	179,389
	Difference	0	0	0	0	0
Third year	Supply totals	177,578	176,473	178,688	179,678	179,328
	Demand totals	177,578	176,473	178,688	179,678	179,328
	Difference	0	0	0	0	0
Fourth year	Supply totals	180,061	176,649	179,309	179,594	179,267
	Demand totals	180,061	176,649	179,309	179,594	179,267
	Difference	0	0	0	0	0
Fifth year	Supply totals	182,545	183,425	186,530	186,110	185,806
	Demand totals	182,545	183,425	186,530	186,110	185,806
	Difference	0	0	0	0	0

NOTES:
Includes treated and untreated water from MET for M&I and non-M&I demands. The multiple dry-year projections estimate a six percent increase on imported M&I demand. Non-M&I demand (Irvine Lake and groundwater storage and replenishment) remain constant at 55,617AFY because these demands are not affected by changes in hydrological conditions. The 2025 column assesses supply and demand for FY 2020-21 through FY 2024-25; the 2030 column assesses FY 2025-26 through FY 2029-30 and so forth, in order to end the water service reliability assessment in FY 2044-45.

7.4 Management Tools and Options

Existing and planned water management tools and options that seek to maximize local resources and results in minimizing the need to import water are described below.

- **Reduced Delta Reliance:** Both MWDOC and MET have demonstrated consistency with Reduced Reliance on the Delta Through Improved Regional Water Self-Reliance (Delta Plan policy WR P1) by reporting the expected outcomes for measurable reductions in supplies from the Delta. MET has improved its self-reliance through methods including water use efficiency, water recycling, stormwater capture and reuse, advanced water technologies, conjunctive use projects, local and regional water supply and storage programs, and other programs and projects. Similarly, MWDOC and its member agencies have further invested in water use efficiency, local water supply projects, and advanced water technologies to increase regional self-reliance. In 2020, MET had a 602,000 AF change in supplies contributing to regional-self-reliance, corresponding to a 15.3 percent change, and this amount is projected to increase through 2045 (MET, 2021). In 2020, MWDOC had a nearly 200,000 AF change in supplies contributing to regional-self-reliance, which represents a 30% change since the 2010 baseline. For detailed information on the Delta Plan Policy WR P1, refer to Appendix C.

- **The continued and planned use of groundwater:** The water supply resources within MWDOC's service area are enhanced by the existence of groundwater basins that account for the majority of local supplies available and are used as reservoirs to store water during wet years and draw from storage during dry years, subsequently minimizing MWDOC service area's reliance on imported water. Groundwater basins are managed within a safe basin operating range so that groundwater wells are only pumped as needed to meet water use. Although MWDOC does not manage any of the service area's groundwater basins, MWDOC supports and partners in efforts to maintain the health of the local basins through local groundwater recharge efforts such OCWD's GWRS program.

- **Groundwater storage and transfer programs:** MWDOC and OCWD's involvement in SARCCUP includes participation in a conjunctive use program that improves water supply resiliency and increases available dry-year yield from local groundwater basins. The groundwater bank has 137,000 AF of storage (OCWD, 2020b). MET has numerous groundwater storage and transfer programs in which MET endeavors to increase the reliability of water supplies, including the AVEK Waster Agency Exchange and Storage Program and the High Desert Water Bank Program. The IRWD Strand Ranch Water Banking Program has approximately 23,000 AF stored for IRWD's benefit, and by agreement, the water is defined to be an "Extraordinary Supply" by MET and counts essentially 1:1 during a drought/water shortage condition under MET's and MWDOC's WSAP. In addition, MET has encouraged storage through its cyclic and conjunctive use programs that allow MET to deliver water into a groundwater basin in advance of agency demands, such as the Cyclic Storage Agreements under the Main San Gabriel Basin Judgement.

- **Water Loss Program:** The water loss audit program reduces MWDOC's dependency on imported water from the Delta by implementing water loss control technologies after assessing

audit data and leak detection.

- **Increased use of recycled water:** MWDOC partners with local agencies in recycled water efforts, including OCWD to identify opportunities for the use of recycled water for irrigation purposes, groundwater recharge and some non-irrigation applications. OCWD's GWRS and GAP allow southern California to decrease its dependency on imported water and create a local and reliable source of water that meet or exceed all federal and state drinking level standards. Expansion of the GWRS is currently underway to increase the plant's production to 130 MGD, and further reduce reliance on imported water.

- **Implementation of demand management measures during dry periods:** During dry periods, water reduction methods to be applied to the public through the retail agencies, will in turn reduce MWDOC's overall demands on MET and reliance on imported water. MWDOC assisted its retail agencies by leading the coordination of the 20% by 2020 Orange County Regional Alliance for all of the retail agencies in Orange County. MWDOC assisted each retail water supplier in Orange County in analyzing the requirements of and establishing their baseline and target water use, as guided by DWR.

7.5 Drought Risk Assessment

CWC Section 10635(b) requires every urban water supplier include, as part of its UWMP, a DRA for its water service as part of information considered in developing its demand management measures and water supply projects and programs. The DRA is a specific planning action that assumes MWDOC is experiencing a drought over the next five years and addresses MWDOC's water supply reliability in the context of presumed drought conditions. Together, the water service reliability assessment, DRA, and WSCP allow MWDOC to have a comprehensive picture of its short-term and long-term water service reliability and to identify the tools to address any perceived or actual shortage conditions.

CWC Section 10612 requires the DRA to be based on the driest five-year historic sequence for MWDOC's water supply. However, CWC Section 10635 also requires that the analysis consider plausible changes on projected supplies and demands due to climate change, anticipated regulatory changes, and other locally applicable criteria.

The following sections describe the methodology and results from MWDOC's DRA.

7.5.1 Methodology

The water demand forecasting model developed for the Demand Forecast TM (described in Section 4.3.1) isolated the impacts that weather and future climate can have on water demand through the use of a statistical model. The impacts of hot/dry weather condition are reflected as a percentage increase in water demands from the average condition (average of FY 2017-18 and FY 2018-19). For a single dry year condition (FY 2013-14), the model projects a six percent increase in demand for the MWDOC's service area (CDM Smith, 2021).

For MWDOC, the five consecutive years of FY 2011-12 to FY 2015-16 represent the driest five -consecutive year historic sequence for MWDOC's service area water supply. This period that

spanned water years 2012 through 2016 included the driest four-year statewide precipitation on record (2012-2015) and the smallest Sierra-Cascades snowpack on record (2015, with five percent of average). It was marked by extraordinary heat: 2014, 2015 and 2016 were California's first, second and third warmest year in terms of statewide average temperatures. Locally, Orange County rainfall for the five-year period totaled 36 inches, the driest on record.

Water Demand Characterization

All of MWDOC's water supplies are purchased from MET, regardless of hydrologic conditions. As described in Section 6.2.1, MET's supplies are from the Colorado River, SWP, and in -region storage. In their 2020 UWMP, both MET's DRA concluded that even without activating WSCP actions, MET can reliably provide water to all of their member agencies, including MWDOC, through 2045, assuming a five -year drought from FY 2020-21 through FY 2024-25. Beyond this, MET's DRA indicated a surplus of supplies that would be available to all of its member agencies, including MWDOC, should the need arise. Therefore, any increase in demand that is experienced in MWDOC's service area will be met by MET's water supplies.

Based on MWDOC's Demand Forecast TM, in a single dry year, demand is expected to increase by six percent above a normal year. MWDOC's projected normal water use is presented annually for the next five years in Table 7-5. MWDOC's DRA conservatively assumes a drought from FY 2020-21 through FY 2024-25 is a repeat of the single dry year over five consecutive years.

MWDOC developed its demand forecast in a number of steps. First, MWDOC estimated total retail demands for its service area. This was based on estimated future demands using historical water use trends, future expected water use efficiency measures, additional projected land-use development, and changes in population. Next, MWDOC estimated the projections of local supplies derived from current and expected local supply programs from MWDOC member agencies. Finally, MWDOC used its demand model to calculate the difference between total forecasted demands and local supply projections. The resulting difference between total demands net of savings from conservation and local supplies is the expected regional demands on MWDOC. The sum of the 1) M&I demand estimated from the model and the 2) non-M&I water for surface water storage and groundwater replenishment, equate MWDOC's demand, which is supplied by MET.

Table 7-5: MWDOC's Projected Normal M&I and Non-M&I Water Demand

MWDOC's Projected Normal M&I and Non-M&I Water Demand					
	2021	2022	2023	2024	2025
Water Use (AF)	164,316	167,077	169,838	172,599	175,360
NOTES: Source – Linearly interpolated from MWDOC Service Area Water Supply Projections					

Water Supply Characterization

MWDOC's assumptions for its supply capabilities are discussed and presented in 5-year increments under its water reliability assessment in Section 7.3. For MWDOC's DRA, these supply capabilities are further refined and presented annually for the years 2021 to 2025 by assuming a repeat of historic

conditions from FY 2011-12 to FY 2015-16. For its DRA, MWDOC assessed the reliability of supplies available to MWDOC through MET using historical supply availability under dry-year conditions. MET's supply sources under the CR, SWP, and In-Region supply categories are individually listed and discussed in detail in MET's UWMP. Future supply capabilities for each of these supply sources are also individually tabulated in Appendix 3 of MET's UWMP, with consideration for plausible changes on projected supplies under climate change conditions, anticipated regulatory changes, and other factors. For simplicity, the supply capabilities presented in Table 7-6 constitute the total of MWDOC's water supplies made available by MET. MWDOC's supplies are used to meet consumptive use, surface water and groundwater recharge needs that are in excess of locally available supplies. In addition, MWDOC has access to supply augmentation actions through MET. MET may exercise these actions based on regional need, and in accordance with their WSCP, and may include the use of supplies and storage programs within the Colorado River, SWP, and in-region storage.

7.5.2 Total Water Supply and Use Comparison

MWDOC's anticipated total water use and supply under a five-year drought from FY 2020-21 through FY 2024-25, are compared in Table 7-6. MWDOC's assessment reveals that its supply capabilities are expected to balance with its projected water use for the next five years, from 2021 to 2025, under a repeat of a five consecutive-year drought.

Table 7-6: Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

DWR Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	172,611
Total Supplies	172,611
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2022	**Total**
Total Water Use	175,094
Total Supplies	175,094
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2023	**Total**
Total Water Use	177,578
Total Supplies	177,578
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0

DWR Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2024	**Total**
Total Water Use	180,061
Total Supplies	180,061
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%
2025	**Total**
Total Water Use	182,545
Total Supplies	182,545
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	0
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

7.5.3 Water Source Reliability

As detailed in Section 8, MWDOC has in place a robust WSCP and comprehensive shortage response planning efforts that include demand reduction measures and supply augmentation actions. However, since MWDOC's DRA shows a balance, no water service reliability concern is anticipated, and no shortfall mitigation measures are expected to be exercised over the next five years. Additionally, while a balance

of supplies and demands are shown in the previously displayed Table 7-6, it is important to note that MET's DRA shows a surplus of supplies that would be available all of its Member Agencies, including MWDOC, should the need for additional supplies arise. MWDOC will periodically revisit its representation of both individual supply sources and of the gross water use estimated for each year and will revise its DRA if needed.

8 WATER SHORTAGE CONTINGENCY PLANNING

8.1 Layperson's Description

Water shortage contingency planning is a strategic planning process that MWDOC engages to prepare for and respond to water shortages. A water shortage, when water supply available is insufficient to meet the normally expected customer water use at a given point in time, may occur due to a number of reasons, such as water supply quality changes, climate change, drought, and catastrophic events (e.g., earthquake). The MWDOC WSCP provides a water supply availability assessment and structured steps designed to respond to actual conditions. This level of detailed planning and preparation will help maintain reliable supplies and reduce the impacts of supply interruptions.

The Water Code Section 10632 requires that every urban water supplier that serves more than 3,000 acre-feet per year or have more than 3,000 connections prepared and adopt a standalone WSCP as part of its UWMP. The WSCP is required to plan for a greater than 50% supply shortage. This WSCP due to be updated based on new requirements every five years and will be adopted as a current update for submission to DWR by July 1, 2021.

8.2 Overview of the Water Shortage Contingency Plan

The WSCP serves as the operating manual that MWDOC will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSCP contains the processes and procedures that will be deployed when shortage conditions arise so that the MWDOC governing body, its staff, and its retail agencies can easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate to the degree of water shortfall anticipated.

A copy of the MWDOC WSCP is provided in Appendix I and includes the steps to assess if a water shortage is occurring, and what level of demand reduction actions to trigger the most appropriate response to the water shortage conditions. MWDOC, as a wholesaler of MET's treated water supply, has an interdependent relationship with MET documents related to planning for, and responding to, water shortage; therefore, the MWDOC WSCP includes the MET Water Supply Allocation Plan[1] (WSAP). The MET WSAP outlines how MET will determine and implement each of its wholesale and retail agencies' allocation during a time of shortage. MWDOC also has its own version of a WSAP the outlines how MWDOC will determine and implement each of its retail agency's allocation during a time of shortage.

Figure 8-1 illustrates the interdependent relationship between the MET and MWDOC procedural documents related to planning for and responding to water shortages.

[1] MET's Water Shortage Contingency Plan, which includes Water Surplus and Drought Management Plan and WSAP, Appendix 4 of the 2020 UWMP

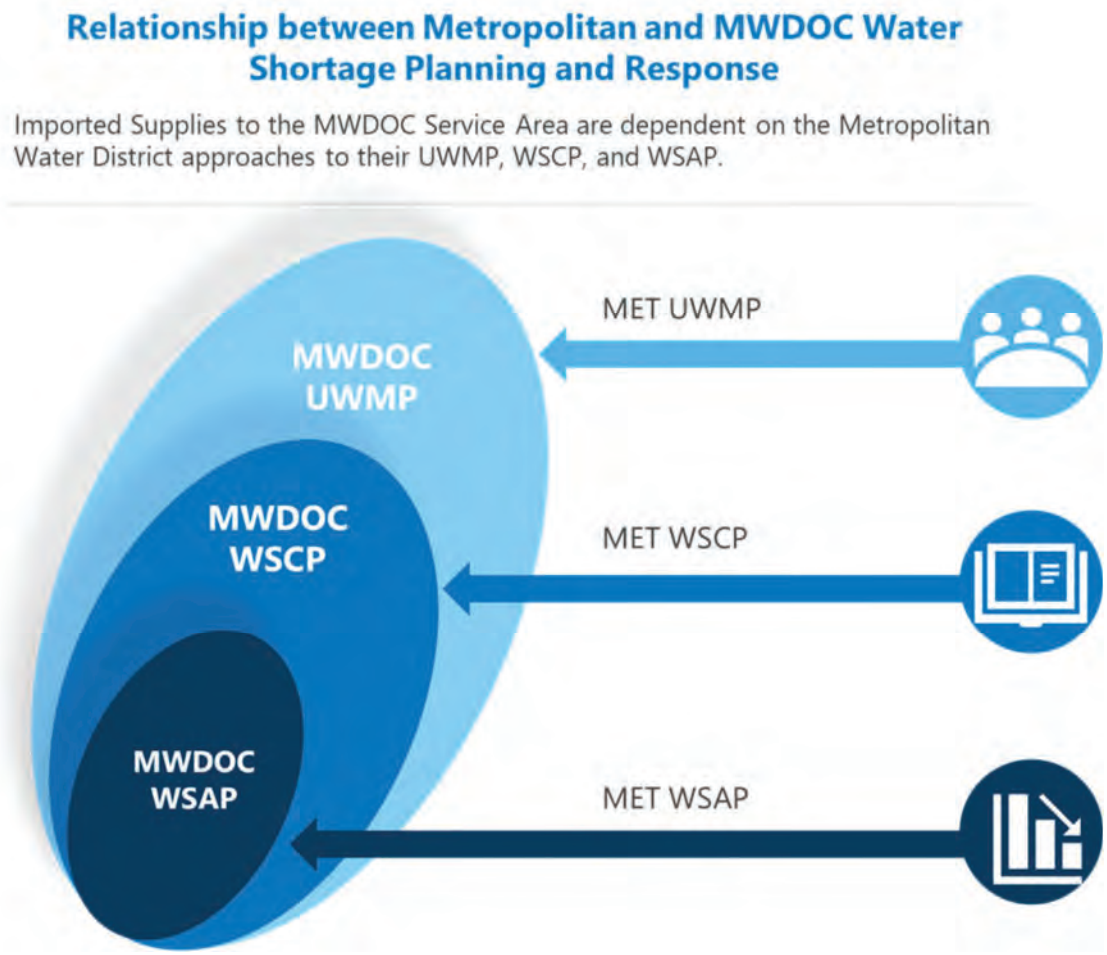


Figure 8-1: Relationship Between MET and MWDOC Water Shortage Planning and Response

WSCP has prescriptive elements, including an analysis of water supply reliability; the drought shortage actions for each of the six standard water shortage levels, that correspond to water shortage percentages ranging from 10 percent to greater than 50 percent; an estimate of potential to close supply gap for each measure; protocols and procedures to communicate identified actions for any current or predicted water shortage conditions; procedures for an annual water supply and demand assessment; reevaluation and improvement procedures for evaluating the WSCP.

During past shortages MWDOC has adopted Board Resolutions urging its retail agencies to develop and implement water shortage plans, calling upon each agency to adopt and enforce regulations prohibiting the waste of water, and implementing an allocation plan for available imported water consistent with reductions, incentives, and allocation surcharges imposed on MWDOC by MET. As part of the 2020 UWMP, MWDOC has worked with retail agencies to develop and align individual WSCPs.

8.3 Summary of Water Shortage Response Strategy and Required DWR Tables

This WSCP is organized into three main sections with Section 3 aligned with the California Water Code Section 16032 requirements.

Section 1 Introduction and WSCP Overview gives an overview of the WSCP fundamentals.

Section 2 Background provides a background on the MWDOC's water service area.

Section 3 Water Shortage Contingency Plan

Section 3.1 Water Supply Reliability Analysis provides a summary of the water supply analysis and water reliability findings from the 2020 UWMP.

Section 3.2 Annual Water Supply and Demand Assessment Procedures provide a description of procedures to conduct and approve the Annual Assessment.

Section 3.3 Six Standard Water Shortage Stages explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50 percent shortages.

Section 3.4 Shortage Response Actions describes the WSCP's shortage response actions that align with the defined shortage levels.

Section 3.5 Communication Protocols addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding any current or predicted shortages and any resulting shortage response actions.

Section 3.6 Compliance and Enforcement is not required by wholesaler agencies.

Section 3.7 Legal Authorities is a description of the legal authorities that enable MWDOC to implement and enforce its shortage response actions.

Section 3.8 Financial Consequences of the WSCP provides a description of the financial consequences of and responses for drought conditions.

Section 3.9 Monitoring and Reporting is not required by wholesaler agencies.

Section 3.10 WSCP Refinement Procedures addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.

Section 3.11 Special Water Feature Distinction.

Section 3.12 Plan Adoption, Submittal, and Implementation provides a record of the process MWDOC followed to adopt and implement its WSCP.

The WSCP is based on adequate details of demand reduction and supply augmentation measures that are structured to match varying degrees of shortage will ensure the relevant stakeholders understand what to expect during a water shortage situation. MWDOC adopted water shortage levels consistent with the requirements identified in Water Code Section 10632 (a)(3)(A) (Table 8-1).

The supply augmentation actions that align with each shortage level are described in DWR Table 8-3 (Appendix B). These augmentations represent short-term management objectives triggered by the WSCP and do not overlap with the long-term new water supply development or supply reliability enhancement projects.

The demand reduction measures that align with each shortage level are described in DWR Table 8-2 (Appendix B). This table also estimates the extent to which that action will reduce the gap between supplies and demands to demonstrate to the that choose suite of shortage response actions can be expected to deliver the expected outcomes necessary to meet the requirements of a given shortage level.

Table 8-1: Water Shortage Contingency Plan Levels

DWR Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions**
0	0% (Normal)	A Level 0 Water Supply Shortage –Condition exists when MWDOC notifies its water users that no supply reductions are anticipated in this year. MWDOC proceeds with planned water efficiency best practices to support consumer demand reduction in line with state mandated requirements and local MWDOC goals for water supply reliability.
1	Up to 10%	A Level 1 Water Supply Shortage – Condition exists when no supply reductions are anticipated, a consumer imported demand reduction of up to 10% is recommended to make more efficient use of water and respond to existing water conditions. Upon the declaration of a Water Aware condition, MWDOC shall implement the mandatory Level 1 conservation measures identified in this WSCP. The type of event that may prompt MWDOC to declare a Level 1 Water Supply Shortage may include, among other factors, a finding that its wholesale water provider (MET) calls for extraordinary water conservation efforts.
2	Up to 20%	A Level 2 Water Supply Shortage – Condition exists when MWDOC notifies its member agencies that due to drought or other supply reductions, a consumer imported demand reduction of up to 20% is necessary to make more efficient use of water and respond to existing water conditions. Upon declaration of a Level 2 Water Supply Shortage condition, MWDOC shall implement the mandatory Level 2 conservation measures identified in this WSCP.

DWR Submittal Table 8-1 Water Shortage Contingency Plan Levels		
3	Up to 30%	A Level 3 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 30% consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
4	Up to 40%	A Level 4 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 40% consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
5	Up to 50%	A Level 5 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 50% or more consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
6	>50%	A Level 6 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that greater than 50% or more consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350.
NOTES:		

9 DEMAND MANAGEMENT MEASURES

The goal of the Demand Management Measures (DMM) section is to provide a comprehensive description of the water conservation programs that a supplier has implemented, is currently implementing, and plans to implement in order to meet its urban water used reduction targets. The reporting of DMMs were significantly modified in 2014 by Assembly Bill 2067 to streamline the DMM reporting requirements. For retail suppliers the requirements changed from 14 specific measures to six more general requirements plus an "other" category:

- Water waste prevention ordinances;
- Metering;
- Conservation pricing;
- Public education and outreach;
- Programs to assess and manage distribution system real loss;
- Water conservation program coordination and staffing support;
- Other demand management measures that have a significant impact on water use as measured in GPCD, including innovative measures, if implemented;
- Programs to assist retailers with Conservation Framework Compliance

Wholesale agencies must now provide narrative descriptions of metering, public education and outreach, water conservation program coordination and staffing support, and other DMMs, as well as a narrative of asset management and the wholesale supplier assistance programs.

9.1 Overview

MWDOC demonstrated its commitment to water use efficiency in 1991 by voluntarily signing the MOU Regarding Urban Water Conservation in the California Urban Water Conservation Council. As a signatory to the MOU, MWDOC has committed to a good-faith-effort to implement all cost-effective best management practices (BMPs) as demand management measures DMMs.

An ethic of efficient use of water has been developing over the last 30 years of implementing water use efficiency programs. Retail water agencies throughout Orange County also recognize the need to use existing water supplies efficiently – implementation of water efficiency programs makes good economic sense and reflects responsible stewardship of the region's water resources. All retail water agencies in Orange County are actively implementing DMM-based programs.

MWDOC still honors its commitment to urban water efficiency, and continues to implement BMP-based DMMs through multi-faceted, holistic water use efficiency programs today. As a wholesaler, to help facilitate implementation of DMM throughout Orange County, MWDOC's efforts focus on the following three areas: Regional Program Implementation, Local Program Assistance, and Research and Evaluation. This both complies with and goes beyond the Foundational BMPs of Utility Operations Programs requirements:

Regional Program Implementation - MWDOC develops, obtains funding for, and implements regional water savings programs on behalf of all retail water agencies in Orange County. This approach minimizes confusion to consumers by providing the same programs with the same participation guidelines,

maintains a consistent message to the public to use water efficiently, and provides support to retail water agencies by acting as program administrators for the region. As a leader of water efficiency in Orange County, MWDOC provides a holistic suite of programs that are accessible by all consumer groups in the region. Many of these programs have been structured through Integrated Regional Water Management Planning processes in north, central and south Orange County.

Local Program Assistance - When requested, MWDOC assists retail agencies in developing and implementing local programs within their service areas. This assistance includes collaboration with each retail agency to design a program to fit that agency's local needs, including providing staffing, targeting customer classes, acquiring grant funding from a variety of sources, and implementing, marketing, reporting, and evaluating the program. MWDOC assists with a variety of local programs including, but not limited to: Pressure Regulation Valve Replacement Pilot, regional Smart Timer Distributions, Sub-Metering, Custom Commercial Retrofits, various public information, and outreach campaigns, K-12 Choice School Programs, Conservation Pricing, Leak Detection, and Water Waste Prohibitions..

Research and Evaluation - An integral component of MWDOC's water use efficiency program is the research and evaluation of potential and existing programs. Research allows an agency to measure the water savings benefits of a specific program and then compare those benefits to the costs of implementing the program in order to evaluate the economic feasibility of the program when compared to other efficiency projects or existing or potential sources of supply. MWDOC regularly conducts statistical water savings (impact evaluations) and program process evaluations to determine how to best invest and run its water efficiency programs. From 2016-2020, MWDOC conducted process and impact evaluations on its Spray-to-Drip Program, the results of which have created a starting point of a standardized rebate program throughout the MET service area, and its Landscape Design Assistance Program. Additionally, an evaluation was conducted of MWDOC's Comprehensive Landscape Water Use Efficiency (CLWUE) Program, which included smart timers, rotating nozzles, turf removal, drip irrigation, and recycled water conversions. This study evaluated how much water was saved at properties implementing these measures and compared savings among landscapes that implemented one versus two of the measures (e.g., a turf removal site compared to a turf removal site that also installed a smart irrigation timer). Additionally, MWDOC is currently piloting a research program investigating water savings associated with the replacement of broken pressure regulating valves at residential homes. The results of this study are expected in 2023.

Furthermore, in 2013 MWDOC published its first Orange County Water Use Efficiency Master Plan to define how Orange County will comply with, or exceed, the state mandate of a 20 percent reduction in water use by 2020, and how MWDOC will achieve its share of MET's Integrated Resources Plan water savings goal. The Master Plan is being used to achieve the water savings goal at the lowest possible costs while maintaining a mix of programs desired by water agencies and consumers throughout Orange County. MWDOC is planning an update to the 2013 Orange county Water Use Efficiency Master Plan in 2023 that will integrate all necessary measures relevant to SB 606 and AB 1668.

Table 9-1 summarizes DMM implementation responsibilities of MWDOC as Orange County's wholesale supplier and responsibilities of MWDOC's retail agencies.

Table 9-1: DMM Implementation Responsibility and Regional Programs in Orange County

Efficiency Measure	Applies to:		MWDOC Regional Program and Activities
	Retailer	MWDOC as a Wholesaler	
Operations Practices			
Wholesale Agency Assistance Programs	-	✓	✓
Conservation Pricing	✓	✓	✓
Conservation Coordinator	✓	✓	✓
Water Waste Prevention	✓	-	✓
Water Loss Control (System Water Audits, Leak Detection and Repair)	✓	(1)	✓
Metering with Commodity Rates	✓	(1)	(1)
Commercial, Industrial, and Institutional (CII) Programs	✓	-	✓
Large Landscape Conservation Programs	✓		✓
Landscape Programs			
Residential and CII Landscape Rebate Programs (Turf Removal, Spray-to-Drip, Smart Timer, High Efficiency Sprinkler Nozzles (HENs), Rain Barrels, Large Rotary Nozzles, In-stem Flow Regulators)	✓	-	✓
Residential Landscape Design and Maintenance Assistance Programs	✓	-	✓
Qualified Water Efficient Landscaper (QWEL) Training Program	✓	✓	✓
Residential Implementation			
High-Efficiency Washing Machine Rebate Program	✓	-	✓

Efficiency Measure	Applies to:		MWDOC Regional Program and Activities
	Retailer	MWDOC as a Wholesaler	
WaterSense Specification Toilets (Residential Plumbing Fixture Retrofits(1))	✓	-	✓
WaterSense Specification for Residential Development	✓	-	-
Commercial, Industrial, Institutional Implementation			
Water Savings Incentive Program	✓	-	✓
On-site Retrofit Program	✓	-	✓
Direct Install High Efficiency Toilets (HET) (DAC and Non-DAC)	✓	-	✓
CII Rebate Programs (HET and Urinals, Plumbing Flow Control Valves, Connectionless Food Steams, Air-cool Ice Machines, Cooling Tower Conductivity Controllers and pH Controllers, Dry Vacuum Pumps, Laminar Flow Restrictors	✓	-	✓
Education Programs			
Public Outreach Programs	✓	✓	✓
Choice K-12 School Programs	✓	✓	✓
Boy Scouts Soil and Water Conservation Badge Program	✓	✓	✓
Girl Scouts Water Resources and Conservation Patch Program	✓	✓	✓
Water Energy Education Alliance	✓	✓	✓

(1) MWDOC does not own or operate a distribution system; water wholesaled by MWDOC is delivered through the MET distribution system and meters.

9.2 DMM Implementation in MWDOC Service Area

Successful strategies are built by leveraging opportunities and creating customer motivation to take action to begin a market transformation. For Water Use Efficiency programs specifically, this starts by selecting the highest water consuming sectors and then creating an attractive implementation package. The next step is to identify ways to break through traditional market barriers by testing out innovative technologies and/or delivery mechanisms. Additionally, a program marketing campaign is launched, employing a full spectrum of varying outreach methods. Furthermore, Programs are thoroughly evaluated to maximize water savings, break down barriers to participation, or other ways that effectiveness may be increased. The Implementation Design Steps are illustrated on Figure 9-1.

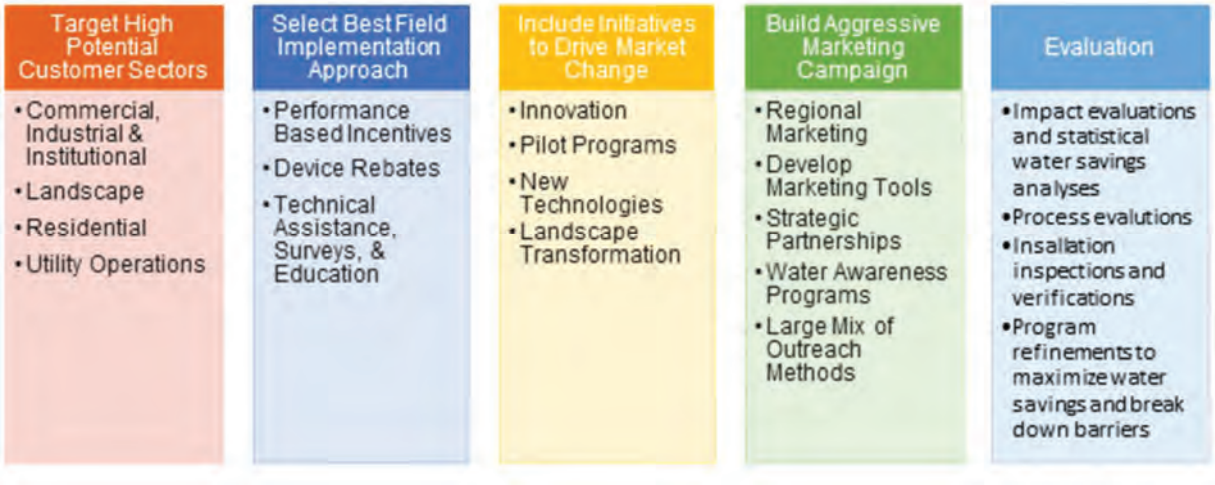


Figure 9-1: Implementation Design Steps

MWDOC's water use efficiency programs cut across all consumer segments and differ in their delivery formats. There are intentional reasons for this varied approach. Through evaluation of past programs, it has been shown that there are three implementation approaches that are particularly effective at securing water savings in a cost-effective and persistent manner. These implementation approaches have been built into each of MWDOC's program offerings and matched up with the appropriate program sector as follows:

Performance based incentives - This payment format works especially well for the large landscape and CII sectors due to the array of site-specific needs and custom processes and equipment at these sites. This program pays a flat incentive per acre foot saved that scales to the water saved at each site so the more they save the higher the incentive. This approach provides an avenue for high water using sites that will save the most water through a custom approach that works for each particular site. Additionally, this method provides an even greater incentive for the highest water users to engage in water savings activity and create a most attractive return on investment for site decision makers.

Standardized device rebates - Rebates are most applicable for the more "cookie cutter" type measures where there is a limited number of products and styles and well-defined water savings rates. These incentives are the predominant payment method for residential, small commercial, and small to medium

sized landscape markets. There are a wide variety of standardized device rebates available to all water-users of all water sectors.

Technical assistance, surveys, and education - All customer segments benefit from additional technical support services. MWDOC offers water efficiency educational programs to primary school-age children, residential homeowners, property managers, professional landscapers, or any other interested water-user. These programs provide public awareness of the importance of water efficiency and provide the technical support to implement appropriate water savings measures.

Figure 9-2 shows MWDOC's programs under each of the three implementation approaches.

	Field Implementation Approaches		
Program Segments:	Performance Based Incentives	Device Based Incentives	Audits, Assistance & Education
Commercial, Industrial, & Institutional	Water Savings Incentive Program On-site Retrofit Program	• DAC/Non-DAC Direct Install HET • SoCal Water$mart Device Rebates • ULV Urinals • HET • Food Steamers • Ice Machines • pH & Conductivity Controllers • Laminar Flow Restrictors • Dry Vacuum Pumps	Large Landscape Surveys QWEL
Landscape	Water Savings Incentive Program On-site Retrofit Program	• SoCal Water$mart Device Rebates (Commercial and Residential) • Smart Controllers • Large Rotary Nozzles • In-stem Flow Regulators • Turf Removal Incentive Program	Landscape Design Assistance Landscape Maintenance Assistance CA Friendly Landscape Classes

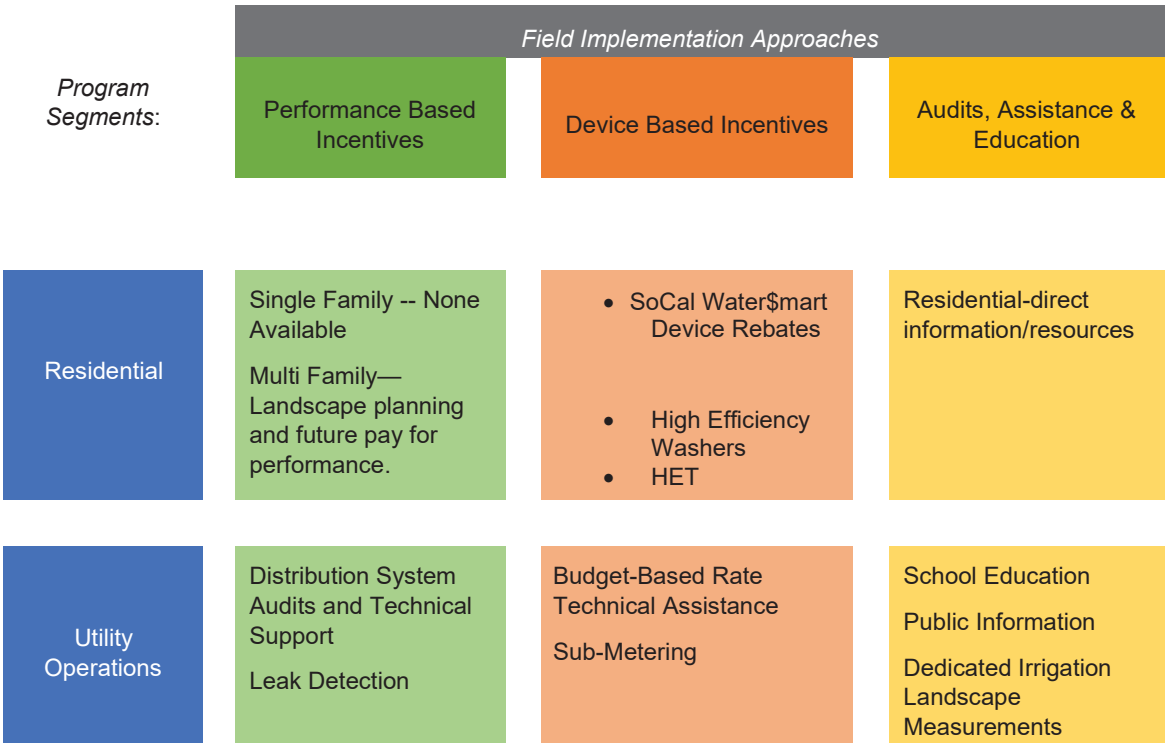


Figure 9-2: Demand Management Measure Implementation Approaches

9.3 Wholesale Supplier Assistance Programs

As described in the sections above, MWDOC provides financial incentives, conservation-related technical support, and regional implementation of a variety of demand management programs. In addition, MWDOC is providing assistance with compliance of the Conservation Framework and conducts research projects to evaluate implementation of both existing programs and new pilot programs. On behalf of its member agencies, MWDOC also organizes and provides the following:

- Monthly coordinator meetings
- Marketing materials
- Public speaking
- Community events
- Legislation compliance assistance

The many programs that MWDOC offers to Orange County on behalf of retail water agencies are described in detail in Appendix K.

9.4 Water Use Objectives (Future Requirements)

To support Orange County retailers with compliance of SB 606 and AB 1668 (Conservation Framework), MWDOC is providing multi-level support to assist agencies meet the primary goals of the legislation including to Use Water More Wisely and to Eliminate Water Waste. Beginning in 2023, Urban water

suppliers are required to calculate and report their annual urban water use objective (WUO), submit validated water audits annually, and to implement and report BMP CII performance measures.

Urban Water Use Objective

An Urban Water Supplier's urban water use objective (WUO) is based on efficient water use of the following:

- Aggregate estimated efficient **indoor residential** water use;
- Aggregate estimated efficient **outdoor residential** water use;
- Aggregate estimated efficient **outdoor** irrigation landscape areas with dedicated irrigation meters or equivalent technology in connection with **CII** water use;
- Aggregate estimated efficient **water losses;**
- Aggregate estimated water use for variances approved the State Water Board;
- Allowable **potable reuse water** bonus incentive adjustments.

MWDOC offers a large suite of programs, described in detail throughout Section 9.3, that will assist Orange County retailers in meeting and calculating their WUO.

Table 9-2 describes MWDOC's programs that will assist agencies in meeting their WUO through both direct measures: programs/activities that result in directly quantifiable water savings; and indirectly: programs that provide resources promoting water efficiencies to the public that are impactful but not directly measurable.

Table 9-2: MWDOC Programs to Help Agencies Meet their WUO

WUO Component	Calculation	Program	Impact
Indoor Residential	Population and GPCD standard	**Direct Impact** • High Efficiency Washer • HET • Multi-Family HET (DAC/ non-DAC)	**Direct Impact** Increase of indoor residential efficiencies and reductions of GPCD use

WUO Component	Calculation	Program	Impact
Outdoor Residential	Irrigated/irrigable area measurement and a percent factor of local ETo	**Direct Impact** • Turf Removal • Spray-to-Dip • Smart Timer • HEN • Rain Barrels/Cisterns **Indirect Impact** • Landscape Design and Maintenance Assistance • OC Friendly Gardens Webpage • CA Friendly/Turf Removal Classes • QWELL	**Direct Impact** Increase outdoor residential efficiencies and reductions of gallons per ft^2 of irrigated/ irrigable area used **Indirect Impact** Provide information, resources, and education to promote efficiencies in the landscape
Outdoor Dedicated Irrigation Meters	Irrigated/irrigable area measurement and a percent factor of local ETo	**Direct Impact** • Turf Removal • Spray-to-Dip • Smart Timer • HEN • Central Computer Irrigation Controllers • Large Rotary Nozzles • In-Stem Flow Regulators **Indirect Impact** • OC Friendly Gardens Webpage • CA Friendly/Turf Removal Classes • QWELL	**Direct Impact** Increase outdoor residential efficiencies and reductions of gallons per ft^2 of irrigated/ irrigable area used **Indirect Impact** Provide information, resources, and education to promote efficiencies in the landscape

WUO Component	Calculation	Program	Impact
Water Loss	Following the AWWA M36 Water Audits and Water Loss Control Program, Fourth Edition and AWWA Water Audit Software V5	**Direct Impact** • Water Balance Validation • Customer Meter Accuracy Testing • Distribution System Pressure Surveys • Distribution System Leak Detection • No-Discharge Distribution System Flushing • Water Audit Compilation • Component Analysis	**Direct Impact** Identify areas of the distribution system that need repair, replacement, or other action
Bonus Incentives	**One of the following:** 1. Volume of potable reuse water from existing facilities, not to exceed 15% of WUO 2. Volume of potable reuse water from new facilities, not to exceed 10% of WUO	**Direct Impact** • GWRS **Indirect Impact** • On Site Retrofit Program (ORP)	**Direct Impact** The GWRS (run by OCWD) significantly increases the availability of potable reuse water **Indirect Impact** The ORP expands the recycled water supply grid that will be used for future projects

In addition, MWDOC is providing support to agencies to assist with the calculation of WUOs. DWR will provide residential outdoor landscape measurements; however, Urban Water Suppliers are responsible for measuring landscape that is irrigated/irrigable by dedicated irrigation meters. MWDOC is contracting

for consultant services to assist agencies in obtaining these measurements. Services may include but are not limited to:

- Accounting/database clean up (e.g., data mining billing software to determine dedicated irrigation customers);
- Geolocation of dedicated irrigation meters;
- In-field measurements;
- GIS/Aerial imagery measurements;
- Transformation of static/paper maps to digital/GIS maps.

These services will help agencies organize and/or update their databases to determine which accounts are dedicated irrigation meters and provide landscape area measurements for those accounts. These data points are integral when calculating the WUO. MWDOC is also exploring funding options to help reduce retail agencies' costs of obtaining landscape area measurements for dedicated irrigation meters.

CII Performance Measures

Urban water supplies are expected to report BMPs and more for CII customers. MWDOC offers a broad variety of programs and incentives to help CII customers implement BMPs and increase their water efficiencies (Table 9-3).

Table 9-3: MWDOC BMP and Water Efficiency Programs and Incentives

Component	Program Offered	Impact
CII Performance Measures	• Water Savings Incentive Program (WSIP) • HET • High Efficiency Urinals • Plumbing Flow Control Valves • Connectionless Food Steamers • Air-cooled Ice Machines • Cooling Tower Conductivity controllers • Cooling Tower pH Controllers • Dry Vacuum Pumps • Laminar Flow Restrictors	WSIP incentivizes customized CII water efficiency projects that utilize BMPS. Additional CII rebates based on BMPS increase the economic feasibility of increasing water efficiencies.

These efforts to assist OC retail agencies have successfully assisted the retail agencies in OC in using water more efficiently over time. Our plan is to ensure that all agencies are fully ready to begin complying with the new water use efficiency standards framework called for in SB 606 and SB 1668 by the start date of 2023.

10 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

The Water Code requires the UWMP to be adopted by the Supplier's governing body. Before the adoption of the UWMP, the Supplier has to notify the public and the cities and counties within its service area per the Water Code and hold a public hearing to receive input from the public on the UWMP. Post adoption, the Supplier submits the UWMP to DWR and the other key agencies and makes it available for public review.

This section provides a record of the process MWDOC followed to adopt and implement its UWMP.

10.1 Overview

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, MWDOC worked closely with many other entities, including representation from diverse social, cultural, and economic elements of the population within MWDOC's service area, to develop and update this planning document. MWDOC also encouraged public involvement through its public hearing process, which provided residents with an opportunity to learn and ask questions about their water supply management and reliability. Through the public hearing, the public has an opportunity to comment and put forward any suggestions for revisions of the Plan.

Table 10-1 summarizes external coordination and outreach activities carried out by MWDOC and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

Table 10-1: External Coordination and Outreach

External Coordination and Outreach	Date	Reference
Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	2/24/2021	Appendix L
Public Hearing Notice	5/3/2021 - 5/10/2021	Appendix L
Held Public Hearing	5/19/2021	Appendix L
Adopted UWMP and WSCP	5/19/2021	Appendix M
Submitted UWMP to DWR (no later than 30 days after adoption)	7/1/2021	-
Submitted UWMP to the California State Library (no later than 30 days after adoption)	7/1/2021	-
Submitted UWMP to the cities and county within the supplier's service area (no later than 30 days after adoption)	7/1/2021	-
Made UWMP available for public review (no later than 30 days after filing with DWR)	8/1/2021	-

This UWMP was adopted by the MWDOC Board of Directors on May 19, 2021. A copy of the adopted resolution is provided in Appendix M.

10.2 Agency Coordination

The Water Code requires the Suppliers preparing UWMPs to notify any city or county within their service area at least 60 days prior to the public hearing. As shown in Table 10-2, MWDOC sent a Letter of Notification to the County of Orange and the cities within its service area on February 2, 2021 to state that it was in the process of preparing an updated UWMP (Appendix L).

Table 10-2: Wholesale: Notification to Cities and Counties

DWR Submittal Table 10-1 Wholesale: Notification to Cities and Counties			
☑	Supplier has notified more than 10 cities or counties in accordance with Water Code Sections 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**		
Appendix L	Provide the page or location of this list in the UWMP.		
☐	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**		
City Name		60 Day Notice	Notice of Public Hearing
County Name		60 Day Notice	Notice of Public Hearing
NOTES:			

The MWDOC's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. The MWDOC is dependent on imported water from MET. As such, MWDOC involved MET and other relevant agencies in this 2020 UWMP at various levels of contribution as summarized in Table 10-3.

Table 10-3: Coordination with Appropriate Agencies

	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Contacted for Assistance	Sent Copy of Draft Plan	Sent Notice of Public Hearing	Not Involved/ No Information
Cities within service area	-	-	-	-	✓	✓	✓
County of Orange	-	-	-	-	✓	✓	✓
MET	✓	-	-	✓	✓	✓	✓
MWDOC 28 Retail Agencies	✓	✓	✓	✓	✓	✓	✓
OC San	✓	-	-	✓	✓	-	-
OCWD	✓	-	-	✓	✓	✓	✓
Public Library	-	-	-	-	-	✓	-
SJBA	✓	-	-	✓	✓	-	-
SOCWA	✓	-	-	✓	✓	-	-

MET - As a member agency of MET, MWDOC developed this UWMP in collaboration with MET's 2020 UWMP to ensure consistency between the two documents.

MWDOC Retail Agencies - MWDOC provided assistance to its retail agencies' 2020 UWMP development by providing much of the data and analysis such as population projections from the California State University at Fullerton CDR and the information quantifying water availability to meet the retailers' projected demands for the next 25 years, in five-year increments. Additionally, MWDOC led the effort to develop a Model Water Shortage Ordinance that its retail suppliers can adopt as is or customize and adopt as part of developing their WSCPs.

Groundwater Management Agencies - MWDOC also worked with the following five agencies to obtain information for the five groundwater basin resources in its service area: OCWD for Lower Santa Ana River Basin, SJBA for San Juan Basin, City of La Habra for La Habra Basin, City of San Clemente for

San Mateo Basin, and LBCWD for Laguna Canyon Basin. Details of the basin information are described in Section 6.3.

Wastewater Management Agencies - To meet the requirements of the Act in the preparation of this UWMP, MWDOC contacted individual wastewater collection and treatment providers and other water agencies within its service area for data on recycled water and associated projects in the region. The information MWDOC obtained was then combined with a review of several completed Orange County studies. The information MWDOC obtained from wastewater collection and treatment providers allows the UWMP to describe wastewater discharge methods, treatment levels, discharge volumes, and recycled use in the region.

10.3 Public Participation

MWDOC encouraged community and public interest involvement in the Plan update through a public hearing and inspection of the draft document on May 19 2021. Copies of the draft 2020 UWMP were placed for public inspection at MWDOC's office and made available for the public on MWDOC's website.

Public hearing notifications were sent to retail agencies and other interested parties. A copy of the Notice of Public Hearing is included in Appendix L.

The hearing was conducted during a regularly scheduled meeting of the MWDOC Board of Directors. A staff report and presentation reviewed the process, key components of the UWMP and the conclusions that served as the basis of the UWMP. The President of the Board of Directors then opened the Public Hearing where all comments were recorded.

10.4 UWMP Submittal

The Board of Directors reviewed and approved the 2020 UWMP at its May 19, 2021 meeting after the public hearing. See Appendix M for the resolution approving the Plan.

By July 1, 2021, the Adopted 2020 MWDOC UWMP was filed with DWR, California State Library, County of Orange, and cities within MWDOC's service area. The submission to DWR was done electronically through the online submittal tool – WUE Data Portal. MWDOC will make the Plan available for public review on its website no later than 30 days after filing with DWR.

10.5 Amending the Adopted UWMP or WSCP

Based on DWR's review of the UWMP, MWDOC will make any amendments in its adopted UWMP, as required and directed by DWR and will follow each of the steps for notification, public hearing, adoption, and submittal for the amending the adopted UWMP.

If MWDOC revises its WSCP after UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

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APPENDICES

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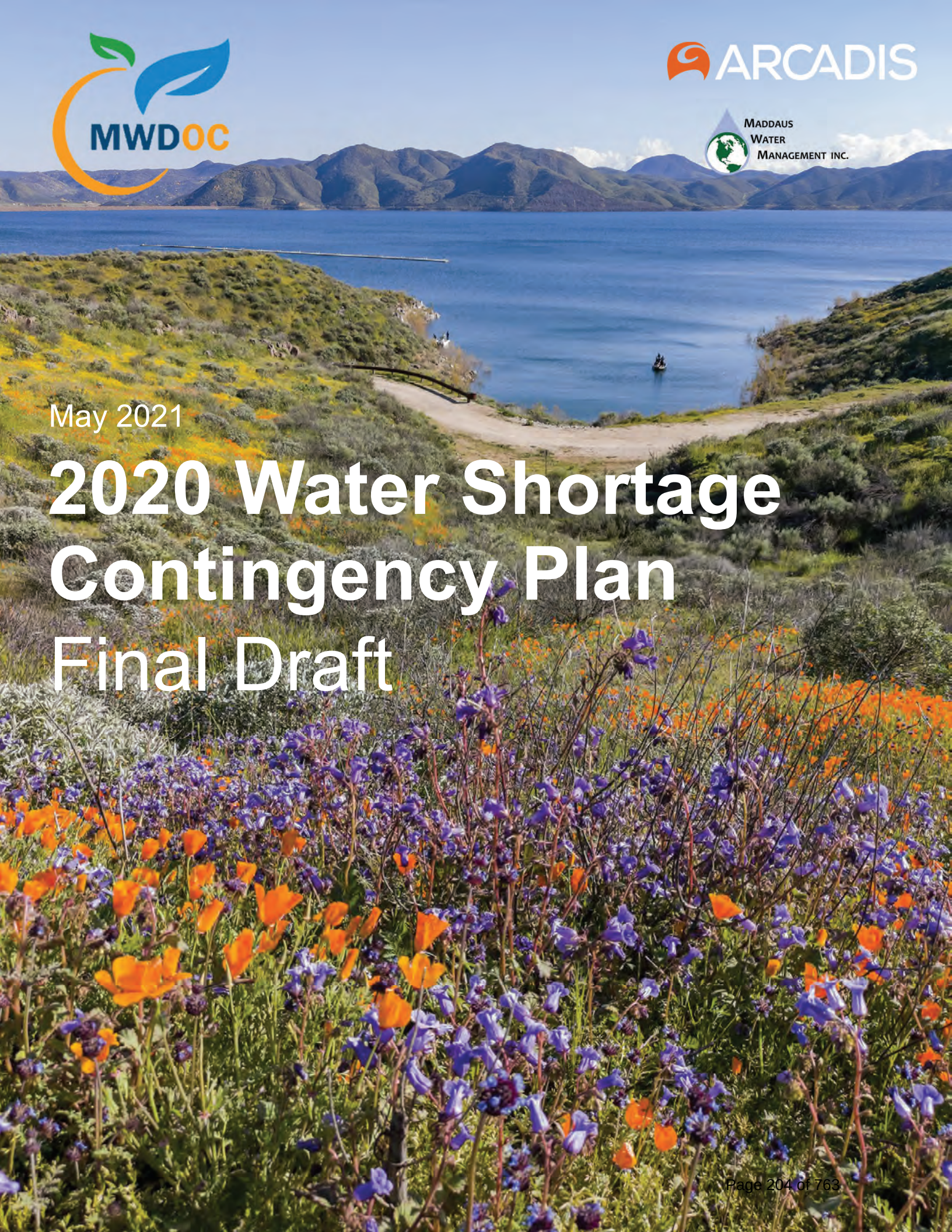

May 2021

2020 Water Shortage Contingency Plan

Final Draft

2020 Water Shortage Contingency Plan

May 2021

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Acronyms and Abbreviations

%	Percent
Act	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
Annual Assessment	Annual Water Supply and Demand Assessment
BPP	Basin Production Percentage
CRA	Colorado River Aqueduct
CVP	Central Valley Project
CWC	California Water Code
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin River Delta
DRA	Drought Risk Assessment
DVL	Diamond Valley Lake
DWR	California Department of Water Resources
EBSD	Emerald Bay Services District
EOCWD	East Orange County Water District
EOC	Emergency Operation Center
EOP	Emergency Operations Plan
ERP	Emergency Response Plan
ETWD	El Toro Water District
FY	Fiscal Year
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GSP	Groundwater Sustainability Plan
GSWC	Golden State Water Company
HMP	Hazard Mitigation Plan
IRP	Integrated Water Resource Plan
IRWD	Irvine Ranch Water District
LBCWD	Laguna Beach County Water District
M&I	Municipal and industrial
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
Mesa Water	Mesa Water District
MET	Metropolitan Water District of Southern California
Metropolitan Act	Metropolitan Water District Act
MGD	Million Gallons per Day
MNWD	Moulton Niguel Water District
MWDOC	Municipal Water District of Orange County
OC	Orange County

OC Basin	Orange County Groundwater Basin
OC San	Orange County Sanitation District
OCWD	Orange County Water District
SCAB	South Coast Air Basin
SCWD	South Coast Water District
Serrano	Serrano Water District
SMWD	Santa Margarita Water District
SOCWA	South Orange County Water Authority
Supplier	Urban Water Supplier
SWP	State Water Project
SWRCB	California State Water Resources Control Board
TCWD	Trabuco Canyon Water District
UWMP	Urban Water Management Plan
WEROC	Water Emergency Response Organization of Orange County
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management Plan
WUE	Water Use Efficiency
YLWD	Yorba Linda Water District

1 INTRODUCTION AND WSCP OVERVIEW

The Water Shortage Contingency Plan is a strategic planning document designed to prepare for and respond to water shortages. This Water Shortage Contingency Plan (WSCP) complies with California Water Code (CWC) Section 10632, which requires that every urban water supplier (Supplier) shall prepare and adopt a WSCP as part of its Urban Water Management Plan (UWMP). This level of detailed planning and preparation is intended to help maintain reliable supplies and reduce the impacts of supply interruptions.

The WSCP is MWDOC's operating manual that is used to prevent catastrophic service disruptions through proactive, rather than reactive, management. A water shortage, when water supply available is insufficient to meet the normally expected customer water use at a given point in time, may occur due to a number of reasons, such as population and land use growth, climate change, drought, and catastrophic events. This Plan provides a structured guide for MWDOC to deal with water shortages, incorporating prescriptive information and standardized action levels, along with implementation actions in the event of a catastrophic supply interruption. This way, if and when shortage conditions arise, MWDOC's governing body, its staff, and retail agencies can easily identify and efficiently implement pre-determined steps to manage a water shortage. A well-structured WSCP allows real-time water supply availability assessment and structured steps designed to respond to actual conditions, to allow for efficient management of any shortage with predictability and accountability.

The WSCP also describes MWDOC's procedures for conducting an Annual Water Supply and Demand Assessment (Annual Assessment) that is required by CWC Section 10632.1 and is to be submitted to the California Department of Water Resources (DWR) on or before July 1 of each year, or within 14 days of receiving final allocations from the State Water Project (SWP), whichever is later. MWDOC's 2020 WSCP is included as an appendix to its 2020 UWMP which will be submitted to DWR by July 1, 2021. However, this WSCP is created separately from MWDOC's 2020 UWMP and can be amended, as needed, without amending the UWMP. Furthermore, the CWC does not prohibit a Supplier from taking actions not specified in its WSCP, if needed, without having to formally amend its UWMP or WSCP.

1.1 Water Shortage Contingency Plan Requirements and Organization

The WSCP provides the steps and water shortage response actions to be taken in times of water shortage conditions. WSCP has prescriptive elements, such as: an analysis of water supply reliability; the water shortage response actions for each of the six standard water shortage levels that correspond to water shortage percentages ranging from 10% to greater than 50%; an estimate of potential to close supply gap for each measure; protocols and procedures to communicate identified actions for any current or predicted water shortage conditions; procedures for an Annual Assessment; and reevaluation and improvement procedures for evaluating the WSCP.

This WSCP is organized into three main sections, with Section 3 aligned with the CWC Section 16032 requirements.

Section 1 Introduction and WSCP Overview gives an overview of the WSCP fundamentals.

Section 2 Background provides a background on MWDOC's water service area.

Section 3 Water Shortage Contingency Preparedness and Response

Section 3.1 Water Supply Reliability Analysis provides a summary of the water supply analysis and water reliability findings from the 2020 UWMP.

Section 3.2 Annual Water Supply and Demand Assessment Procedures provide a description of procedures to conduct and approve the Annual Assessment.

Section 3.3 Six Standard Water Shortage Stages explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, 50, and more than 50% shortages.

Section 3.4 Shortage Response Actions describes the WSCP's shortage response actions that align with the defined shortage levels.

Section 3.5 Communication Protocols addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding any current or predicted shortages and any resulting shortage response actions.

Section 3.6 Compliance and Enforcement is not required by wholesale water providers.

Section 3.7 Legal Authorities is a description of the legal authorities that enable MWDOC to implement and enforce its shortage response actions.

Section 3.8 Financial Consequences of the WSCP provides a description of the financial consequences of and responses for drought conditions.

Section 3.9 Monitoring and Reporting is not required by wholesale water providers.

Section 3.10 WSCP Refinement Procedures addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.

Section 3.11 Special Water Feature Distinction is a required definition per the CWC for retail water agencies, not applicable to MWDOC as wholesale water supplier.

Section 3.12 Plan Adoption, Submittal, and Implementation provides a record of the process MWDOC followed to adopt and implement its WSCP.

1.2 Integration with Other Planning Efforts

As a retail water supplier in Orange County, MWDOC considered other key entities in the development of this WSCP, including the Metropolitan Water District of Southern California (MET) (regional wholesaler for Southern California and the direct supplier of imported water to MWDOC), and Orange County Water District (OCWD) (Orange County Groundwater Basin manager and provider of recycled water in North Orange County). As a wholesale water provider, MWDOC also worked with its retail agencies to align WSCP strategies to ensure robust water shortage planning and response across the District. The DWR Submittal tables for MWDOC's WSCP can be found in Appendix A.

Some of the key planning and reporting documents that were used to develop this WSCP are:

- **MWDOC's 2020 UWMP** provides the basis for the projections of the imported supply availability over the next 25 years for MWDOC's service area.

- **MWDOC's Orange County Reliability Study** provides the basis for water demand projections for MWDOC's member agencies as well as Anaheim, Fullerton, and Santa Ana.
- **MET's 2020 Integrated Water Resources Plan (IRP)** is a long-term planning document to ensure water supply availability in Southern California and provides a basis for water supply reliability in Orange County.
- **MET's 2020 UWMP** was developed as a part of the 2020 IRP planning process and was used by MWDOC as another basis for the projections of supply capability of the imported water received from MET.
- **MET's 2020 WSCP** provides a water supply assessment and guide for MET's intended actions during water shortage conditions.
- **OCWD's 2021 Water Reliability Plan** provides the latest information on groundwater management and supply projection for the Orange County Groundwater Basin (OC Basin), the primary source of groundwater for a significant number of water suppliers in Orange County.
- **OCWD's 2018-19 Engineer's Report** provides information on the groundwater conditions and basin utilization of the OC Basin.
- **OCWD's 2017 Basin 8-1 Alternative Plan i**s an alternative to the Groundwater Sustainability Plan (GSP) for the OC Basin and provides significant information related to sustainable management of the basin in the past and hydrogeology of the basin, including groundwater quality and basin characteristics.
- **2020 Local Hazard Mitigation Plan** provides the basis for the seismic risk analysis of the water system facilities.
- **Orange County Local Agency Formation Commission's 2020 Municipal Service Review for MWDOC Report** provides a comprehensive service review of the municipal services provided by MWDOC.
- **Water Master Plan and Sewer Master Plan** of MWDOC provide information on water infrastructure planning projects and plans to address any required water system improvements.
- **Groundwater Management Plans** provide the groundwater sustainability goals for the basins in the MWDOC's service area and the programs, actions, and strategies activities that support those goals.

2 BACKGROUND INFORMATION

MWDOC was formed by Orange County voters in 1951 under the Municipal Water District Act of 1911 to provide imported water to inland areas of Orange County. Governed by an elected seven-member Board of Directors, MWDOC is MET's third largest member agency based on assessed valuation.

MWDOC is a regional water wholesaler and resource planning agency, managing all of Orange County's imported water supply except for water imported to the cities of Anaheim, Fullerton, and Santa Ana. MWDOC is committed to ensuring water reliability for 28 water entities and retail water agencies in its 600-square-mile service area. To that end, MWDOC focuses on sound planning and appropriate investments in water supply, water use efficiency, regional delivery infrastructure, and emergency preparedness.

Lying in the South Coast Air Basin (SCAB), its climate is characterized by southern California's "Mediterranean" climate with mild winters, warm summers, and moderate rainfall. In terms of land use, MWDOC's service area in the North Orange County is almost built out with predominantly residential units with pockets dedicated to commercial, institutional, governmental uses and open space and parks and the existing vacant lots in South Orange County are gradually transitioning to residential and commercial mixed-use areas. The current population of 2,342,740 is projected to increase by 8% over the next 25 years.

MWDOC is governed by an elected seven-member Board of Directors, with each board member representing a specific area of the County and elected to a four-year term by voters who reside within that part of the MWDOC service area. Each director is a member of at least one of the following standing committees: Planning and Operations; Administration and Finance; and Executive.

2.1 MWDOC Service Area

MWDOC serves more than 2.34 million residents in a 600-square-mile service area (Figure 2-1). Although MWDOC does not have its own water facilities and does not have jurisdiction over local supplies, it works to ensure the delivery of reliable water supplies to the region.

MWDOC serves imported water in Orange County to 28 water agencies. These entities, comprised of cities and water districts, are referred to as MWDOC member agencies and provide water to approximately 2.34 million residents. MWDOC retail agencies include:

- City of Brea
- City of Buena Park
- City of Fountain Valley
- City of Garden Grove
- City of Huntington Beach
- City of La Habra
- City of La Palma
- East Orange County Water District (EOCWD)
- El Toro Water District (ETWD)
- Emerald Bay Services District (EBSD)
- Irvine Ranch Water District (IRWD)
- Golden State Water Company (GSWC)
- Laguna Beach County Water District (LBCWD)
- Mesa Water District (Mesa Water)

- City of Newport Beach
- City of Orange
- City of San Clemente
- City of San Juan Capistrano
- City of Seal Beach
- City of Tustin
- City of Westminster
- Moulton Niguel Water District (MNWD)
- Orange County Water District (OCWD)
- Santa Margarita Water District (SMWD)
- Serrano Water District (Serrano)
- South Coast Water District (SCWD)
- Trabuco Canyon Water District (TCWD)
- Yorba Linda Water District (YLWD)

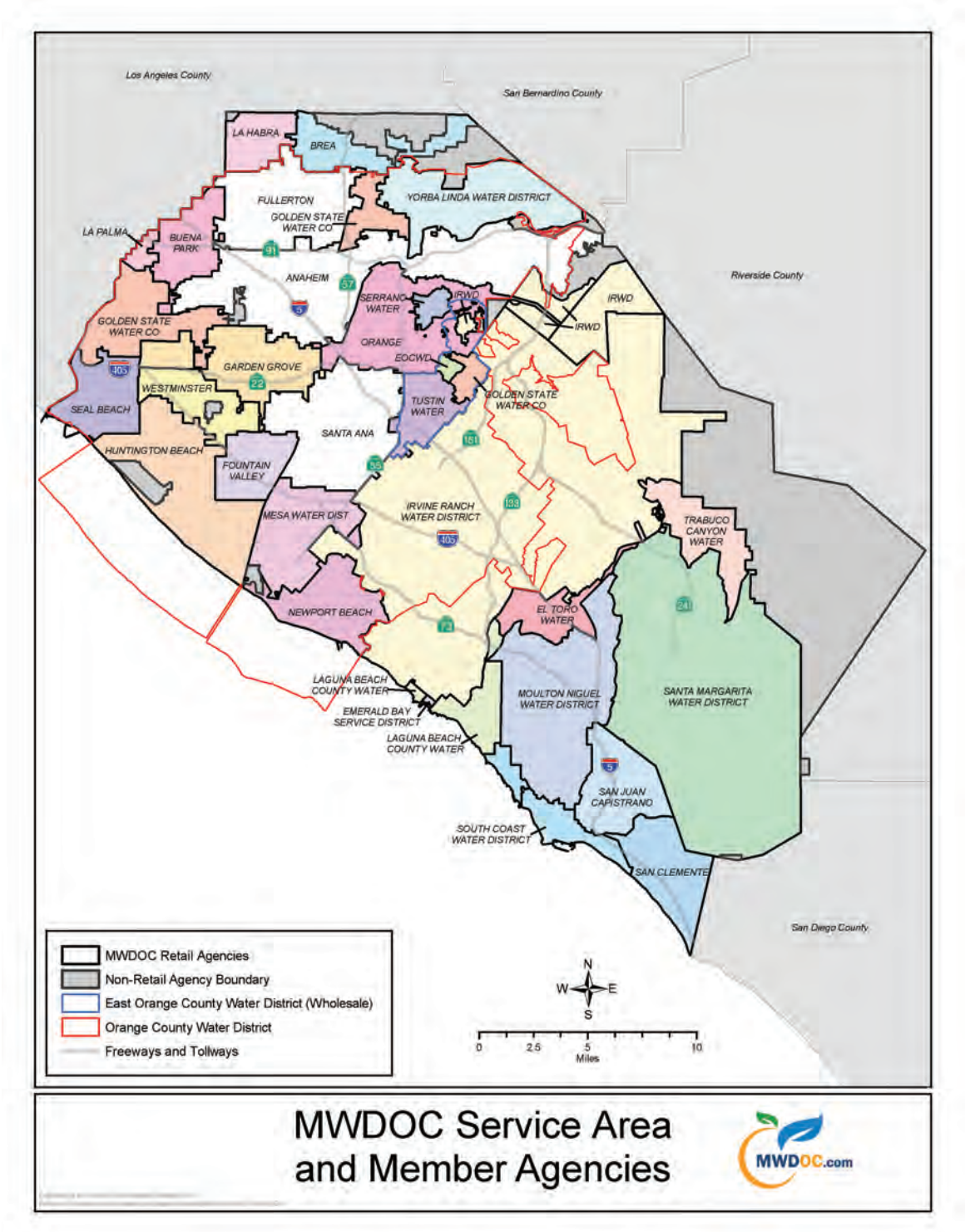


Figure 2-1: MWDOC Service Area

2.2 Relationship to MET

MWDOC became a member agency of MET in 1951 to bring supplemental imported water supplies to parts of Orange County. MET is the largest water wholesaler for domestic and municipal uses in California, serving approximately 19 million customers. MET wholesales imported water supplies to 26 member cities and water districts in six southern California counties. Its service area covers the southern California coastal plain, extending approximately 200 miles along the Pacific Ocean from the City of Oxnard in the north to the international boundary with Mexico in the south. This encompasses 5,200 square miles and includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. The regional locations of MET's member agencies are shown in Figure 2-2. Approximately 85% of the population from the aforementioned counties reside within MET's boundaries.

MET is governed by a Board of Directors comprised of 38 appointed individuals with a minimum of one representative from each of MET's 26 member agencies. The allocation of directors and voting rights are determined by each agency's assessed valuation. Each member of the Board shall be entitled to cast one vote for each ten million dollars ($10,000,000) of assessed valuation of property taxable for district purposes, in accordance with Section 55 of the Metropolitan Water District Act (Metropolitan Act). Directors can be appointed through the chief executive officer of the member agency or by a majority vote of the governing board of the agency. Directors are not compensated by MET for their service.

MET is responsible for importing water into the region through its operation of the Colorado River Aqueduct (CRA) and its contract with the State of California for SWP supplies. Member agencies receive water from MET through various delivery points and pay for service through a rate structure made up of volumetric rates, capacity charges and readiness to serve charges. Member agencies provide estimates of imported water demand to MET annually in April regarding the amount of water they anticipate they will need to meet their demands for the next five years.

In Orange County, MWDOC and the cities of Anaheim, Fullerton, and Santa Ana are MET member agencies that purchase imported water directly from MET. Furthermore, MWDOC purchases both treated potable and untreated water from MET to supplement its retail agencies' local supplies.

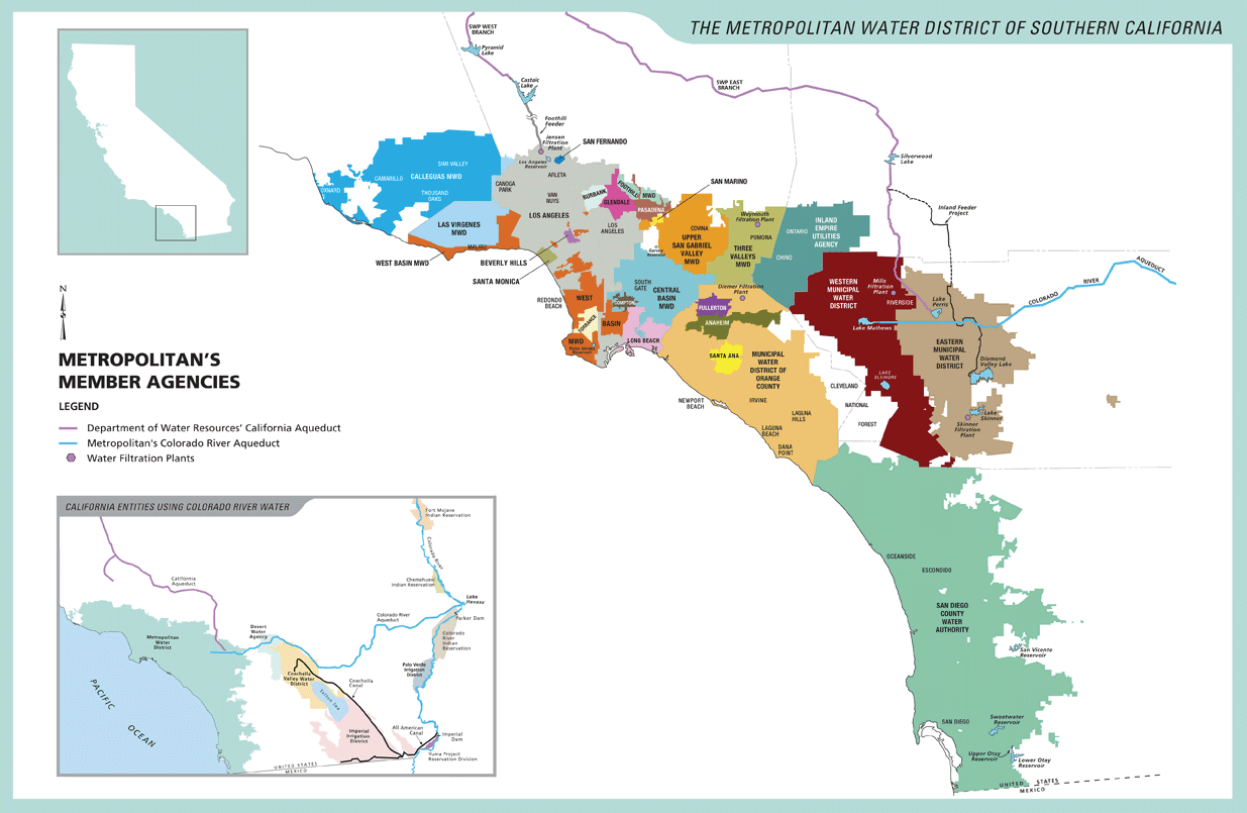


Figure 2-2: Regional Location of MET's Member Agencies

2.3 Relationship with MET Water Shortage Planning

The WSCP is designed to be consistent with MET's Water Shortage and Demand Management (WSDM) Plan, MET's Water Supply Allocation Plan (MET WSAP), MWDOC's Water Supply Allocation Plan (WSAP), and other emergency planning efforts as described below. MET and MWDOC's WSAPs are integral to the WSCP's shortage response strategy. In the event that MET determines that supply augmentation (including dedicated drought storage supply) and demand reduction measures would not be sufficient to meet projected supply needs, MET will determine shortage conditions exist and assign a water shortage level required for MWDOC's service area to meet a reduction in demands. In turn, MWDOC will need to further assess the shortage conditions within their service area to meet member agencies' demands and as required activate MWDOC's WSAP. If applicable, MWDOC will also need to need invoke water shortage level conditions appropriate to meet projected member agencies' demands as described further in Section 2.3.3 below.

2.3.1 MET Water Surplus and Drought Management Plan

MET evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage annually. Each stage is associated with specific resource management actions to avoid extreme shortages to the extent possible and minimize adverse impacts to retail

customers should an extreme shortage occur. The sequencing outlined in the WSDM Plan reflects anticipated responses towards MET's existing and expected resource mix.

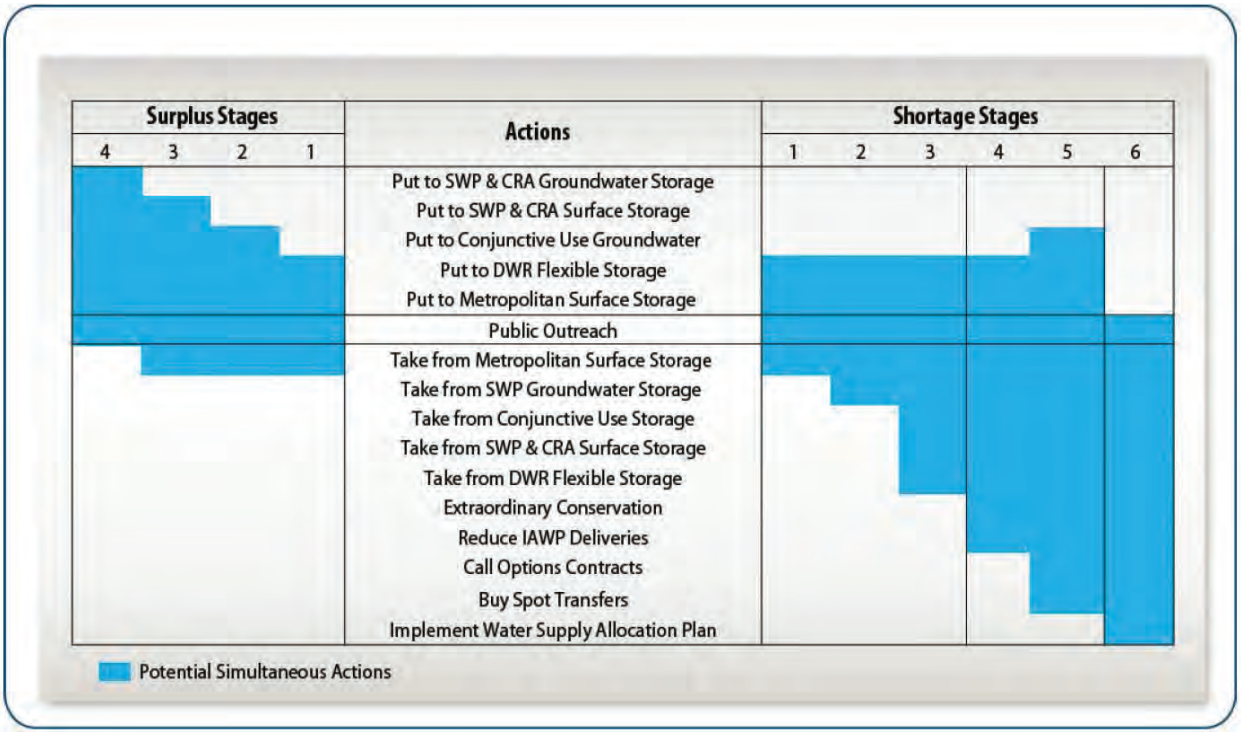
Surplus stages occur when net annual deliveries can be made to water storage programs. Under the WSDM Plan, there are four surplus management stages that provides a framework for actions to take for surplus supplies. Deliveries in Diamond Valley Lake (DVL) and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage.

The WSDM Plan distinguishes between shortages, severe shortages, and extreme shortages. The differences between each term are listed below.

- Shortage: MET can meet full-service demands and partially meet or fully meet interruptible demands using stored water or water transfers, as necessary.
- Severe Shortage: MET can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.
- Extreme Shortage: MET must allocate available supply to full-service customers.

There are six shortage management stages to guide resource management activities. These stages are defined by shortfalls in imported supply and water balances in MET's storage programs. When MET must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Source: MET's WSDM, 1999.

Figure 2-3 gives a summary of actions under each surplus and shortage stages when an allocation plan is necessary to enforce mandatory cutbacks. The goal of the WSDM plan is to avoid Stage 6, an extreme shortage (MET, 1999).



Source: MET's WSDM, 1999.

Figure 2-3: Resource Stages, Anticipated Actions, and Supply Declarations

MET's Board of Directors adopted a Water Supply Condition Framework in June 2008 in order to communicate the urgency of the region's water supply situation and the need for further water conservation practices. The framework has four conditions, each calling increasing levels of conservation. Descriptions for each of the four conditions are listed below:

- Baseline Water Use Efficiency: Ongoing conservation, outreach, and recycling programs to achieve permanent reductions in water use and build storage reserves.
- Condition 1 Water Supply Watch: Local agency voluntary dry-year conservation measures and use of regional storage reserves.
- Condition 2 Water Supply Alert: Regional call for cities, counties, member agencies, and retail water agencies to implement extraordinary conservation through drought ordinances and other measures to mitigate use of storage reserves.
- Condition 3 Water Supply Allocation: Implement MET's WSAP.

As noted in Condition 3, should supplies become limited to the point where imported water demands cannot be met, MET will allocate water through the WSAP (MET, 2021a).

2.3.2 MET Water Supply Allocation Plan

MET's imported supplies have been impacted by a number of water supply challenges as noted earlier. In case of extreme water shortage within the MET service area is the implementation of its WSAP.

MET's Board of Directors adopted the WSAP in February 2008 to fairly distribute a limited amount of water supply and applies it through a detailed methodology to reflect a range of local conditions and needs of the region's retail water consumers (MET, 2021a).

The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation. MET's WSAP is the foundation for the urban water shortage contingency analysis required under CWC Section 10632 and is part of MET's 2020 UWMP.

MET's WSAP was developed in consideration of the principles and guidelines in MET's 1999 WSDM Plan with the core objective of creating an equitable "needs-based allocation". The WSAP's formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of MET supplies of greater than 50%. The formula takes into account a number of factors, such as the impact on retail customers, growth in population, changes in supply conditions, investments in local resources, demand hardening aspects of water conservation savings, recycled water, extraordinary storage and transfer actions, and groundwater imported water needs.

The formula is calculated in three steps: 1) based period calculations, 2) allocation year calculations, and 3) supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations – The first step in calculating a member agency's water supply allocation is to estimate their water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of supply and demand is calculated using data from the two most recent non-shortage years.

Step 2: Allocation Year Calculations – The next step in calculating the member agency's water supply allocation is estimating water needs in the allocation year. This is done by adjusting the base period estimates of retail demand for population growth and changes in local supplies.

Step 3: Supply Allocation Calculations – The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2.

In order to implement the WSAP, MET's Board of Directors makes a determination on the level of the regional shortage, based on specific criteria, typically in April. The criteria used by MET includes, current levels of storage, estimated water supplies conditions, and projected imported water demands. The allocations, if deemed necessary, go into effect in July of the same year and remain in effect for a 12-month period. The schedule is made at the discretion of the Board of Directors (MET, 2021b).

As demonstrated by the findings in MET's 2020 UWMP both the Water Reliability Assessment and the Drought Risk Assessment (DRA) demonstrate that MET is able to mitigate the challenges posed by hydrologic variability, potential climate change, and regulatory risk on its imported supply sources through the significant storage capabilities it has developed over the last two decades, both dry-year and emergency storage (MET, 2021a).

Although MET's 2020 UWMP forecasts that MET will be able to meet projected imported demands throughout the projected period from 2025 to 2045, uncertainty in supply conditions can result in MET needing to implement its WSAP to preserve dry-year storage and curtail demands (MET, 2021b).

2.3.3 MWDOC Water Supply Allocation Plan

To prepare for the potential allocation of imported water supplies from MET, MWDOC worked collaboratively with its 28 retail agencies to develop its own WSAP that was adopted in January 2009 and amended in 2020. The MWDOC WSAP outlines how MWDOC will determine and implement each of its retail agencies' allocation during a time of shortage.

The MWDOC WSAP uses a similar method and approach, when reasonable, as that of the MET's WSAP. However, MWDOC's plan remains flexible to use an alternative approach when MET's method produces a significant unintended result for the member agencies. The MWDOC WSAP model follows five basic steps to determine a retail agency's imported supply allocation.

Step 1: Determine Baseline Information – The first step in calculating a water supply allocation is to estimate water supply and demand using a historical based period with established water supply and delivery data. The base period for each of the different categories of demand and supply is calculated using data from the last two non-shortage years.

Step 2: Establish Allocation Year Information – In this step, the model adjusts for each retail agency's water need in the allocation year. This is done by adjusting the base period estimates for increased retail water demand based on population growth and changes in local supplies.

Step 3: Calculate Initial Minimum Allocation Based on MET's Declared Shortage Level – This step sets the initial water supply allocation for each retail agency. After a regional shortage level is established, MWDOC will calculate the initial allocation as a percentage of adjusted Base Period Imported water needs within the model for each retail agency.

Step 4: Apply Allocation Adjustments and Credits in the Areas of Retail Impacts and Conservation– In this step, the model assigns additional water to address disparate impacts at the retail level caused by an across-the-board cut of imported supplies. It also applies a conservation credit given to those agencies that have achieved additional water savings at the retail level as a result of successful implementation of water conservation devices, programs and rate structures.

Step 5: Sum Total Allocations and Determine Retail Reliability – This is the final step in calculating a retail agency's total allocation for imported supplies. The model sums an agency's total imported allocation with all of the adjustments and credits and then calculates each agency's retail reliability compared to its Allocation Year Retail Demand.

The MWDOC WSAP includes additional measures for plan implementation, including the following (MWDOC, 2016):

- **Appeal Process** – An appeals process to provide retail agencies the opportunity to request a change to their allocation based on new or corrected information. MWDOC anticipates that under most circumstances, a retail agency's appeal will be the basis for an appeal to MET by MWDOC.
- **Melded Allocation Surcharge Structure** – At the end of the allocation year, MWDOC would only charge an allocation surcharge to each retail agency that exceeded their allocation if MWDOC exceeds its total allocation and is required to pay a surcharge to MET. MET enforces allocations to retail agencies through an allocation surcharge to a retail agency that exceeds its total annual allocation at the end of the 12-month allocation period. MWDOC's surcharge would

be assessed according to the retail agency's prorated share (AF over usage) of MWDOC amount with MET. Surcharge funds collected by MET will be invested in its Water Management Fund, which is used to in part to fund expenditures in dry-year conservation and local resource development.

- **Tracking and Reporting Water Usage** – MWDOC will provide each retail agency with water use monthly reports that will compare each retail agency's current cumulative retail usage to their allocation baseline. MWDOC will also provide quarterly reports on its cumulative retail usage versus its allocation baseline.
- **Timeline and Option to Revisit the Plan** – The allocation period will cover 12 consecutive months and the Regional Shortage Level will be set for the entire allocation period. MWDOC only anticipates calling for allocation when MET declares a shortage; and no later than 30 days from MET's declaration will MWDOC announce allocation to its retail agencies.

3 WATER SHORTAGE CONTINGENCY PREPAREDNESS AND RESPONSE PLANNING

MWDOC's WSCP is a detailed guide of how MWDOC intends to act in the case of an actual water shortage condition. The WSCP anticipates a water supply shortage and provides pre-planned guidance for managing and mitigating a shortage. Regardless of the reason for the shortage, the WSCP is based on adequate details of demand reduction and supply augmentation measures that are structured to match varying degrees of shortage will ensure the relevant stakeholders understand what to expect during a water shortage situation.

3.1 Water Supply Reliability Analysis

Per CWC Section 10632 (a)(1), the WSCP shall provide an analysis of water supply reliability conducted pursuant to CWC Section 10635, and the key issues that may create a shortage condition when looking at MWDOC's water asset portfolio.

Understanding water supply reliability, factors that could contribute to water supply constraints, availability of alternative supplies, and what effect these have on meeting customer demands provides MWDOC with a solid basis on which to develop appropriate and feasible response actions in the event of a water shortage. In the 2020 UWMP, MWDOC conducted a Water Reliability Assessment to compare the total water supply sources available to the water supplier with long-term projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years (MWDOC, 2021).

MWDOC also conducted a DRA to evaluate a drought period that lasts five consecutive water years starting from the year following when the assessment is conducted. An analysis of both assessments determined that MWDOC is capable of meeting all of its member agencies' demands from 2021 through 2045 for a normal year, a single dry year, and a drought lasting five consecutive dry years with significant supplemental dedicated drought supplies from MET and ongoing conservation program efforts from its member agencies. MET's projections take into account the imported demands from Orange County and as so, MET's water reliability assessments determine that demands within MWDOC can be met, and the development of numerous local sources further augments the reliability of the imported water system. As a result, there is no projected shortage condition due to drought that will trigger agency demand reductions until MET notifies MWDOC of its implementation of its WSAP. More information is available in MWDOC's 2020 UWMP Section 6 and 7 (MWDOC, 2021).

3.2 Annual Water Supply and Demand Assessment Procedures

Per CWC Section 10632.1, MWDOC will conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and by July 1st of each year, beginning in 2022, submit an annual water shortage assessment with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan.

MWDOC must include in its WSCP the procedures used for conducting an Annual Assessment. The Annual Assessment is a determination of the near-term outlook for supplies and demands and how a perceived shortage may relate to WSCP shortage stage response actions in the current calendar year. This determination is based

on information available to MWDOC at the time of the analysis. Starting in 2022, the Annual Assessment will be due by July 1 of every year.

This section documents the decision-making process required for formal approval of MWDOC's Annual Assessment determination of water supply reliability each year and the key data inputs and the methodologies used to evaluate the water system reliability for the coming year, while considering that the year to follow would be considered dry.

3.2.1 Decision-Making Process

The following decision-making process describes the functional steps that MWDOC will take to formally approve the Annual Assessment determination of water supply reliability each year.

3.2.1.1 MWDOC Steps to Approve the Annual Assessment Determination

The MWDOC Annual Assessment will be predicated on MET's WSDM supply demand tracking, which is reported monthly to their Board of Directors. MET WSDM planning involves the examination of developing demand and supply conditions for the calendar year, as well as considerations of potential actions consistent with the WSDM Plan. Additionally, MWDOC staff simultaneously provides water supplies and demand reports to its Board of Directors to inform them of emerging demand and supply conditions. These monthly analyses provide key information for MWDOC and MET to manage resources to meet a range of estimated demands and adjust to changing conditions throughout the year.

For many of MWDOC's member agencies, their primary source of water is produced locally from groundwater basins, recycle water projects, surface reservoirs, and groundwater recovery projects. Their remaining source to meet retail demands comes from the purchase of imported water from MWDOC. However, some member agencies, particularly in South Orange County, rely heavily on imported water due to limited local supplies. As described below, MWDOC surveys each member agency to project near term and long-term consumptive and replenishment imported water demands.

Annually, MWDOC surveys its member agencies for anticipated water demands and supplies for the upcoming year. MWDOC utilizes this information to plan for the anticipated imported water supplies for the MWDOC service area. This information is then shared and coordinated with MET and is incorporated into their analysis of their service area's annual imported water needs. Based on the year's supply conditions and WSDM actions, MET will present a completed Annual Assessment for its member agencies' review from which they will then seek Board approval in April of each year.

Additionally, MET expects that any triggers or specific shortage response actions that result from the Annual Assessment would be approved by their Board at that time. Based upon MET's Assessment and taking into consideration information provided to MWDOC through the annual survey, MWDOC will provide each member agency an anticipated estimate of imported supplies by member agency to be incorporated into each agency's annual supply and demand assessment. MWDOC will then adopt its completed Annual Assessment prior to the July 1 deadline, so MWDOC's member agencies will be able to submit their annual assessment by the July 1 DWR deadline. Figure 3-1 provides a breakdown of the decision-making process.

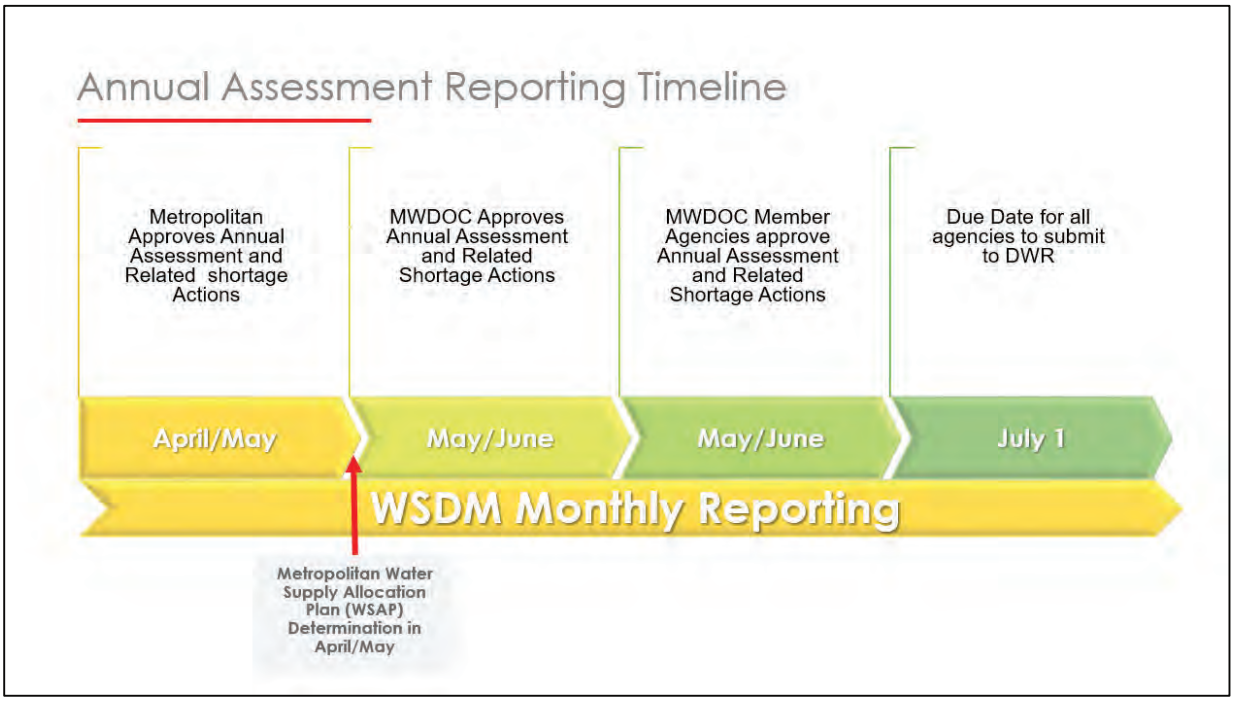


Figure 3-1: Sample Annual Assessment Reporting Timeline

3.2.2 Data and Methodologies

The following paragraphs document the key data inputs and methodologies that are used to evaluate MWDOC's water system reliability for the coming year, while considering that the year to follow would be considered dry.

3.2.2.1 Assessment Methodology

MWDOC will evaluate water supply reliability for the current year and one dry year for the purpose of the Annual Assessment. The Annual Assessment determination will be based on considerations of unconstrained water demand, local water supplies, MET imported water supplies, planned water use, and infrastructure considerations. The balance between projected in-service area supplies, coupled with MET imported supplies, and anticipated unconstrained demand will be used to determine what, if any, shortage stage is expected under the WSCP framework as presented in Figure 3-2. The WSCP's standard shortage stages are defined in terms of shortage percentages. Shortage percentages will be calculated by dividing the difference between water supplies and unconstrained demand by total unconstrained demand. This calculation will be performed separately for anticipated current year conditions and for assumed dry year conditions. More information on the basis of this calculation is available in MWDOC's 2020 UWMP Section 6 and 7.

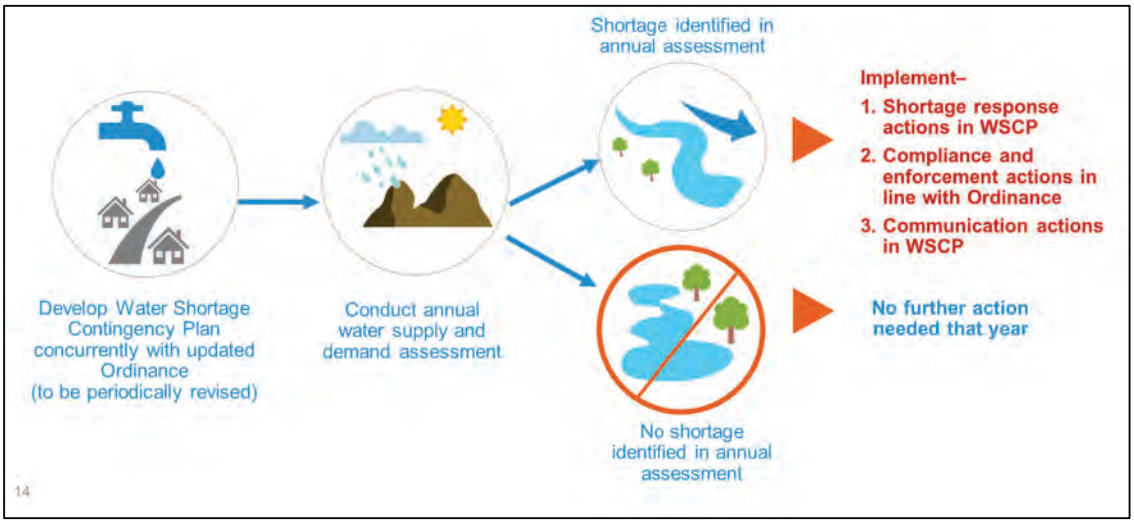


Figure 3-2: Water Shortage Contingency Annual Assessment Framework

3.2.2.2 Locally Applicable Evaluation Criteria

The information and analyses that comprise the Annual Assessment are based on ongoing planning processes that include the monthly WSDM supply-demand reporting. The Annual Assessment represents a mid-year evaluation at a given point in time; even after formal approval and submittal of the Annual Assessment determination by July 1, MWDOC will continue to monitor emerging supply and demand conditions and take appropriate actions consistent with the flexibility and adaptiveness inherent to the WSCP. Some conditions that affect MWDOC's wholesale supply and demand, such as groundwater replenishment, surface water and local supply production, can differ significantly from earlier projections throughout the year.

Within Orange County, there are no significant local applicable criteria that directly affect reliability. Through the years, the water agencies in Orange County have made tremendous efforts to integrate their systems to provide flexibility to interchange with different sources of supplies. There are emergency agreements in place to ensure all parts of the County have an adequate supply of water. In the northern part of the County, agencies have the ability to meet a majority of their demands through groundwater with very little limitation, except for the OCWD Basin Production Percentage (BPP) as provided to each agency. For the agencies in southern Orange County, most of their demands are met with imported water where their limitation is based on the capacity of their system, which is considered sufficient to meet anticipated demands.

However, if a major earthquake on the San Andreas Fault occurs, it has the potential to damage all three key regional water aqueducts and disrupt imported supplies for up to six months. The region would likely impose a water use reduction ranging from 10-25% until the system is repaired. However, MET has taken proactive steps to handle such disruption, such as constructing DVL, which mitigates potential impacts. DVL, along with other local reservoirs, can store a six to twelve-month supply of emergency water (MET, 2021b).

3.2.2.3 Water Supply

MWDOC is the regional wholesaler of imported water that provides treated and untreated water purchased from MET for Municipal and Industrial (M&I) (direct) and non-M&I (indirect) uses within its service area. Imported water represents 35% of total water supply in MWDOC's service area. As detailed in MWDOC's 2020 UWMP, water

supplies within MWDOC's service area are from local and imported sources. Local supplies developed by other entities and retail agencies include groundwater, recycled water, and surface water, accounting for 65% of the service area's water supplies. In North Orange County, imported water from MWDOC is supplemental, as agencies can pump a significant amount of their water demand from the OC Basin as set by the BPP; however, member agencies in South Orange County rely more heavily on imported water due to limited local resources.

3.2.2.4 Unconstrained Customer Demand

The WSCP and Annual Assessment define unconstrained demand as expected water use prior to any projected shortage response actions that may be taken under the WSCP. Unconstrained demand is distinguished from observed demand, which may be constrained by preceding, ongoing, or future actions, such as emergency supply allocations during a multi-year drought. WSCP shortage response actions to constrain demand are inherently extraordinary; routine activities such as ongoing conservation programs and regular operational adjustments are not considered as constraints on demands.

MWDOC's DRA reveals that its supply capabilities are expected to balance anticipated total water use and supply, assuming a five-year consecutive drought from 2021 through 2045. Water demands in a five-year consecutive drought are calculated as a six percent increase in potable water demand above a normal year for each year of the drought. MWDOC purchases a fixed amount of untreated imported water from MET for use in groundwater recharge for the OC Basin and surface storage in Irvine Lake, which accounts for its non-potable demand that does not experience a six percent increase in demand, as these volumes are not affected by changes in hydrological conditions. MWDOC purchases a fixed amount of untreated imported water from MET for use in groundwater recharge for the OC Basin and surface storage in Irvine Lake, which accounts for its non-potable demand that does not experience a six percent increase in demand, as these volumes are not directly affected by changes in hydrological conditions.

3.2.2.5 Planned Water Use for Current Year Considering Dry Subsequent Year

CWC Section 10632(a)(2)(B)(ii) requires the Annual Assessment to determine "current year available supply, considering hydrological and regulatory conditions in the current year and one dry year."

The Annual Assessment will include two separate estimates of MWDOC's annual water supply and unconstrained demand using: 1) current year conditions, and 2) assumed dry year conditions. Accordingly, the Annual Assessment's shortage analysis will present separate sets of findings for the current year and dry year scenarios. The CWC does not specify the characteristics of a dry year, allowing discretion to the Supplier. MWDOC will use its discretion to refine and update its assumptions for a dry year scenario in each Annual Assessment as information becomes available and in accordance with best management practices.

In MWDOC's 2020 UWMP, the "single dry year" is characterized to resemble conditions as a year in which conditions reflect the lowest water supply available to the Supplier. Supply and demand analyses for the single-dry year case was based on conditions affecting the SWP as this supply availability fluctuates the most among MET's, and therefore MWDOC's, sources of supply. Fiscal Year 2013-14 is considered the single driest year for SWP supplies with an allocation of 5% to M&I uses. Unique to this year, the 5% SWP allocation was later reduced to 0%, before ending up at its final allocation of 5%, highlight the stressed water supplies for the year. Furthermore, on January 17, 2014 Governor Brown declared the drought State of Emergency, citing 2014 as the driest year in California history. Additionally, within MWDOC's service area, precipitation for FY 2013-14 was the second lowest on record, with 4.37 inches of rain, significantly impacting water demands (MWDOC, 2021).

3.2.2.6 Infrastructure Considerations

With the sale of the Allen-McColloch Pipeline to MET in 1995, MWDOC no longer owns or operates a distribution system. However, as the regional wholesale agency, MWDOC closely coordinates with MET and its member agencies on any planned infrastructure work that may impact water supply availability. The Annual Assessment will include consideration of any infrastructure issues that may pertain to near-term water supply reliability, including repairs, construction, and environmental mitigation measures that may temporarily constrain capabilities, as well as any new projects that may add to system capacity. Throughout each year, MET regularly carries out preventive and corrective maintenance of its facilities within the MWDOC service area that may require shutdowns. MET plans and performs shutdowns to inspect and repair pipelines and facilities and support capital improvement projects. These shutdowns involve a high level of planning and coordination between MWDOC, MWDOC's Member Agencies, and MET. These shutdowns are scheduled to ensure that major portions of the distribution system are not out of service at the same time. Operational flexibility within MET's system and the cooperation of member agencies allow shutdowns to be successfully completed while continuing to meet all system demands.

3.3 Six Standard Water Shortage Levels

Per CWC Section 10632 (a)(3)(A), MWDOC must include the six standard water shortage levels that represent shortages from the normal reliability as determined in the Annual Assessment. The shortage levels have been standardized to provide a consistent regional and statewide approach to conveying the relative severity of water supply shortage conditions. This is an outgrowth of the severe statewide drought of 2012-2016, and the widely recognized public communication and state policy uncertainty associated with the many different local definitions of water shortage Levels.

The six standard water shortage levels correspond to progressively increasing estimated shortage conditions (up to 10%, 20%, 30%, 40%, 50%, and greater than 50% shortage compared to the normal reliability condition) and align with the response actions MWDOC would implement to meet the severity of the impending shortages (Table 3-1).

Table 3-1: Water Shortage Contingency Plan Levels

DWR Submittal Table 8-1 Water Shortage Contingency Plan Levels		
Shortage Level	**Percent Shortage Range**	**Shortage Response Actions**
0	0% (Normal)	A Level 0 Water Supply Shortage –Condition exists when MWDOC notifies its water users that no supply reductions are anticipated in this year. MWDOC proceeds with planned water efficiency best practices to support consumer demand reduction in line with state mandated requirements and local MWDOC goals for water supply reliability.

DWR Submittal Table 8-1 Water Shortage Contingency Plan Levels		
1	Up to 10%	A Level 1 Water Supply Shortage – Condition exists when no supply reductions are anticipated, a consumer imported demand reduction of up to 10% is recommended to make more efficient use of water and respond to existing water conditions. Upon the declaration of a Water Aware condition, MWDOC shall implement the mandatory Level 1 conservation measures identified in this WSCP. The type of event that may prompt MWDOC to declare a Level 1 Water Supply Shortage may include, among other factors, a finding that its wholesale water provider (MET) calls for extraordinary water conservation efforts.
2	Up to 20%	A Level 2 Water Supply Shortage – Condition exists when MWDOC notifies its member agencies that due to drought or other supply reductions, a consumer imported demand reduction of up to 20% is necessary to make more efficient use of water and respond to existing water conditions. Upon declaration of a Level 2 Water Supply Shortage condition, MWDOC shall implement the mandatory Level 2 conservation measures identified in this WSCP.
3	Up to 30%	A Level 3 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 30% consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350. A member agencies water supply shortage level is the governing shortage level for their respective service area.
4	Up to 40%	A Level 4 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 40% consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350. A member agencies water supply shortage level is the governing shortage level for their respective service area.

DWR Submittal Table 8-1 Water Shortage Contingency Plan Levels		
5	Up to 50%	A Level 5 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that up to 50% or more consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350. A member agencies water supply shortage level is the governing shortage level for their respective service area.
6	>50%	A Level 6 Water Supply Shortage – Condition exists when MWDOC declares a water shortage emergency condition pursuant to California Water Code section 350 and notifies its member agencies that greater than 50% or more consumer imported demand reduction is required to ensure sufficient supplies for human consumption, sanitation, and fire protection. MWDOC must declare a Water Supply Shortage Emergency in the manner and on the grounds provided in California Water Code section 350. A member agencies water supply shortage level is the governing shortage level for their respective service area.
NOTES: MWDOC's water shortage levels are aligned with MET's (MET, 2021a).		

3.4 Shortage Response Actions

CWC Section 10632 (a)(4) requires the WSCP to specify shortage response actions that align with the defined shortage levels. MWDOC has defined specific shortage response actions that align with the defined shortage levels in DWR Tables 8-2 and 8-3 (Appendix A). These shortage response actions were developed with consideration to the system infrastructure and operations changes, supply augmentation responses, customer-class or water use-specific demand reduction initiatives, and increasingly stringent water use prohibitions.

3.4.1 Demand Reduction

The demand reduction measures that would be implemented to address shortage levels are described in DWR Table 8-2 (Appendix A). This table indicates which actions align with specific defined shortage levels and estimates the extent to which that action will reduce the gap between supplies and demands. DWR Table 8-2 (Appendix A) demonstrates the chosen suite of shortage response actions anticipated to deliver the expected outcomes necessary to meet the requirements of a given shortage level (e.g., target of an additional 10% water savings). This table also identifies the enforcement action, if any, associated with each demand reduction measure.

MWDOC's demand reduction actions correspond to shortage Levels 0 through 6, with coordination with the Water Emergency Response Organization of Orange County (WEROC) anticipated to begin at Level 4 or greater.

At Level 0, MWDOC has ongoing long-term conservation savings measures including providing rebates for landscape irrigation efficiency, plumbing fixtures and devices, and turf replacement and providing programmatic support to retail agencies to reduce system water loss. For Shortage Levels 1 through 6, MWDOC will continuously expand public awareness campaigns to encourage consumers to reduce their water usage and implement voluntary demand reduction and its WSAP to further reduce the imported water shortage gap at each level, reaching up to greater than 50% of the shortage gap at Level 6.

3.4.2 Supply Augmentation

Supply Augmentation actions represent short-term management objectives triggered by the MET's WSDM Plan and do not overlap with the long-term new water supply development or supply reliability enhancement projects. Supply Augmentation is made available to MWDOC through MET. MWDOC relies on MET's reliability portfolio of water supply programs including existing water transfers, storage, and exchange agreements to supplement gaps in the supply/demand balance. MET has developed significant storage capacity (over 5 MAF) in reservoirs and groundwater banking programs both within and outside of the Southern California region. Additionally, MET can pursue additional water transfer and exchange programs with other water agencies to help mitigate supply/demand imbalances and provide additional dry-year supply sources.

MWDOC will work in close coordination with MET on their supply augmentation projects during normal conditions and shortage Levels 1 through 6 to ensure reliability of imported water for the service area. MWDOC's supply augmentation actions are described in DWR Table 8-3 (Appendix A).

3.4.3 Operational Changes

During shortage conditions, water operations in Orange County may be affected depending on the specific condition or situation. As noted in section 3.2.2.6, MWDOC does not own any infrastructure, nor does it direct the operations of infrastructure in Orange County. MWDOC will coordinate and facilitate operational changes that may result from shortage conditions or arise from an emergency situation.

3.4.4 Additional Mandatory Restrictions

CWC Section 10632(a)(4)(D) calls for "additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions" to be included among the WSCP's shortage response actions. These prohibitions are in addition to the proposed State Board regulation in California Code of Regulations, title 23, division 3, a new chapter 3.5 on Conservation and the Prevention of Waste and Unreasonable Use; and within chapter 3.5, a new article 2 pertaining to Wasteful and Unreasonable Uses. Mandatory prohibitions include:

- Hosing off sidewalks, driveways, and other hardscapes;
- Washing automobiles with hoses not equipped with a shut-off nozzle;
- Using non-recirculated water in a fountain of other decorative water feature;
- Watering lawns in a manner that causes runoff, or within 48 hours after measurable precipitation;
- Irrigating ornamental turf on public street medians.

MWDOC currently does not have any additional restrictions above the Statewide Mandatory prohibitions. However, State law gives substantial discretion to wholesale and retail water agencies to promulgate regulations and restrictions to conserve and allocate water in the event of a water shortage.

3.4.5 Emergency Response Plan (Hazard Mitigation Plan)

A catastrophic water shortage would be addressed according to the appropriate water shortage level and response actions. It is likely that a catastrophic shortage would immediately trigger a shortage level of up to Level 6 in the impacted area, and response actions have been put in place to mitigate a catastrophic shortage. In addition, there are several Plans that address catastrophic failures and align with the WSCP, including MET's WSDM and WSAP and MWDOC's Hazard Mitigation Plan (HMP) and Emergency Operations Plan (EOP).

3.4.5.1 MET's Water Surplus and Drought Management and Water Supply Allocation Plans

MET has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP. MET also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the southern California region, including seismic events along the San Andreas Fault. In addition, MET is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences outside of the southern California region, such as a maximum probable seismic event in the Sacramento-San Joaquin River Delta (Delta) that would cause levee failure and disruption of SWP deliveries.

3.4.5.2 Water Emergency Response Organization of Orange County Emergency Operations Plan

In 1983, the Orange County water community identified a need to develop a plan on how agencies would respond effectively to disasters impacting the regional water distribution system. The collective efforts of these agencies resulted in the formation of WEROC to coordinate emergency response on behalf of all Orange County water and wastewater agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC was established with the creation of an indemnification agreement between its member agencies to protect each other against civil liabilities and to facilitate the exchange of resources. WEROC is unique in its ability to provide a single point of contact for representation of all water and wastewater utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency response for the water community, including MWDOC.

As a member of WEROC, MWDOC will follow WEROC's EOP in the event of an emergency and coordinate with WEROC to assess damage, initiate repairs, and request and coordinate mutual aid resources for MWDOC's service area.

The EOP defines the actions to be taken by WEROC Emergency Operations Center (EOC) staff to reduce the loss of water and wastewater infrastructure; to respond effectively to a disaster; and to coordinate recovery operations in the aftermath of any emergency involving extensive damage to Orange County water and wastewater utilities. The EOP includes activation notification protocol that will be used to contact partner agencies to inform them of the situation, activation status of the EOC, known damage or impacts, or resource needs. The EOP is a standalone document that is reviewed annually and approved by the Board every three years.

MWDOC is responsible for managing the response effort within the service area in the event of an emergency. In order to avoid duplicating requests and efforts, MWDOC can use the California Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS). SEMS and

NIMS implement an organized system of information flow to ensure a timely and coordinated effort in response to any sort of disaster to meet specific emergency needs within its service area.

The WEROC EOC is responsible for assessing the overall condition and status of the Orange County regional water distribution and wastewater collection systems including MET facilities that serve Orange County. The EOC can be activated during an emergency situation that can result from both natural and man-made causes, and can be activated through automatic, manual, or standby for activation.

WEROC recognized four primary phases of emergency management, which include:

- **Preparedness:** Planning, training, and exercises that are conducted prior to an emergency to support and enhance response to an emergency or disaster.
- **Response:** Activities and programs designed to address the immediate and short-term effects of the onset of an emergency or disaster that helps to reduce effects to water infrastructure and speed recovery. This includes alert and notification, EOC activation, direction and control, and mutual aid.
- **Recovery:** This phase involved restoring systems to normal, in which short-term recovery actions are taken to assess the damage and return vital life-support systems to minimum operating standards, while long-term recovery actions have the potential to continue for many years.
- **Mitigation/Prevention:** These actions prevent the occurrence of an emergency or reduce the area's vulnerability in ways that minimize the adverse impacts of a disaster or emergency. MWDOC's HMP outlines threats and identifies mitigation projects.

The EOC Action Plans (EAP) provide frameworks for EOC staff to respond to different situations with the objectives and steps required to complete them, which will in turn serve the WEROC member agencies. In the event of an emergency which results in a catastrophic water shortage, MWDOC will declare a water shortage condition of up to Level 6 for the impacted area depending on the severity of the event, and coordination with WEROC is anticipated to begin at Level 4 or greater (WEROC, 2018).

3.4.6 Seismic Risk Assessment and Mitigation Plan

Per CWC Section 10632.5, Suppliers are required to assess seismic risk to water supplies as part of their WSCP. The plan also must include the mitigation plan for the seismic risk(s). Given the great distances that imported supplies travel to reach Orange County, the region is vulnerable to interruptions along hundreds of miles aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, the infrastructure in place to deliver supplies are susceptible to damage from earthquakes and other disasters.

In lieu of conducting a seismic risk assessment specific to its 2020 UWMP, MWDOC has included the previously prepared regional HMP for the Orange County region and its member agencies, as the regional imported water wholesaler, that is required under the federal Disaster Mitigation Act of 2000 (Public Law 106-390).

MWDOC's HMP identified that the overarching goals of the HMP were the same for all of its member agencies, which include:

- Goal 1: Minimize vulnerabilities of critical infrastructure to minimize damages and loss of life and injury to human life caused by hazards.
- Goal 2: Minimize security risks to water and wastewater infrastructure.
- Goal 3: Minimize interruption to water and wastewater utilities.
- Goal 4: Improve public outreach, awareness, education, and preparedness for hazards in order to increase community resilience.

- Goal 5: Eliminate or minimize wastewater spills and overflows.
- Goal 6: Protect water quality and supply, critical aquatic resources, and habitat to ensure a safe water supply.
- Goal 7: Strengthen Emergency Response Services to ensure preparedness, response, and recovery during any major or multi-hazard event.

MWDOC's HMP evaluates hazards applicable to all jurisdictions in its entire planning area, prioritized based on probability, location, maximum probable extent, and secondary impacts. Earthquake fault rupture and seismic hazards, including ground shaking and liquefaction, are among the highest ranked hazards to the region as a whole because of its long history of earthquakes, with some resulting in considerable damage. A significant earthquake along one of the major faults could cause substantial casualties, extensive damage to infrastructure, fires, damages and outages of water and wastewater facilities, and other threats to life and property.

Nearly all of Orange County is at risk of moderate to extreme ground shaking, with liquefaction possible throughout much of Orange County, but the most extensive liquefaction zones occur in coastal areas. Based on the amount of seismic activity that occurs within the region, there is no doubt that communities within Orange County will continue to experience future earthquake events, and it is a reasonable assumption that a major event will occur within a 30-year timeframe.

MWDOC's mitigation actions identify the hazard, proposed mitigation action, location/facility, local planning mechanism, risk, cost, timeframe, possible funding sources, status, and status rationale, as applicable. It is envisioned that the mitigation actions will mostly be implemented on a jurisdiction-by-jurisdiction basis; however, MWDOC will provide facilitation to spearhead coordination of initiatives on a regional level. This includes acting as a lead on water related hazard mitigation projects that are regional in nature, such as projects that cross several jurisdictional boundaries and work planned on behalf of MET, while Orange County Sanitation District (OC San) and South Orange County Water Authority (SOCWA) will take the lead on wastewater related hazard mitigation projects that are regional and within their service areas (MWDOC, 2019). In South Orange County, MNWD works with OCWD to transfer water to the area, and MWDOC has a goal to pursue additional local projects in South Orange County.

3.4.7 Shortage Response Action Effectiveness

For each specific Shortage Response Action identified in the plan, the WSCP also estimates the extent to which that action will reduce the gap between supplies and demands identified in DWR Table 8-2 (Appendix A). To the extent feasible, MWDOC has estimated percentage savings for the chosen suite of shortage response actions, which can be anticipated to deliver the expected outcomes necessary to meet the requirements of a given shortage level.

3.5 Communication Protocols

Timely and effective communication is a critical element of the WSCP implementation. Per CWC Section 10632 (a)(5), MWDOC has established communication protocols and procedures to inform the public, stakeholders, and local, regional, and state governments regarding any current or predicted water supply shortages as determined by the annual water supply and demand assessment described pursuant to

Section 10632.1; any water shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1; and any other relevant communications.

This section includes specific communications protocols to address each water shortage level and response action that can be derived from the results of the Annual Assessment This element would likely be triggered based upon the decision-making process in Section 3.2 and/or emergency communications protocols to address earthquakes, fires, infrastructure failures, civil unrest, and other catastrophic events.

Strategic communication is an ongoing activity where the purpose, audience, message, tools, and channels may change at any given moment. In the context of water shortage response, the purpose may be an emergency water shortage like what may result from the impacts of an earthquake or a longer-term, non-emergency shortage condition like drought. In an emergency, MWDOC will activate the communication protocoldetailed in the WEROC Emergency Operations Plan. In a non-emergency water shortage situation, MWDOC will implement the procedures identified in the Strategic Communications Program and Plan.

3.5.1 WEROC Emergency Operations Plan Communication

This Plan defines the actions to be taken by WEROC EOC staff to reduce the loss of water and wastewater infrastructure; to respond effectively to a disaster; and to coordinate recovery operations in the aftermath of any emergency involving extensive damage to Orange County water and wastewater utilities. The EOC Plan includes activation notification protocol that will be used to contact partner agencies to inform them of the situation, activation status of the EOC, known damage or impacts, or resource needs. The EOC Plan is a standalone document that is reviewed annually and approved by the Board every three years.

The WEROC EOC is responsible for assessing the overall condition and status of the Orange County regional water distribution and wastewater collection systems including MET facilities that serve Orange County.
The EOC can be activated during an emergency situation that can result from both natural and human-made causes, and can be activated through automatic, manual, or standby for activation. The WEROC EOC activation decision steps include the following (WEROC, 2018):

- **Categorize incident:** Using information gathered from one or more sources, the WEROC primary contact will categorize the incident as a natural disaster, human-made disaster, terrorist threat, or terrorist physical attack.
- **Initial determination of situation:** WEROC and MWDOC management will make an initial determination of the situation based on scope and severity of the incident, damage to affected agencies, and potential impacts.
- **WEROC activation level:** WEROC and MWDOC management will determine the appropriate level of WEROC activation.
- **Groups that will be notified:** When the EOC is activated, at a minimum, WEROC EOC staff, affected water utilities, MET's EOC at Eagle Rock, the Operational Area EOC, the Division of Drinking Water, health care agency, and California Department of Public Health should be notified.

3.5.2 Strategic Communications Program and Plan

MWDOC presently develops, coordinates, and delivers a substantial number of programs and services to elevate stakeholders' awareness about water policy, efficient water use, and the District's role in advocating for water

reliability investments that are in the best interest of Orange County. MWDOC's award-winning Strategic Communications Program and Plan serves as a blueprint for District communications, establishing a baseline understanding for how MWDOC's programs and activities provide information to the public, various stakeholders, partners, and employees during normal and non-emergency water shortage conditions (MWDOC 2020).

The MWDOC Public Affairs Department (Department) elevates public awareness, garners support, and works to establish confidence in the District's initiatives by providing transparent, accurate, and reliable information to the public, stakeholders, partners, and 28 member agencies. Serving all 3.2 million Orange County residents and businesses in some fashion, MWDOC utilizes various communications tools and channels to reach and unify a vast and diverse group of audiences.

The Department stays up-to-date on water supply conditions and shortage actions through active participation in local, regional, and statewide meetings. Additionally, the Department continuously evaluates its programs and communications tools and channels to reach the District's identified goals and objectives, actively support its member agencies, and effectively inform the Orange County community. Upon declaration of a non-emergency, water shortage condition, the Department has the appropriate tools and systems to implement the communication protocols defined in the MWDOC Strategic Communications Program and Plan (MWDOC 2020).

3.5.2.1 Goals & Objectives

The MWDOC Strategic Communications Program and Plan aligns the District's identified goals and objectives with the respective audiences and outlines the appropriate communications tools and channels used to connect them. Specifically, water shortage communication will follow the protocols designed for Goal #2, Objective 2.2 as defined by the Board of Directors, executive management, and the District's Mission Statement (MWDOC 2020):

- **Goal #2:** Examine, develop, and implement sound policies and programs that support Orange County water investments, and provide recognized value to the region.
- **Objective 2.2:** Be the trusted, leading voice for the region on water reliability, water policy, efficient water use, water education, and emergency preparedness and response.

3.5.2.2 Target Audiences

The MWDOC Strategic Communications Program and Plan provides a detailed framework of the District's target audience groups to provide clear and concise messaging based on the audience's needs, wants, and interests. Understanding MWDOC's identified audience groups will make it possible to logically align messaging with the appropriate communications tools and channels and reach the District's identified goals and objectives during a non-emergency water shortage (MWDOC 2020).

3.5.2.3 Communications Tools and Channels

As a guiding reference, the MWDOC Strategic Communications Program and Plan defines communications tools, activities, and channels and identifies how MWDOC currently utilizes each of these resources to reach the goals and objectives of the District (MWDOC 2020). During a normal and non-emergency water shortage condition, MWDOC will use these readily available communication tools and resources to successfully reach the District's target audience groups with intended messages.

3.5.2.4 Implementation, Assignments, and Schedules

A carefully developed and executed communications plan can establish trust and credibility for the public, stakeholders, partners, member agencies, and employees. A clearly outlined plan must be in place to effectively communicate water supply conditions and water shortage actions. Once described, all strategic targets should include an implementation plan which identifies tactics and logistics, and eventually, active monitoring, evaluation, and amending. This step is essential as the District's communications tools, resources, and messaging must adapt and evolve, sometimes rapidly, in the ever-changing landscape of water policy and regulation.

Assignments are essential to maintaining productivity and accountability as well as collectively accomplishing the goals of a project. The Department has developed a Programs and Responsibility flowchart which breaks down the Department's primary roles and assignments by team member (MWDOC 2020). Additionally, the Department has developed a series of logistical checklists to efficiently plan, implement, and control the flow of information during a water shortage. It will continue to do so as the situation evolves. Furthermore, the Department uses robust program management software tools such as Asana and CoSchedule to stay in touch with impending deadlines and to keep everything, including assignments and checklists, organized and in one place.

3.5.2.5 Monitor, Evaluate, and Amend

The effectiveness of the MWDOC Strategic Communications Program and Plan depends on a large variety of factors, including technological advancements or changes, the rise and fall of audience engagement, current news or media concentration, political changes in leadership and focus, and even the weather. The Department currently utilizes a robust set of Key Performance Indicators (KPI), metrics, and measurements to track the effectiveness of MWDOC's programs, activities, and communication efforts (MWDOC 2020). Through this process, the District's programs and activities are continuously shaped and refined to remain relevant and valuable to the public, stakeholders, partners, employees, and its 28 member agencies.

3.5.2.6 Water Shortage Communication

The type and degree of communication varies with each shortage level; thus, predefined and actionable communication protocols improve MWDOC's ability to message necessary events. These communication protocols and procedures are summarized in Table 3-2.

Table 3-2: Communication Procedures

Communications Procedures Matrix				
Level 0 Permanent Water Waste Prohibitions	**Level 1 Up to 10% Voluntary Conservation**	**Level 2 Up to 20% Mandatory Conservation**	**Levels 3-4 Up to 30% or 40% Mandatory Conservation**	**Levels 5-6 Up to 50% or >50% Mandatory Conservation**
Standard outreach efforts in effect (media relations, social media, websites, etc.)	Update message platform to reflect conditions and needed actions from the public	Update campaigns and messages to generate immediate actions and behaviors by the public	Update campaigns and messages to raise awareness for more severe water-saving actions and behaviors by the public	Update campaigns and messages to reflect extreme or emergency conditions, and likely need to focus water use on health and safety needs
Promote ongoing WUE programs, tools, partnerships designed to achieve long-term water management goals	Announce status change to the public, key stakeholders, partners, and employees (News release, social media, etc.)	Announce status change to the public, key stakeholders, partners, and employees (News release, social media, etc.)	Announce status change to the public, key stakeholders, partners, and employees (News release, social media, etc.)	Announce status change to the public, key stakeholders, partners, and employees (News release, social media, etc.)
Standard coordination with member agencies	Include increased conservation messages on MWDOC.com and in standard outreach efforts; provide regular condition updates to stakeholders and the media	Supplement Level 1 activities with additional tactics (mass media ads, partnerships, events,, etc.) as needed; provide regular condition updates to Stakeholders and the media	Supplement Level 2 outreach with additional tactics (supplemental ads, etc.) as needed; provide regular updates to stakeholders and the media on conditions	Supplement Level 3-4 outreach with additional tactics as needed; provide regular condition updates to stakeholders and the media on conditions
As-needed Board reports on public communication and WUE outreach activities	Enhance promotion of ongoing WUE programs and tools; deploy targeted advertising	Conduct issue briefings with elected officials, and other key civic and business leaders	Conduct specialized outreach to reduce discretionary outdoor use while minimizing landscape damage	Suspend promotion of long-term WUE programs and tools to focus on imminent needs

Communications Procedures Matrix				
	Increase coordination with member agencies	Continue promotion of ongoing WUE programs and tools	Promote available water assistance resources for vulnerable populations; specialized outreach to impacted industries	Continue enhanced coordination with member agencies as needed (daily or weekly briefings, email updates, etc.)
		Enhance coordination with member agencies as needed	Continue enhanced coordination with member agencies as needed	Analyze water use and other data to determine any appropriate supplemental actions
	Analyze water use and other data to determine any appropriate supplemental actions	Analyze water use and other data to determine any appropriate supplemental actions	Analyze water use and other data to determine any appropriate supplemental actions	

3.6 Compliance and Enforcement

Per the CWC Section 10632 (a)(6), wholesale water providers are not subject to these requirements.

3.7 Legal Authorities

As a regional wholesaler, MWDOC does not have the legal authority to implement and enforce its shortage response in its service area; however, to comply with CWC Section 10632 (a)(6), MWDOC uses pricing to discourage their member agencies from purchasing greater amounts of water during a shortage.

Per CWC Section 10632 (a)(7) (B), MWDOC shall declare a water shortage emergency condition to prevail within the area served by such wholesaler whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

Per CWC Section 10632 (a)(7)(C), MWDOC shall coordinate with any agency or county within which it provides water supply services for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558). Table 3-3 identifies the contacts for all cities or counties for which the Supplier provides service in the WSCP, along with developed coordination protocols, can facilitate compliance with this section of the CWC in the event of a local emergency as defined in subpart (c) of Government Code Section 8558.

Table 3-3: Agency Contacts and Coordination Protocols

Contact	Agency	Coordination Protocols
Assistant General Manager, Water Services	Anaheim Public Utilities	Notification, Coordination, and provide supportive actions
Public Works Director	City of Brea	Notification, Coordination, and provide supportive actions
Director of Public Works/City Engineer	City of Buena Park	Notification, Coordination, and provide supportive actions
Director of Public Works/City Engineer	City of Fountain Valley	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Fullerton	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Garden Grove	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Huntington Beach	Notification, Coordination, and provide supportive actions
Director of Public Works	City of La Habra	Notification, Coordination, and provide supportive actions
Public Works & Community Services Director	City of La Palma	Notification, Coordination, and provide supportive actions
Utilities Director	City of Newport Beach	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Orange	Notification, Coordination, and provide supportive actions
Public Works Director	City of San Clemente	Notification, Coordination, and provide supportive actions
Director of Public Works	City of San Juan Capistrano	Notification, Coordination, and provide supportive actions

Contact	Agency	Coordination Protocols
Acting Public Works Director	City of Santa Ana	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Seal Beach	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Tustin	Notification, Coordination, and provide supportive actions
Director of Public Works	City of Westminster	Notification, Coordination, and provide supportive actions
General Manager	East Orange County Water District	Notification, Coordination, and provide supportive actions
General Manager	El Toro Water District	Notification, Coordination, and provide supportive actions
General Manager	Emerald Bay Service District	Notification, Coordination, and provide supportive actions
General Manager, Orange County	Golden State Water Company	Notification, Coordination, and provide supportive actions
General Manager	Irvine Ranch Water District	Notification, Coordination, and provide supportive actions
General Manager	Laguna Beach County Water District	Notification, Coordination, and provide supportive actions
General Manager	Mesa Water	Notification, Coordination, and provide supportive actions
General Manager	Moulton Niguel Water District	Notification, Coordination, and provide supportive actions
General Manager	Orange County Water District	Notification, Coordination, and provide supportive actions

Contact	Agency	Coordination Protocols
General Manager	Santa Margarita Water District	Notification, Coordination, and provide supportive actions
General Manager	Serrano Water District	Notification, Coordination, and provide supportive actions
General Manager	South Coast Water District	Notification, Coordination, and provide supportive actions
General Manager	Trabuco Canyon Water District	Notification, Coordination, and provide supportive actions
General Manager	Yorba Linda Water District	Notification, Coordination, and provide supportive actions
Public Works Director	Orange County	Notification
Public Works Director	City of Aliso Viejo	Notification
Director of Public Services	City of Costa Mesa	Notification
Public Works Director	City of Cypress	Notification
Public Works Director	City of Dana Point	Notification
Public Works Director	City of Irvine	Notification
Public Works Director	City of Laguna Beach	Notification
Public Works Director	City of Laguna Hills	Notification

Contact	Agency	Coordination Protocols
Public Works Director	City of Laguna Niguel	Notification
City Engineer	City of Laguna Woods	Notification
Public Works Director	City of Lake Forest	Notification
City Engineer	City of Los Alamitos	Notification
Public Works Director	City of Mission Viejo	Notification
Public Works Director	City of Placentia	Notification
Public Works Director	City of Rancho Santa Margarita	Notification
Public Works Director	City of Stanton	Notification
Public Works Director	City of Villa Park	Notification
Public Works Director	City of Yorba Linda	Notification

3.8 Financial Consequences of WSCP

Per CWC Section 10632(a)(8), Suppliers must include a description of the overall anticipated financial consequences to the Supplier of implementing the WSCP. This description must include potential reductions in revenue and increased expenses associated with implementation of the shortage response actions. This should be coupled with an identification of the anticipated mitigation actions needed to address these financial impacts.

MWDOC's rates and fees fall into three general categories: (1) the pass through of costs from MET for imported water rates and charges; (2) specific charges for MWDOC services contracted by our Member Agencies (Choice Budget); and (3) charges for MWDOC services that apply to all our member agencies (Core Budget). Below is a more detail description on each category:

1. The pass-through rates and charges from MET are billed on a monthly basis to our member agencies with the majority of the cost allocation based on their volumetric purchases. MWDOC does not collect any revenue from these charges.
2. The Choice Budget fees are primarily associated with the water education school program and the water use efficiency program, including conservation rebates. MWDOC member agencies elect to subscribe to specific programs and can opt-out of program participation. These fees are assessed to recover the entire cost of these "Choice" programs. Any additional revenue collected is either reimbursed to the participating agencies at the end of the year or credited the following year. No additional revenue is collected for MWDOC.
3. MWDOC's Core Budget includes all other programs and functions provided to our member agencies. Among them are: Water Reliability Planning, MET Activities, Government Affairs, Public Affairs, Water Use Efficiency, Emergency Response, Board Functions, Finance, Information Technology, and Administration.

MWDOC's Core Budget is funded through a fixed charge assessed on each agency's retail meter and a fixed groundwater service charge, which are both collected at the beginning of each fiscal year. Because MWDOC's rate structure is completely fixed and does not fluctuate with volumetric sales, the implementation of the WSCP will not impact MWDOC's revenues. There may be an increase in MWDOC's expenditures as it relates to additional public and media outreach. However, as experienced in the last drought of 2014-2015, MWDOC coordinated such outreach efforts with its member agencies and most costs were shared among the participating agencies. Therefore, any additional expenditures are not anticipated to be significant and can be recovered by MWDOC reserves.

MWDOC's choice budget would also not be adversely impacted by implementation of the WSCP. Although we anticipate during a shortage there will be an increase in funding to support the implementation of member agency WSCPs, as described above, MWDOC's Choice Budget are selected by our member agencies to participate and pay their share according to the service received.

Lastly, the pass-through rates and charges from MET do not have a financial impact on MWDOC and will not be adversely impacted by the implementation of the WSCPs.

3.9 Monitoring and Reporting

Per CWC Section 10632(a)(9), water provider wholesalers are not subject to this requirement.

3.10 WSCP Refinement Procedures

Per CWC Section 10632 (a)(10), MWDOC must provide reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

MWDOC's WSCP is prepared and implemented as an adaptive management plan. In addition, if certain procedural refinements or new actions are identified by MWDOC staff, or suggested by customers or other interested parties, MWDOC will evaluate their effectiveness, incorporate them into the WSCP, and implement them quickly at the appropriate water shortage level.

It is envisioned that the WSCP will be periodically re-evaluated to ensure that its shortage risk tolerance is adequate, and the shortage response actions are effective and up to date based on lessons learned from implementing the WSCP. The WSCP will be revised and updated during the UWMP update cycle to incorporate updated and new information. For example, new supply augmentation actions will be added, and actions that are no longer applicable for reasons such as program expiration will be removed. However, if revisions to the WSCP are warranted before the UWMP is updated, the WSCP will be updated outside of the UWMP update cycle. In the course of preparing the Annual Assessment each year, MWDOC staff will routinely consider the functionality the overall WSCP and will prepare recommendations for MWDOC Board of Directors if changes are found to be needed.

3.11 Special Water Feature Distinction

As a wholesaler, CWC Section 10632 (b) is not applicable to MWDOC.

3.12 Plan Adoption, Submittal, and Availability

Per CWC Section 10632 (a)(c), MWDOC provided notice of the availability of the draft 2020 UWMP and draft 2020 WSCP and notice of the public hearing to consider adoption of the WSCP. The public review drafts of the 2020 UWMP and the 2020 WSCP were posted prominently on MWDOC's website, in advance of the public hearing on May 19, 2021. Copies of the draft WSCP were also made available for public inspection at MWDOC Clerk's and Utilities Department offices and public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix C.

MWDOC held the public hearing for the draft 2020 UWMP and draft WSCP on May 19, 2021 at the Board meeting. MWDOC Board reviewed and approved the 2020 UWMP and the WSCP at its May 19, 2021 meeting. See Appendix E for the resolution approving the WSCP.

By July 1, 2021, MWDOC's adopted 2020 UWMP and WSCP was filed with DWR, California State Library, and the County of Orange. MWDOC will make the WSCP available for public review on its website no later than 30 days after filing with DWR.

Based on DWR's review of the WSCP, MWDOC will make any amendments in its adopted WSCP, as required and directed by DWR.

If MWDOC revises its WSCP after UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

4 REFERENCES

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Municipal Water District of Orange County (MWDOC). (2020). S*trategic Communications Program and Plan.*

Appendix A

DWR Submittal Tables

Submittal Table 8-1: Water Shortage Contingency Plan Levels

Submittal Table 8-2: Demand Reduction Actions

Submittal Table 8-3: Supply Augmentation Actions

Appendix B

MWDOC Water Supply Allocation Plan

Appendix C

Notice of Public Hearing (Pending)

Appendix D

Adopted WSCP Resolution (Pending)

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Irvine
California 92602
Phone: 714 730 9052
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Maddaus Water Management, Inc.
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APPENDIX C

MWDOC's Reduced Delta Reliance Reporting

MWDOC's
REDUCED DELTA RELIANCE REPORTING

C.1 Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action in the Delta, prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council. Anyone may appeal a certification of consistency, and if the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency, and either no appeal is filed, or the Delta Stewardship Council denies the subsequent appeal.

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

> *(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);*
>
> *(2) That failure has significantly caused the need for the export, transfer, or use; and*
>
> *(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.*

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

> *(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;*
>
> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and*
>
> *(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self- reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).*

The analysis and documentation provided below include all of the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

C.2 Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1 (c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self- reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for MWDOC's regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 – Final Draft (Guidebook Appendix C) issued in March 2021. The data used in this analysis represent the total regional efforts of Metropolitan, MWDOC, and its member agencies and were developed in conjunction with Metropolitan as part of the UWMP coordination process.

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for MWDOC's Delta reliance and regional self-reliance. The results show that as a region, MWDOC, Metropolitan, and its member agencies are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance for MWDOC

- Near-term (2025) – Normal water year regional self-reliance is expected to increase by 243 TAF from the 2010 baseline; this represents an increase of about 37 percent of 2025 normal water year retail demands (Table C-2).
- Long-term (2040) – Normal water year regional self-reliance is expected to increase by nearly 265 TAF from the 2010 baseline, this represents an increase of about 38 percent of 2045 normal water year retail demands (Table C-2).

C.3 Demonstration of Reduced Reliance on the Delta

The methodology used to determine MWDOC's reduced Delta reliance and improved regional self-reliance is consistent with the approach detailed in DWR's UWMP Guidebook Appendix C, including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources. Some of the key assumptions underlying MWDOC's demonstration of reduced reliance include:

- All data were obtained from the current 2020 UWMP or previously adopted UWMPs and represent average or normal water year conditions.
- All analyses were conducted at the service area level, and all data reflect the total contributions of MWDOC and its member agencies in conjunction with information provided by Metropolitan.
- No projects or programs that are described in the UWMPs as "Projects Under Development" were included in the accounting of supplies.

Baseline and Expected Outcomes

In order to calculate the expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from MWDOC's 2005 UWMP as the UWMPs generally do not provide normal water year data for the year that they are adopted (i.e., 2005 UWMP forecasts begin in 2010, 2010 UWMP forecasts begin in 2015, and so on).

Consistent with the 2010 baseline data approach, the expected outcomes for reduced Delta reliance and improved regional self-reliance for 2015 and 2020 were taken from MWDOC's 2010 and 2015 UWMPs respectively. Expected outcomes for 2025-2040 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

Service Area Demands without Water Use Efficiency

In alignment with the Guidebook Appendix C, this analysis uses normal water year demands, rather than normal

water year supplies to calculate expected outcomes in terms of the percentage of water used. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as MWDOC needs to explicitly calculate and report water use efficiency savings separate from service area demands to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. Table C-1 shows the results of this adjustment for MWDOC. Supporting narratives and documentation for the all of the data shown in Table C-1 are provided below.

Table C -1

Service Area Water Use Efficiency Demands	2010	2015	2020	2025	2030	2035	2040
Service Area Water Demands with Water Use Efficiency	616,714	552,487	482,879	486,747	495,958	502,014	501,487
Non-Potable Water Demands	124,590	122,568	121,721	107,634	109,508	51,600	51,600
Potable Service Area Demands with Water Use Efficiency	492,124	429,919	361,158	379,113	386,450	450,414	449,887

Total Service Area Population	2010	2015	2020	2025	2030	2035	2040
Service Area Population	2,197,120	2,295,946	2,342,740	2,411,727	2,473,392	2,518,117	2,532,393

Water Use Efficiency Since Baseline	2010	2015	2020	2025	2030	2035	2040
Per Capita Water Use (GPCD)	200	167	138	140	139	160	159
Change in Per Capita Water Use from Baseline (GPCD)		(33)	(62)	(60)	(60)	(40)	(41)
Estimated Water Use Efficiency Since Baseline		84,341	163,583	161,080	167,555	113,609	117,333

Total Service Area Water Demands	2010	2015	2020	2025	2030	2035	2040
Service Area Water Demands with Water Use Efficiency	616,714	552,487	482,879	486,747	495,958	502,014	501,487
Estimated Water Use Efficiency Since Baseline	-	84,341	163,583	161,080	167,555	113,609	117,333
Service Area Water Demands without Water Use Efficiency	616,714	636,828	646,462	647,827	663,513	615,623	618,820

Service Area Demands with Water Use Efficiency

The service area demands shown in Table C-1 represent the total retail water demands for MWDOC's service area and include municipal and industrial demands, agricultural demands, recycled, seawater barrier demands, and storage replenishment demands. These demand types and the modeling methodologies used to calculate them are described in Section 4.3 of MWDOC's 2020 UWMP.

Non-Potable Water Demands

The non-potable water demands shown in Table C-1 represent demands for non-potable recycled water, water used for surface reservoir storage, and replenishment water for groundwater basin recharge and sweater barrier demands. In accordance with section C.3.6 of the UWMP Guidebook, MWDOC characterizes demands for groundwater basin recharge and seawater barrier demands as indirect uses of water. In order to avoid double counting of water use these supplies are generally excluded from demand projections, since they are already captures as part of MWDOC's retail water demand. Additionally, non-potable supplies have a demand hardening effect due to the inability to shift non-potable supplies to meet potable water demands. When water use efficiency or conservation measures are implemented, they fall solely on the potable water users. This is consistent with the approach for water conservation reporting used by the State Water Resources Control Board.

Total Service Area Population

MWDOC's total service area population as shown in Table C-1 come from the Center for Demographic Research, with actuals and projections further described in Section 3.4 of the 2020 MWDOC UWMP.

Water Use Efficiency Since Baseline

The water use efficiency numbers shown in Table C-1 represent the formulation that MWDOC utilized, consistent with Appendix C of the UWMP Guidebook approach.

Service area demands, excluding non-potable demands, are divided by the service area population to get per capita water use in the service area in gallons per capita per day (GPCD) for each five-year period. The change in per capita water use from the baseline is the comparative GPCD from that five-year period compared to the 2010 baseline. Changes in per capita water use over time are then applied back to the MWDOC service area population to calculate the estimated WUE Supply. This estimated WUE Supply is considered an additional supply that may be used to show reduced reliance on Delta water supplies.

The demand and water use efficiency data shown in Table C-1 were collected from the following sources:

- Baseline (2010) values – MWDOC's 2005 UWMP, Table 2-2-1-A and Table 2-2-1-A
- 2015 values – MWDOC's 2010 UWMP, Table 2-10
- 2020 values – MWDOC's 2015 UWMP, Table 2-3
- 2025-2040 values – MWDOC's 2020 UWMP, Table 4-1

It should be noted that the results of this calculation differ from what MWDOC calculated under MWDOC's 2020 UWMP Section 5.2 pertaining to the Water Conservation Act of 2009 (SB X7-7) due to differing formulas.

C.4 Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table C-2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in Table C-2 represent efforts to improve regional self-reliance for MWDOC's entire service area and include the total contributions of MWDOC and its member agencies. Supporting narratives and documentation for the all of the data shown in Table C-2 are provided below.

The results shown in Table C-2 demonstrate that MWDOC's service area is measurably improving its regional self-reliance. In the near-term (2025), the expected outcome for normal water year regional self-reliance increases by 126 TAF from the 2010 baseline; this represents an increase of about 19.3 percent of 2025 normal water year retail

demands. In the long-term (2040), normal water year regional self-reliance is expected to increase by more than 265 TAF from the 2010 baseline; this represents an increase of about 38 percent of 2040 normal water year retail demands.

Table C-2 – Supplies Contributing to Regional Self Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	2010	2015	2020	2025	2030	2035	2040
Water Use Efficiency	-	84,341	163,583	161,080	167,555	174,551	178,410
Water Recycling	34,393	41,690	42,330	52,017	53,891	59,926	57,043
Stormwater Capture and Use	-	-	-	-	-	-	-
Advanced Water Technologies	66,083	100,347	94,235	130,000	130,000	130,000	130,000
Conjunctive Use Projects	-	-	-	-	-	-	-
Local and Regional Water Supply and Storage Projects	-	-	-	-	-	-	-
Other Programs and Projects the Contribute to Regional Self-Reliance	-	-	-	-	-	-	-
Water Supplies Contributing to Regional Self-Reliance	100,476	226,377	300,148	343,097	351,446	364,477	365,453

Service Area Water Demands without Water Use Efficiency	2010	2015	2020	2025	2030	2035	2040
Service Area Water Demands without Water Use Efficiency	616,714	636,828	646,462	647,827	663,513	676,566	679,880

Change in Regional Self Reliance (Acre-Feet)	2010	2015	2020	2025	2030	2035	2040
Water Supplies Contributing to Regional Self-Reliance	100,476	226,377	300,148	343,097	351,446	364,477	365,453
Change in Water Supplies Contributing to Regional Self-Reliance		125,901	199,672	242,621	250,970	264,001	264,977

Change in Regional Self Reliance (As a Percent of Water Demand w/out WUE)	2010	2015	2020	2025	2030	2035	2040
Water Supplies Contributing to Regional Self-Reliance	16.3%	35.5%	46.4%	53.0%	53.0%	53.9%	53.8%
Change in Water Supplies Contributing to Regional Self-Reliance		19.3%	30.1%	36.7%	36.7%	37.6%	37.5%

Water Use Efficiency

The water use efficiency information shown in Table C-2 is taken directly from Table C-1 above.

Water Recycling

The water recycling values shown in Table C-2 reflect the total recycled water production in MWDOC's service area as described in Section 6.6 of MWDOC's UWMP.

Advanced Water Technologies

The advanced water technologies data shown in Table C-2 include total indirect potable reuse for the Orange County Groundwater Replenishment System (GWRS) production in MWDOC's service area as described in more detail in Section 6.6 of MWDOC's UWMP.

C.5 Reliance on Water Supplies from the Delta Watershed

Metropolitan's service area as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies and demand management measures. Quantifying MWDOC's and its member agencies investments in self-reliance, locally, regionally, and throughout Southern California is infeasible for the reasons as noted in Section C.6. Due to the regional nature of these investments, MWDOC is relying on Metropolitan's regional accounting of measurable reductions in supplies from the Delta Watershed.

The results shown in Table A.11-3 demonstrate that Metropolitan's service area, including MWDOC, is measurably reducing its Delta reliance. In the near-term (2025), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 301 TAF from the 2010 baseline; this represents a decrease of 3 percent of 2025 normal water year retail demands. In the long- term (2045), normal water year reliance on supplies from the Delta watershed decreased by 314 TAF from the 2010 baseline; this represents a decrease of just over 5 percent of 2045 normal water year retail demands.

Table C-2
Metropolitan Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	1,130,000	1,128,000	1,126,000	1,126,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	52,000	52,000	52,000	52,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,182,000**	**1,180,000**	**1,178,000**	**1,178,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	5,032,000	5,156,000	5,261,000	5,374,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,182,000	1,180,000	1,178,000	1,178,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(310,000)**	**(312,000)**	**(314,000)**	**(314,000)**
Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	**Baseline (2010)**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	23.5%	22.9%	22.4%	21.9%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-3.7%**	**-4.3%**	**-4.8%**	**-5.2%**

C.6 Metropolitan Member and Sub-Member Agency Infeasibility of Accounting Supplies from the Delta Watershed

Metropolitan's member agencies and retail subagencies individually contribute to reduced reliance on the Delta in two ways. First, through the development of local projects and demand management measures in their own service areas, and second through their investments in regional projects and programs through Metropolitan. Regional investments are funded through revenues from water purchases from Metropolitan or one or more of its member agencies. Metropolitan uses a portion of revenues from those purchases to fund projects and programs that contribute to the region's reduced reliance on Delta water supplies. Because some or all of these regional investments may not be constructed or implemented directly in a particular water supplier's service area, a water supplier's demands on Metropolitan or one or more of its member agencies will not accurately reflect that water supplier's total contributions to reduced reliance on supplies from the Delta watershed. It infeasible for a water supplier that makes investments in regional projects and programs to quantify its individual contributions to reduced reliance and reflect them properly in its demands on Metropolitan or one or more of Metropolitan's member agencies.

The following discussions outline how regional funding is provided through Metropolitan's local resources and conservation incentive programs and how funding for those programs is collected through Metropolitan's water rates. The history and participation of Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members in local resource and demand management in the region has spanned more than four decades, and thus makes accounting of these contributions at the individual agency level infeasible for those agencies to calculate.

Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region's water needs. Because of Metropolitan's regional distribution system these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan. For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District, is the world's largest water purification system for indirect potable reuse and was funded, in part, by Metropolitan's local resource program and its Member Agencies. Annually, GWRS produces approximately 103,000 acre-feet of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in the Metropolitan Service area, increasing regional and local supply reliability and reducing the region's reliance on imported supplies, including supplies from the State Water Project.

Metropolitan's local resource programs have evolved through the years to better assist Metropolitan's member agencies in increasing local supply production. The following is a description and history of the local supply incentive programs.

Local Projects Program

In 1982, Metropolitan initiated the Local Projects Program (LPP), which provided funding to member agencies to facilitate the development of recycled water projects. Under this approach, Metropolitan contributed a negotiated up-front funding amount to help finance project capital costs. Participating member agencies were obligated to reimburse Metropolitan over time. In 1986, the LPP was revised. Changing the up-front funding approach to an incentive-based approach. Metropolitan contributed an amount equal to the avoided State Water Project pumping costs for each acre-foot of recycled water delivered to end-use consumers. This funding incentive was based on the assumption that local projects resulted in the reduction of water imported from the Delta and the associated pumping cost. The incentive amount varied from year to year depending on the actual variable power cost paid for State Water Project imports. In 1990, Metropolitan's Board increased the LPP contribution to a fixed rate of $154 per acre-foot, which was calculated based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area demands.

Groundwater Recovery Program

The drought of the early 1990s sparked the need to develop additional local water resources, aside from recycled water, to meet regional demand and increase regional water supply reliability. In 1991, Metropolitan conducted the Brackish Groundwater Reclamation Study which determined that large amounts of degraded groundwater in the region were not being utilized. Subsequently, the Groundwater Recovery Program (GRP) was established to assist the recovery of otherwise unusable groundwater degraded by minerals and other contaminants, provide access to the storage assets of the degraded groundwater, and maintain the quality of groundwater resources by reducing the spread of degraded plumes.

Local Resources Program

In 1995, Metropolitan's Board adopted the Local Resources Program (LRP), which combined the LPP and GRP into one program. The Board allowed for existing LPP agreements with a fixed incentive rate to convert to the sliding scale up to $250 per acre-foot, similar to GRP incentive terms. Those agreements that were converted to LRP are known as "LRP Conversions."

Competitive Local Projects Program

In 1998, the Competitive Local Resources Program was established. The competitive program encouraged development of recycled water and recovered groundwater through a process that emphasized cost-efficiency to Metropolitan, timing new production according to regional need while minimizing program administration cost. Under the competitive program, agencies requested an incentive rate up to $250 per acre-foot of production over 25 years under a Request for Proposals (RFP) for the development of up to 53,000 acre-feet per year of new water recycling and groundwater recovery projects. In 2003, a second RFP was issued for the development of an additional 65,000 acre-feet of new recycled water and recovered groundwater projects through the LRP.

Seawater Desalination Program

Metropolitan established the Seawater Desalination Program (SDP) in 2001 to provide financial incentives to member agencies for the development of seawater desalination projects. In 2014, seawater desalination projects became eligible for funding under the LRP and the SDP was ended.

2007 Local Resources Program

In 2006, a task force comprising member agency representatives was formed to identify and recommend program improvements to the LRP. As a result of the task force process the 2007 LRP was established with a goal of 174,000 acre-feet per year of additional local water resource development. The new program allowed for an open application process and eliminated the previous competitive process. This program offered sliding scale incentives of up to $250 per acre-foot, calculated annually based on a member agency's actual local resource project costs exceeding Metropolitan's prevailing water rate.

2014 Local Resources Program

A series of workgroup meetings with member agencies was held to identify the reasons why there was a lack of new LRP applications coming into the program. The main constraint identified by the member agencies was that the $250 per acre-foot was not providing enough of an incentive for developing new projects due to higher construction costs to meet water quality requirements and to develop the infrastructure to reach end-use consumers located further from treatment plants. As a result, in 2014, the Board authorized an increase to the maximum incentive amount, provided alternative payment structures, included onsite retrofit costs and reimbursable services as part of the LRP and added eligibility for seawater desalination projects. The current LRP incentive payment options are structured as follows:

- Option 1 – Sliding scale incentive up to $340/AF for a 25-year agreement term
- Option 2 – Sliding scale incentive up to $475/AF for a 15-year agreement term
- Option 3 – Fixed incentive up to $305/AF for a 25-year agreement term

On-site Retrofit Programs

In 2014, Metropolitan's Board also approved the On-site Retrofit Pilot Program which provided financial incentives to public or private entities toward the cost of small-scale improvements to their existing irrigation and industrial systems to allow connection to existing recycled water pipelines. The On-site Retrofit Pilot Program helped reduce recycled water retrofit costs to the end-use consumer which is a key constraint that limited recycled water LRP projects from reaching full production capacity. The program incentive was equal to the actual eligible costs of the on-site retrofit, or $975 per acre-foot of up-front cost which equates to $195 per acre-foot for an estimated five years of water savings ($195/AF x 5 years) multiplied by the average annual water use in previous three years, whichever is less. The Pilot Program lasted two years and was successful in meeting its goal of accelerating the use of recycled water.

In 2016 Metropolitan's Board authorized the On-site Retrofit Program (ORP), with an additional budget of $10 million. This program encompassed lessons learned from the Pilot Program and feedback from member agencies to make the program more streamlined and improve its efficiency. As of fiscal year 2019/20, the ORP has successfully converted 440 sites increasing the use of recycled water by 12,691 acre-feet per year.

Stormwater Pilot Programs

In 2019, Metropolitan's Board authorized both the Stormwater for Direct Use Pilot Program and a Stormwater for Recharge Pilot Program to better understand stormwater in Southern California. These pilot programs are intended to

encourage the development, monitoring, and study of new and existing stormwater projects by providing financial incentives for their construction/ retrofit and monitoring/reporting costs. These pilot programs will help evaluate the potential water supply benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches. Metropolitan's Board authorized a total of $12.5 million for the stormwater pilot programs ($5 million for the District Use Pilot and $7.5 million for the Recharge Pilot).

Current Status

Today, nearly one-half of the total recycled water and groundwater recovery production in the region is developed with an LRP incentive by Metropolitan. During fiscal year 2019/20, Metropolitan provided about $13 million for production of 71,000 acre-feet of recycled water for non-potable and indirect potable uses. Metropolitan provided about $4 million to support projects that produced about 50,000 acre-feet of recovered groundwater for municipal use. Since 1982, Metropolitan has invested $680 million to fund 85 recycled water projects and 27 groundwater recovery projects that have produced a cumulative total of about 4 million acre-feet.

Conservation Programs

Metropolitan's regional conservation programs and approaches have a long history. Decades ago, it was recognized that demand management would be an important part of balancing regional supplies and demands. By reducing the demand for water, water conservation efforts were seen as a way to reduce the need of imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area. The actual conservation of water takes place at the retail consumer level. Regional conservation approaches have proven to be effective at reaching retail consumers throughout the service area and successfully implementing water saving devices, programs, and practices. Regional investments in demand management programs, of which conservation is a key part along with local supply programs, benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on the district's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all system users.

Incentive-Based Conservation Programs

Conservation Credits Program

In 1988, Metropolitan's Board approved the Water Conservation Credits Program (Credits Program). The Credits Program is similar in concept to the Local Projects Program (LPP). The purpose of the Credits Program is to encourage local water agencies to implement effective water conservation projects through the use of financial incentives. The Credits Program provides financial assistance for water conservation projects that reduce demands on Metropolitan's imported water supplies and require Metropolitan's assistance to be financially feasible.

Initially, the Credits Program provided 50 percent of a member agency's program cost, up to a maximum of $75 per acre-foot of estimated water savings. The $75 Base Conservation Rate was established based Metropolitan's avoided cost of pumping SWP supplies. The Base Conservation Rate has been revisited by Metropolitan's Board and revised twice since 1988, from $75 to $154 per acre-foot in 1990 and from $154 to $195 per acre-foot in 2005.
In fiscal year 2019/20 Metropolitan processed more than 30,400 rebate applications totaling $18.9 million.

Member Agency Administered Program

Some agencies also have unique programs within their service areas that provide local rebates that may differ from Metropolitan's regional program. Metropolitan continues to support these local efforts through a member agency administered funding program that adheres to the same funding guidelines as the Credits Program. The Member Agency Administered Program allows member agencies to receive funding for local conservation efforts that supplement, but do not duplicate, the rebates offered through Metropolitan's regional rebate program.

Water Savings Incentive Program

There are numerous commercial entities and industries within Metropolitan's service area that pursue unique savings opportunities that do not fall within the general rebate programs that Metropolitan provides. In 2012, Metropolitan

designed the Water Savings Incentive Program (WSIP) to target these unique commercial and industrial projects. In addition to rebates for devices, under this program, Metropolitan provides financial incentives to businesses and industries that created their own custom water efficiency projects. Qualifying custom projects can receive funding for permanent water efficiency changes that result in reduced potable demand.

Non-Incentive Conservation Programs

In addition to its incentive-based conservation programs, Metropolitan also undertakes additional efforts throughout its service area that help achieve water savings without the use of rebates. Metropolitan's non-incentive conservation efforts include:

- residential and professional water efficient landscape training classes
- water audits for large landscapes
- research, development and studies of new water saving technologies
- advertising and outreach campaigns
- community outreach and education programs
- advocacy for legislation, codes, and standards that lead to increased water savings

Current Status

Since 1990, Metropolitan has invested $824 million in conservation rebates that have resulted in a cumulative savings of 3.27 million acre-feet of water. These investments include $450 million in turf removal and other rebates during the last drought which resulted in 175 million square feet of lawn turf removed. During fiscal year 2019/20, 1.06 million acre-feet of water is estimated to have been conserved. This annual total includes Metropolitan's Conservation Credits Program, code-based conservation achieved through Metropolitan-sponsored legislation; building plumbing codes and ordinances; reduced consumption resulting from changes in water pricing; and pre-1990 device retrofits.

Rate Structure

Metropolitan's regional demand management programs and approaches have a long history. Decades ago, it was recognized that demand management would be an important part of balancing regional supplies and demands. Developing new local projects and increasing water conservation efforts were seen as ways to reduce the need of increased imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area, reducing infrastructure costs.

The actual production and use of local resources and conservation of water under Metropolitan's demand management programs takes place at the member agency or end-user level, meaning they produce or conserve water for their own use, and the water is not Metropolitan's. Metropolitan determined decades ago that regional investments in demand management—both conservation and local resource development—benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all system users.

Infeasibility of Accounting

The accounting of the regional investments that contribute to reducing Metropolitan's reliance on the Delta is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible at the individual member or sub-member agency level. As described above, the region (through Metropolitan) makes significant investments in resources and programs that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies (and their subagencies) through rates and charges. The relative contributions for a member agency may be able to be approximately quantified or estimated by proxy through relative water purchases, however making an estimate of any quantifiable savings in gallons or acre-feet is not feasible. Water purchases cannot, with any accuracy or precision, be tied to the actual projects or programs that deliver water to the collective member agencies and their subagencies. Additionally, using water purchases as a proxy for member agency and subagencies would result in projects and programs

done outside of the Metropolitan incentive programs to be omitted and discounted. Accounting at the regional level allows for the incorporation of these local supplies and water use efficiency programs done by member agencies and subagencies in both the regional programs and their own specific local programs. Projects and programs each have different online dates, useful lives, production, incentive rates and contributions that cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within Metropolitan's service area. As shown above, despite that infeasibility, Metropolitan's members and their subagencies have together made substantial contributions to the region's reduced reliance.

C.7 2015 UWMP Appendix

The information contained in this Appendix C is also intended to be a new Appendix H attached to MWDOC's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). MWDOC provided notice of the availability of the draft 2020 UWMP (including this Appendix C which will also be a new Appendix H to its 2015 UWMP) and 2020 WSCP and the public hearing to consider adoption of both plans in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix H to the 2015 UWMP, and the 2020 WSCP were posted prominently on MWDOC's website, mwdoc.com. The notice of availability of the documents was sent to MWDOC's member agencies, as well as cities and counties in MWDOC's service area. In addition, a public notice advertising the public hearing was published in the OC Register on May 3 and 10, 2021. Copies of: (1) the notification letter sent to the member agencies, cities, and county in MWDOC's service area, and (2) the notice published in the newspapers are included in the 2020 UWMP Appendix L. Thus, this Appendix C to MWDOC's 2020 UWMP, which will be adopted with MWDOC's 2020 UWMP, will also be recognized and treated as Appendix H to MWDOC's 2015 UWMP.

C.8 References

http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2017/12-Dec/Reports/064863458.pdf

http://www.mwdh2o.com/PDF_About_Your_Water/Annual_Achievement_Report.pdf

http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2016/12-Dec/Reports/064845868.pdf

http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2012/05%20-%20May/Letters/064774100.pdf

http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2020/10%20-%20Oct/Letters/10132020%20BOD%209-3%20B-L.pdf

http://www.mwdh2o.com/WhoWeAre/Board/Board-Meeting/Board%20Archives/2001/10-October/Letters/003909849.pdf

MWDOC APPENDICIES

Due to the large size of the appendices associated with the 2020 Urban Water Management Plan and the 2020 Water Shortage Contingency Plan, links for the appendices are located below for the publics' convenience.

MWDOC 2020 UWMP Appendices

DropBox Link

MWDOC 2020 WSCP Appendices

DropBox Link

Item No. 2

ACTION ITEM
May 19, 2021

TO: Board of Directors

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

Robert Hunter, General Manager Staff Contact: Melissa Baum-Haley

SUBJECT: **LRP Agreement between Metropolitan, MWDOC, and Santa Margarita Water District for the Las Flores Recycled Water Expansion Project**

STAFF RECOMMENDATION

Staff recommends the Board of Directors authorize the General Manager to execute the final Local Resources Program agreement with the Metropolitan Water District of Southern California and Santa Margarita Water District substantially in the form as attached for the Las Flores Recycled Water Expansion Project, subject to review and approval by Legal Counsel of any final agreement changes.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

REPORT

In February 2021, Santa Margarita Water District (SMWD) submitted a Local Resources Program (LRP) application through MWDOC to the Metropolitan Water District for the Las Flores Recycled Water Expansion Project (Project). Metropolitan staff reviewed the application, and developed a LRP agreement for consideration by both MWDOC and SMWD prior to consideration by Metropolitan's Board. As the Metropolitan member agency, MWDOC's approval is required before Metropolitan's Board may consider the Project; the Metropolitan Board approval is scheduled for the July 2021 Metropolitan Board meeting.

The Project would help Metropolitan increase regional water supply reliability, reduce future demands for imported water supplies, and achieve its Integrated Water Resources Plan (IRP) goals. In addition, the Project helps Metropolitan comply with legislative direction under SB 60 to expand water conservation, recycling, and groundwater storage and replenishment.

Budgeted (Y/N): N	Budgeted amount: n/a	Core X	Choice _
Action item amount: None	Line item: Not applicable		
Fiscal Impact (explain if unbudgeted): Not applicable			

Project Overview

The Las Flores Recycled Water Expansion Project consists of expanding SMWD's current recycled water distribution system to serve the Las Flores area which does not currently have recycled water infrastructure. The Project, which will be owned and operated by SMWD, will convert up to 209 acre-feet (AF) per year of potable water demands for irrigation purposes.

The Las Flores Recycled Water Expansion Project will be located within the unincorporated community of Las Flores in south Orange County. This community consists of approximately 5,200 residents and is near the intersection of Oso Parkway and Antonio Parkway.

The project will expand SMWD's current recycled water distribution system to serve the Las Flores area by constructing over 12,000 feet of new recycled water distribution pipelines and will repurpose a surplus sewer lift station to serve as a recycled water booster pump station. The Project is anticipated to be constructed in one phase which will be completed at the end of January 2022.

The source of the water for the Project is wastewater that is treated at either SMWD's Oso Creek Water Reclamation Plant or Chiquita Water Reclamation Plant. The water will be treated to the tertiary level of treatment to meet Title 22 requirements.

LRP Funding Option

As outlined in the attached draft agreement, SMWD has selected LRP incentive Option 2, which provides an incentive amount of up to $475 per AF for 15 years. This could garner a total of up to $1,489,000 based on actual production. Of note, the Project production is required to continue after the initial 15 years even though no LRP financial incentives will be provided by Metropolitan during the last 10 years of the Agreement term.

LRP Agreement Key Terms

The Project complies with LRP criteria adopted by the Metropolitan Board on October 13, 2014. Key terms of the proposed agreement (attached), subject to approval in form by Legal Counsel, include the following:

1. Agreement term is 25 years for a contract yield of 209 AFY.
2. Pay for performance – LRP financial incentives are only for recycled water delivered by the Project for beneficial use.
3. Sliding Scale incentives up to $475 per AF, calculated annually based on actual project unit costs that exceed Metropolitan's prevailing water rate over 15 years.
4. Termination for nonperformance if construction does not commence, or if recycled water deliveries are not realized, in accordance with program performance provisions.
5. Reduction in Metropolitan's contract commitment if the Project falls short of production targets measured in four-year intervals throughout the Agreement term.

BOARD OPTIONS

Option #1

- Recommends the Board of Directors authorize the General Manager to execute the final LRP Agreement with Metropolitan and SMWD substantially in the form as attached for SMWD's Las Flores Recycled Water Expansion Project, for up to 209 AFY of recycled water, subject to review and approval by Legal Counsel of any final agreement changes.

Fiscal Impact: No fiscal impact to MWDOC directly. Would provide incentive amount up to $475 per AF to one of our member agencies.
Business Analysis: Adopting the findings provides financial assistance to one of our member agencies and a total Metropolitan maximum financial obligation of up to $1,489,000, based on actual production, over the agreement term. The project would help Metropolitan to achieve its IRP goals and meet its legislative
Mandates, while reducing Metropolitan's system costs

Option #2

- Do not authorize execution of an agreement for the Project.

Fiscal Impact: None.
Business Analysis: Metropolitan would pursue other projects and it may take longer to meet IRP goals.

STAFF RECOMMENDATION

Option #1

Attachment: Draft Local Resources Program Agreement between Metropolitan, MWDOC, and Santa Margarita Water District for the Las Flores Recycled Water Expansion Project

AGREEMENT NO. xxxxxx
LAS FLORES RECYCLED WATER SYSTEM EXPANSION PROJECT
2014 LOCAL RESOURCES PROGRAM AGREEMENT
BETWEEN
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY, AND
SANTA MARGARITA WATER DISTRICT

Draft 4/27/21

AGREEMENT NO. xxxxxx
LAS FLORES RECYCLED WATER SYSTEM EXPANSION PROJECT
2014 LOCAL RESOURCES PROGRAM AGREEMENT
BETWEEN
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY, AND
SANTA MARGARITA WATER DISTRICT

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AGREEMENT NO. xxxxxx
LAS FLORES RECYCLED WATER SYSTEM EXPANSION PROJECT
2014 LOCAL RESOURCES PROGRAM AGREEMENT
BETWEEN
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA,
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY, AND
SANTA MARGARITA WATER DISTRICT

THE EFFECTIVE DATE OF THIS AGREEMENT (Agreement) is _____, 2021 by and between The Metropolitan Water District of Southern California (Metropolitan), Municipal Water District of Orange County (MWDOC), and the Santa Margarita Water District (SMWD). Metropolitan, MWDOC, and SMWD may be collectively referred to as "Parties" and individually as "Party".

RECITALS

A. Metropolitan's Board of Directors, at its October 2014 meeting, established terms and conditions for the 2014 Local Resources Program (LRP) for local resource development projects within Metropolitan's service area for the purposes of improving regional water supply reliability. The 2014 LRP Program provides three LRP incentive payment structure options to choose from: (1) sliding scale incentives up to $340/AF over 25 years, (2) sliding scale incentives up to $475/AF over 15 years, or (3) fixed incentive up to $305/AF over 25 years. Under option 2, project must continue to produce for 25 years, even when LRP payments are reduced to zero after 15 years. If an agency fails to comply with this provision, Metropolitan may, at its sole discretion, require reimbursement for a portion of the previous LRP payments toward the project.

B. SMWD has chosen option 2 for this Project (defined below).

C. Metropolitan was incorporated under the Metropolitan Water District Act (Act) Statutes 1969, ch.209, as amended, [§§109.1 et seq. of the Appendix to the West's California Water Code] to transport, store and distribute water in the counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura, within the State of California.

D. The Act empowers Metropolitan to acquire water and water rights within or without the state; develop, store and transport water; provide, sell and deliver water at wholesale for municipal and domestic uses and purposes; set the rates for water; and acquire, construct, operate and maintain any and all works, facilities, improvements and property necessary or convenient to the exercise of the powers granted by the Act.

E. MWDOC, as a member public agency of Metropolitan under the Act, is a wholesale purchaser within its service area of water developed, stored, and distributed by Metropolitan.

F. SMWD provides retail water and recycled water services within its service area.

F. SMWD provides retail water and recycled water services within its service area.

G. Metropolitan's mission is to provide its service area with adequate and reliable water to meet present and future needs in an environmentally and economically responsible way.

H. SMWD seeks to enhance its local water supplies and reduce reliance on imported water by providing a direct replacement of potable water with recycled water for irrigation.

I. SMWD is constructing facilities collectively known as the "Las Flores Recycled Water System Expansion Project" (Project) to deliver up to 209 acre-feet per year of recycled water for irrigation uses within its service area and requires Metropolitan's financial incentives to complete and operate the Project.

J. Metropolitan, MWDOC, and SMWD have determined that it is mutually beneficial for local water projects originating in the service area of SMWD to be developed as a supplement to Metropolitan's imported water supplies in order to meet future water needs.

K. Metropolitan in accordance with the LRP desires to assist in increasing distribution of recycled water by providing a financial incentive to SMWD to implement the Project.

L. MWDOC and SMWD believe that Metropolitan's continued financial contribution toward the cost of the Project will make Project operation economically viable, and is committed to implementation of the Project.

M. Metropolitan's LRP and the provisions for financial incentives are premised upon, and require verification of, actual costs for delivering recycled water from the Project.

N. The Parties believe the development of recycled water by the Project will benefit the local community within SMWD, MWDOC, and the region served by Metropolitan.

NOW, THEREFORE, in consideration of the promises and covenants hereinafter set forth, the Parties do agree as follows:

Section 1: Definitions

The following words and terms, unless otherwise expressly defined in their context, shall be defined to mean:

1.1 "Allowable Yield" shall mean the amount of Recycled Water delivered to End Users by SMWD from the Project in a Fiscal Year that is eligible to receive Metropolitan's financial assistance. Allowable Yield shall be used for non-potable uses through direct deliveries to End Users. Allowable Yield shall not exceed Ultimate Yield and shall exclude Recycled Water that Metropolitan reasonably determines will not reduce MWDOC's or SMWD's demand for Metropolitan's imported water. Unless otherwise approved in writing by Metropolitan, Allowable Yield shall exclude: (1) Recycled water provided by existing projects, (2) Allowable Yield from other projects with active or terminated LRP or Local Projects Program agreements; (3) groundwater, surface water,

or potable water deliveries to supplement the Recycled Water system; (4) Recycled Water delivered to environmental and recreational impoundments; and (5) disposed recycled water.

1.2 "End User" shall mean each user that purchases Allowable Yield furnished by this Project within SMWD's service area.

1.3 "Estimated LRP Contribution" shall mean the advanced financial contribution in dollars per acre-foot, not to exceed $475 per acre-foot, Metropolitan pays for Allowable Yield to SMWD for monthly billing purposes until the Final LRP Contribution is calculated pursuant to procedures in Section 5. LRP payments are for up to 15 years after project starts operation but project must continue to produce for 25 years, even after LRP payments are reduced to zero after 15 years, subject to reimbursement provisions outlined in Exhibit F, incorporated herein by this reference.

1.4 "Final LRP Contribution" shall mean the financial contribution, not to exceed $475 per acre-foot, by Metropolitan to the Project for Allowable Yield. The Final LRP Contribution for the Project is equal to the Project Unit Cost minus Metropolitan's prevailing full service treated water rate as defined in Exhibit E attached hereto and incorporated herein by this reference.

1.5 "Fiscal Year" shall mean a Metropolitan Fiscal Year which begins on July 1 and ends on June 30 of the following calendar year.

1.6 "Project" shall mean the Las Flores Recycled Water Expansion Project, as defined in Exhibit A attached hereto and incorporated herein by this reference, being developed by SMWD to deliver the Ultimate Yield. SMWD shall notify Metropolitan prior to making any changes to the Project that requires new environmental documentation other than addendum to the existing environmental documentation. Metropolitan shall inform SMWD of Metropolitan's decision to include or exclude the Project change to this Agreement.

1.7 "Project Unit Cost" shall mean the actual cost to distribute an acre-foot of Recycled Water by the Project and is comprised of an Annualized Capital Component and an Operation and Maintenance Component, as specified in Exhibits B and C attached hereto and incorporated herein by this reference.

1.8 "Recycled Water" shall mean treated municipal wastewater which, subject to regulatory requirements, is suitable for beneficial uses.

1.9 "Recovered Water" shall mean all types of water including Recycled Water and groundwater, or other water delivered for beneficial use to any users by the Project in a Fiscal Year.

1.10 "Ultimate Yield" is 209 acre-feet per Fiscal Year and subject to reduction provisions outlined in Exhibit D, incorporated herein by this reference.

Section 2: Representations and Warranties

2.1 SMWD warrants that it is able and has a right to sell Allowable Yield from the Project.

2.2 SMWD warrants that neither it nor any of its agents discriminate against employees or against any applicant for employment because of ancestry, creed, religion, age, sex, color, national origin, denial of family and medical care leave, marital status, medical condition, mental or physical disability (including HIV and AIDS), and further warrants that it requires all contractors and consultants performing work on the Project to comply with all laws and regulations prohibiting discrimination against employees or against any applicant for employment because of ancestry, creed, religion, age, sex, color, national origin, denial of family and medical care leave, marital status, medical condition, mental or physical disability (including HIV and AIDS).

2.3 SMWD warrants that it has or will comply with the provisions of the California Environmental Quality Act for each and all components of the Project facilities.

Section 3: Ownership and Responsibilities

3.1 SMWD shall be the sole owner of Project facilities. Metropolitan shall have no ownership right, title, security interest or other interest in the Project facilities.

3.2 SMWD shall be solely responsible for all design, environmental compliance, right-of-way acquisitions, permits, construction, and cost of the Project and all modifications thereof.

3.3 SMWD shall be solely responsible for operating and maintaining the Project, in accordance with all applicable local, state, and federal laws. Metropolitan shall have no rights, duties or responsibilities for operation and maintenance of Project facilities.

3.4 SMWD shall install, operate, and maintain metering devices for the purpose of measuring the quantity of Recovered Water and Allowable Yield delivered to each End User.

3.5 SMWD shall also provide electrical metering devices to accurately measure the energy used for the Project to determine incurred operation and maintenance costs. SMWD provides meters to measure recycled water conveyance pumping electrical uses. To determine incurred operation and maintenance costs for the Project and the payment due from Metropolitan, the electrical usage shall be prorated based on the total water deliveries measured by the Project and other facilities. Metropolitan shall not pay for electrical energy costs if SMWD fails to install electrical metering devices.

3.6 SMWD shall at all times during the term of this Agreement, use its best efforts to operate the Project facilities to maximize Allowable Yield on a sustained basis.

3.7 SMWD shall assist Metropolitan in its effort to forecast future Project production and cost.

3.8 SMWD shall notify and provide Metropolitan with a copy of relevant agreements and payments if SMWD decides to convey water using Project facilities to any party that is not an End User.

Section 4: Invoicing Process

4.1 SMWD shall notify Metropolitan in writing not less than 30 days prior to the start of Project operation. Before the first invoice, MWDOC, SMWD and Metropolitan shall meet to coordinate the agreement administration requirements and to determine the Estimated LRP Contribution based on historical cost data and expected Project activities. After the first year of operation, the Estimated LRP Contribution will be determined during the annual reconciliation process pursuant to Section 5.

4.2 After the start of Project operation, SMWD shall invoice Metropolitan monthly for the Estimated LRP Contribution based upon Allowable Yield delivered during the previous month. Metropolitan shall pay SMWD for invoiced Estimated LRP Contribution by means of a credit included on the next monthly water service invoice issued to MWDOC in accordance with Metropolitan's Administrative Code.

4.3 Pursuant to Metropolitan's Administrative Code, invoices for Estimated LRP Contribution must be received by Metropolitan before 3:30 p.m. on the third working day after the end of the month to receive credit for any preceding month on the next monthly water service invoices issued to MWDOC. Metropolitan will not pay for any invoiced Estimated LRP Contribution received more than six months following the end of any month in which a credit is claimed, and the Recycled Water claimed in any such late invoice shall not be included in the Allowable Yield.

4.4 Metropolitan, MWDOC, and SMWD have entered into agreements for development of local water resources projects in addition to this Agreement. Each agreement contains specific terms and conditions to determine project yield, payment process, and project performance and any adjustments to contractual yield and incentive payments. Unless approved in writing by Metropolitan, these agreements are independent from each other and, therefore, the yield produced under one agreement shall not be used to fulfill the performance requirements under other agreements. These provisions shall also apply to all future incentive agreements between Metropolitan, MWDOC, and SMWD.

Section 5: Reconciliation Process

5.1 After the start of Project operation and by December 31 of each year, SMWD shall provide Metropolitan with the following reconciliation data for the previous Fiscal Year: (a) records of Recovered Water and Allowable Yield; (b) supporting documentation of the actual cost of the Project required to perform the calculations prescribed in Exhibits B and C; (c) records of water deliveries to end users; (d) terms and schedule of payments of the Project's financing instruments; (e) a description of any changes to the Project's financing instruments; and (f) all contributions pursuant to Section 5.4.

5.2 If reconciliation data is not submitted by December 31 in accordance with Section 5.1, Metropolitan will assess a late penalty charge to SMWD as prescribed in Metropolitan's

Administration Code, currently set at $2,500 in Section 4507. Metropolitan may suspend its payment of Estimated LRP Contribution if SMWD fails to provide reconciliation data by the ensuing April 1. During the suspension period, SMWD shall continue to invoice Metropolitan for the Estimated LRP Contribution based upon the Allowable Yield for water accounting purposes. Metropolitan will resume payment of the monthly Estimated LRP Contribution once complete data is received and the corresponding reconciliation is complete pursuant to Section 5.3. In the event SMWD fails to provide reconciliation data by December 31 of the following Fiscal Year, which is 18 months after the end of the Fiscal Year for which a reconciliation is required, this Agreement shall automatically terminate without notice or action by any Party and SMWD shall repay Metropolitan all Estimated LRP Contributions for which no reconciliation data was provided within 90 days of termination.

5.3 Within 180 days after Metropolitan receives complete data from SMWD, pursuant to Section 5.1, Metropolitan shall calculate the Final LRP Contribution for the Fiscal Year. The Final LRP Contribution shall then apply retroactively to all Allowable Yield for the applicable Fiscal Year. An adjustment shall be computed by Metropolitan for over- or under-payment for the Allowable Yield and included on the next invoice issued to MWDOC. As part of this reconciliation, Metropolitan shall also consult with SMWD to determine the Estimated LRP Contribution for the following year based on historic cost data and expected Project activities.

5.4 The Parties agree that all contributions other than LRP incentives under this Agreement and contributions by MWDOC, including but not limited to grants provided by the U.S. Bureau of Reclamation and funding by private parties received prior to and during the term of this Agreement that offset eligible Project costs, shall be deducted from all respective cost components. During the reconciliation process, following receipt of such contributions, the Parties shall determine the equitable apportionment of such contributions for capital and/or operational purposes.

Section 6: Record Keeping and Audit

6.1 SMWD shall establish and maintain accounting records of all costs incurred for the construction, operation and maintenance, and replacement parts of the Project as described in Exhibits B and C. Accounting for the Project shall utilize generally accepted accounting practices and be consistent with the terms of this Agreement. SMWD's Project accounting records must clearly distinguish all costs for the Project from SMWD's other water production, treatment, and distribution costs. SMWD's records shall also be adequate to determine Allowable Yield and Recovered Water to accomplish all cost calculations contemplated in this Agreement.

6.2 SMWD shall establish and maintain accounting records of all contributions including grants that offset eligible Project capital costs, operation and maintenance costs, and/or replacement costs, as outlined in Section 5.4.

6.3 SMWD shall collect Recovered Water and Allowable Yield data for each Fiscal Year of Project operation and retain records of that data based on the metering requirements in

Section 3.4. In addition, SMWD shall collect and retain records of the total annual amount of water conveyed outside of SMWD's service area using Project facilities.

6.4 Metropolitan shall have the right to audit Project costs and other data relevant to the terms of this Agreement for a period of three years following the termination of this Agreement. Metropolitan may elect to have such audits conducted by its staff or by others, including independent accountants, designated by Metropolitan. SMWD shall make available for inspection to Metropolitan or its designee, upon 30 days advance notice, all records, books and other documents, including all billings and costs incurred by contractors, relating to the construction, operation and maintenance of the Project; any grants and contributions, as described in Exhibits B and C, and capital cost financing. Upon 30 days advance notice and at Metropolitan's request, SMWD shall also allow Metropolitan's staff or its designee to accompany SMWD staff in inspecting SMWD's contractors' records and books for the purpose of conducting audits of Project costs.

6.5 In lieu of conducting its own audit(s), Metropolitan shall have the right to direct SMWD to have an independent audit conducted of all Project costs incurred in any Fiscal Year(s) pursuant to this Agreement. SMWD shall then have an audit performed for said Fiscal Year(s) by an independent certified public accounting firm and provide Metropolitan copies of the audit report within six months after the date of the audit request. The cost of any independent audit performed under this Agreement shall be paid by SMWD and is an allowable Project operation and maintenance cost pursuant to Exhibit C.

6.6 SMWD shall retain an independent auditor satisfactory to Metropolitan to conduct an initial audit of the Project costs and accounting record keeping practices and submit the results to Metropolitan with the first reconciliation data as outlined in Section 5.

6.7 SMWD shall keep all Project records for at least ten consecutive years prior to each cost audit per Section 6. SMWD shall maintain audited records for three years after the audit. SMWD shall keep unaudited Project records for at least three years following the termination of this Agreement.

6.8 If an audit of SMWD's reported Project costs cannot be provided, then those costs are not eligible under this Agreement. Based on the results of any project cost audit, an adjustment for over- or under-payment of Allowable Yield for each applicable Fiscal Year shall be completed by Metropolitan and included in Metropolitan's next invoice issued to SMWD.

Section 7: Term and Amendments

7.1 The Agreement shall commence on the effective date of this Agreement and shall terminate 25 years after the date SMWD notifies Metropolitan that the Project has begun operation, subject to provisions outlined in Exhibit D. LRP payments are for up to 15 years after project starts operation but project must continue to produce for 25 years, even after LRP payments are reduced to zero after 15 years, subject to reimbursement provisions outlined in Exhibit F, incorporated herein by this reference. The provisions

regarding reconciliation and audit shall remain in effect until three years after Agreement termination.

7.2 This Agreement may be amended at any time by the written mutual agreement executed by each of the Parties.

7.3 In addition to the termination provisions provided for in Section 5.2 and Exhibit D, Metropolitan may terminate this Agreement, upon thirty (30) days notice to SMWD on the occurrence of one the following:

a. A material breach of this Agreement by any party other than Metropolitan provided that such other party shall have the opportunity to cure or commence to cure such breach within thirty (30) days' of written notice of the breach from Metropolitan to the breaching party; or

b. Metropolitan is not required to make payments to SMWD pursuant to the terms of this Agreement for a five-consecutive year period subsequent to Project operation.

7.4 Each Party represents that it is represented by legal counsel, that it has reviewed this Agreement and agrees that:

a. This Agreement is legally enforceable;

b. Payments made by Metropolitan to SA through MA pursuant to this Agreement are a legal use of Metropolitan's funds; and

c. Metropolitan may legally recover the costs incurred by Metropolitan pursuant to this Agreement in the water rates charged to its Member Agencies, including MA.

Section 8: Hold Harmless and Liability

8.1 Except for the sole negligence or willful misconduct of Metropolitan, SMWD agrees at its sole cost and expense to protect, indemnify, defend, and hold harmless Metropolitan and its Board of Directors, officers, representatives, agents and employees from and against any and all claims and liability of any kind (including, but not limited to, any claims or liability for injury or death to any person, damage to property, natural resources or the environment, or water quality problems) that arise out of or relate to SMWD's approval, construction, operation, repair or ownership of the Project, including any use, sale, exchange or distribution of Project water. Such indemnity shall include all damages and losses related to any claim made, whether or not a court action is filed, and shall include attorney fees, administrative and overhead costs, engineering and consulting fees and all other costs related to or arising out of such claim of liability, but shall exclude damages and losses that arise from the sole negligence or willful misconduct of Metropolitan.

8.2 SMWD shall include the following language in any agreement with any consultant or contractor retained to work on the Project:

"Except for the sole negligence or willful misconduct of Metropolitan, (Consultant) agrees at its sole cost and expense to protect, indemnify, defend, and hold harmless Metropolitan and its Board of Directors, officers, representatives, agents and employees from and against any and all claims and liability of any kind (including, but not limited to, any claims or liability for injury or death to any person, damage to property, natural resources or the environment, or water quality problems) that arise out of or relate to SMWD's approval, construction, operation, repair or ownership of the Project. Such indemnity shall include all damages and losses related to any claim made, whether or not a court action is filed, and shall include attorney fees, administrative and overhead costs, engineering and consulting fees and all other costs related to or arising out of such claim of liability, but shall exclude damages and losses that arise from the sole negligence or willful misconduct of Metropolitan."

Section 9: Notice

Any notice, payment or instrument required or permitted to be given hereunder shall be deemed received upon personal delivery or 24 hours after deposit in any United States post office, first class postage prepaid and addressed to the Party for whom intended, as follows:

If to Metropolitan:

The Metropolitan Water District of Southern California
Post Office Box 54153
Los Angeles, California 90054-0153

Attention: Manager, Water Resource Management

If to SMWD:

Santa Margarita Water District
26111 Antonio Parkway
Rancho Santa Margarita, California 92688
Attention: General Manager

Any Party may change such address by notice given to each of the other Parties as provided in this section.

Section 10: Successors and Assigns

The benefits and obligations of this Agreement are specific to the Parties and are not assignable without the express written consent of Metropolitan. Any attempt to assign or delegate this Agreement or any of the obligations or benefits of this Agreement without the express written consent of Metropolitan shall be void and of no force or effect.

Section 11: Severability

The partial or total invalidity of one or more sections of this Agreement shall not affect the validity of this Agreement.

Section 12: No Third Party Beneficiary

This Agreement does not create, and shall not be construed to create any rights enforceable by any person, partnership, corporation, joint venture, limited liability company, or any other form of organization or association of any kind that is not a party to this Agreement.

Section 13: Integration

This Agreement comprises the entire integrated understanding between the Parties concerning the Las Flores Recycled Water Expansion Project, and supersedes all prior negotiations, representations, or agreements.

Section 14: Governing Law

The law governing this Agreement shall be the laws of the State of California and the venue of any action brought hereunder shall be in Los Angeles County, California. All parties shall bear their own costs and attorneys' fees in the event of any such action.

Section 15: Non-Waiver

No delay or failure by any Party to exercise or enforce at any time any right or provision of this Agreement shall be considered a waiver thereof or of such Party's right thereafter to exercise or enforce each and every right and provision of this Agreement. A waiver to be valid shall be in writing and need not be supported by consideration. No single waiver shall constitute a continuing or subsequent waiver.

Section 16: Joint Drafting

All parties have participated in the drafting of this Agreement and have been represented by counsel at all times. The rule of construction that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

Section 17: Entire Agreement

This writing contains the entire agreement of the Parties relating to the subject matter hereof; and the Parties have made no agreements, representations, or warranties either written or oral relating to the subject matter hereof which are not set forth herein.

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IN WITNESS WHEREOF, the parties hereto have executed this Agreement effective as of the date first hereinabove written.

APPROVED AS TO FORM:

Marcia L. Scully
General Counsel

By: _____
Deputy General Counsel

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Jeffrey Kightlinger
General Manager

By: _____
Debra Man, Assistant General Manager and Chief Operating Officer

APPROVED AS TO FORM:

By: _____
Deputy General Counsel

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

By: _____
Robert J. Hunter
General Manager

APPROVED AS TO FORM:

By: _____
NAME[AM1]
General Counsel

SANTA MARGARITA WATER DISTRICT

By: _____
Daniel R. Ferons
General Manager

EXHIBIT A

LAS FLORES RECYCLED WATER EXPANSION PROJECT

Project Description

Overview

The Las Flores Recycled Water Expansion Project (Project) will be owned and operated by Santa Margarita Water District (SMWD). The Project will be located within the unincorporated community of Las Flores in south Orange County. The Project will convert up to 209 acre-feet per year of potable water demands for irrigation purposes to recycled water in Las Flores.

Project Facilities

The Project (as shown in Figure 1) consists of expanding SMWD's current recycled water distribution system to serve the Las Flores area which does not currently have recycled water infrastructure. The Project will construct over 12,000 feet of new recycled water distribution pipelines and will repurpose a surplus sewer lift station to serve as a recycled water booster pump station. The on-site retrofit costs, if paid by SMWD, are eligible costs under this Agreement.

Source of Water

The source of the water is wastewater that is treated at either SMWD's Oso Creek Water Reclamation Plant (Oso Creek WRP) or Chiquita Water Reclamation Plant (Chiquita WRP). The water will be treated to the tertiary level of treatment to meet Title 22 requirements.

End Users

The Project will deliver recycled water to the Las Flores community in south Orange County within SMWD's service area. This community consists of approximately 5,200 residents and is near the intersection of Oso Parkway and Antonio Parkway.

Points of Connection

Project facilities begin at the connection to the existing recycled water distribution pipeline and end at the following points of connection:

- Each end-user
- Sewer, storm drain, channel and potable system interties

Figure 1

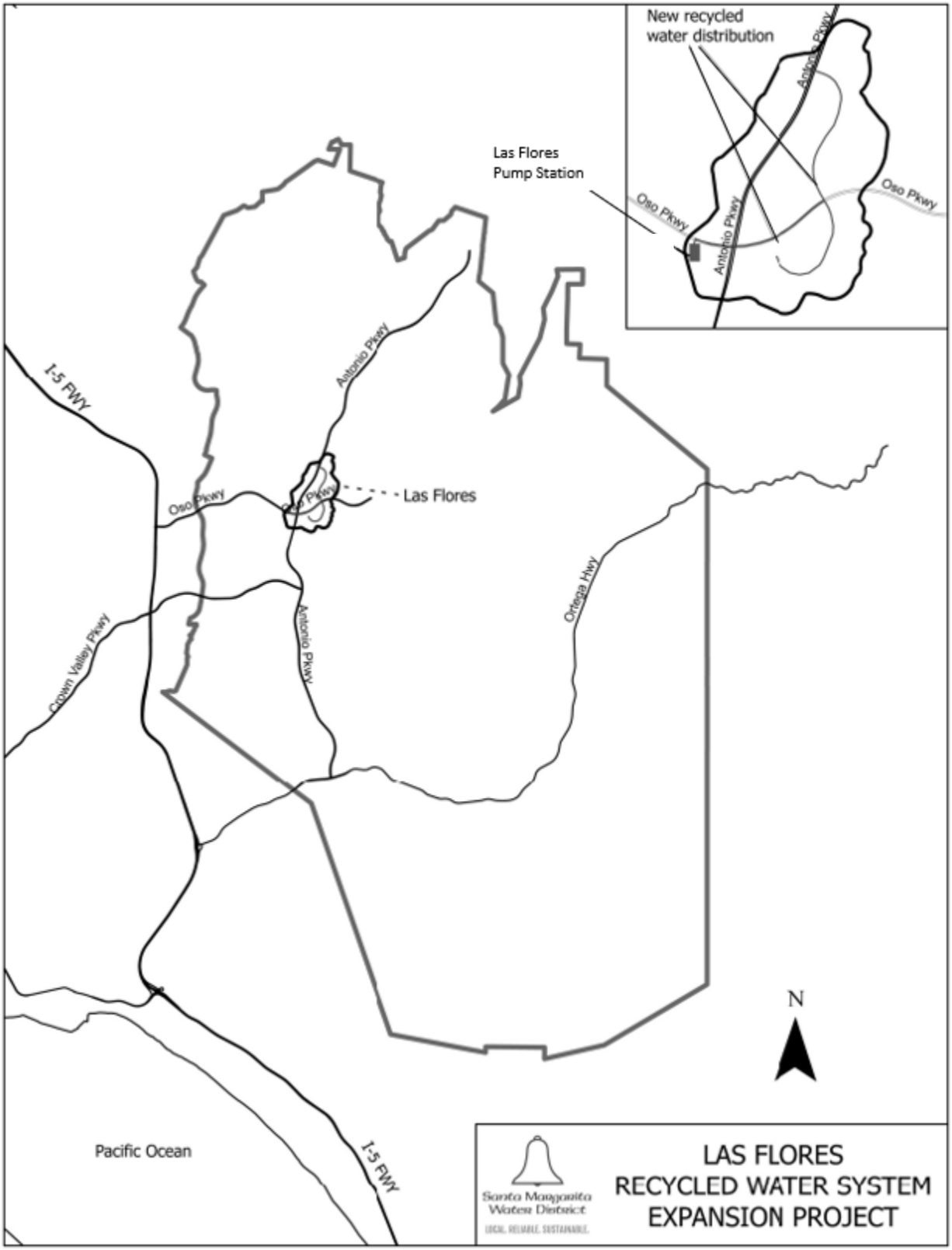

New recycled
water distribution
Las Flores
Pump Station
Oso Pkwy
Antonio Pkwy
Las Flores
I-5 FWY
Crown Valley Pkwy
Ortega Hwy
N
Pacific Ocean
Santa Margarita
Water District
LOCAL. RELIABLE. SUSTAINABLE.
LAS FLORES
RECYCLED WATER SYSTEM
EXPANSION PROJECT

EXHIBIT B

ANNUALIZED CAPITAL COMPONENT

1. The Annualized Capital Component shall be computed using only costs incurred by SMWD for the Project. The Annualized Capital Component shall be computed using costs for the following:

   a. Design (including preliminary design) and construction management services.

   b. Construction of Project facilities, more particularly described in Exhibit A.

   c. Agency administration of the Project design, construction, and start-up, not to exceed three (3) percent of construction costs unless otherwise approved in writing by Metropolitan.

   d. Permits, including required data collection.

   e. Land, right-of-way and easements for the Project described in Exhibit A.

   f. Environmental documentation and mitigation measures directly related to the implementation or operation of the project and required to comply with applicable environmental permits and laws, including but not limited to the California Environmental Quality Act, National Environmental Policy Act, and the California and Federal Endangered Species Acts. Environmental documentation costs shall commence with the Notice of Preparation (NOP) and conclude with the filing of the Notice of Determination. Environmental documentation costs incurred prior to the NOP that are directly related to the environmental clearance of the Project may also be eligible, subject to review and approval by Metropolitan.

   g. All contributions as outlined in Section 5.4 of this Agreement shall be treated as negative capital cost values for the purpose of computing the Annualized Capital Component.

   h. The on-site retrofit costs, if paid by SMWD.

2. Cost of the following items shall not be used to calculate the Annualized Capital Component:

   a. Storm drains, sewer collection systems, and treatment and distribution facilities beyond the Project's points of connection

   b. Existing facilities, land, right-of-way, and easements

   c. Feasibility studies

   d. Deposit of any reserve funds required as a condition of financing

e. Payments made to another department or element of MWDOC or SMWD, unless otherwise approved in writing by Metropolitan

f. Public outreach, education, and water marketing activities including but not limited to preparing brochures and handout materials, training, meetings, and workshops

g. All others costs not specified in Section 1 of this Exhibit, unless otherwise approved in writing by Metropolitan

3. Annualized Capital Cost (ACCost) in dollars per year shall be computed using the following procedure:

a. For fixed-interest rate financing:

$ACCost = CRF_1 \times P_1 + CRF_2 \times P_2 + ... + CRF_j \times P_j$

Where:

P_j is each portion of incurred capital cost for Project with a distinct financing arrangement.

CRF_j is the capital recovery factor for each distinct financing arrangement, as follows:

$CRF_j = [i \times (1+i)^n] / [(1+i)^n-1]$

where:

i is the interest rate (%).

n is the term of financing (in years) commencing in the first Fiscal Year of Project operation. For all capital financing, cash expenditures, and grants and contributions received after the Project begins operation, annual payments shall be calculated, using above process, beginning in the Fiscal Year the costs occur.

j is the number of each separate financing element.

In the first Fiscal Year and Fiscal Year n+1 of production of Allowable Yield, each amortization for the calculation of ACCost shall be prorated by the number of days needed to achieve exactly n years of amortization following the first day of production of Allowable Yield.

b. For variable-interest rate financing, annual payments shall be computed based on the actual payments made in the applicable Fiscal Year according to SMWD's financing documents. Any principal payments toward the Project capital cost

before the Project operation will be treated as cash. SMWD shall provide Metropolitan with the accumulated paid principal pursuant to Section 5.1.

c. For fixed-interest rate financing with a non-uniform annual payment schedule, an economically-equivalent uniform annual payment schedule shall be calculated based on an "Internal Rate of Return" analysis to establish the annualized capital cost.

d. Project capital costs not covered by a financing arrangement described above and all grants and contributions as defined in Section 5.3 shall be amortized over 25 years at an interest rate equal to the lesser of:

a) Metropolitan's most recent weighted cost of long-term debt on June 30 in the year the capital expenditure occurred; or

b) The Fiscal Year average of the 25-bond Revenue Bond Index (RBI) as published in the Bond Buyer, or such other index that may replace the RBI, over the most recent Fiscal Year prior to the date the replacement cost was incurred.

All grants or contributions shall be amortized as negative capital cost values beginning in the year that money was received.

e. After the first Fiscal Year of operation, only refinancing changes which lower the Annualized Capital Component shall be included in the Annualized Capital Component calculation of each subsequent Fiscal Year.

f. If the Project capital cost is part of a broad financing arrangement, annual payments shall be calculated by prorating the annual payments of the broad financing using the ratio of the Project capital cost to the initial principal of the broad financing arrangement.

4. The Annualized Capital Component (ACCom) in dollars per acre-foot for purposes of determining the Project Unit Cost each Fiscal Year shall be calculated using the following formula:

$$\text{ACCom} = \text{ACCost} / \text{Recovered Water}$$

EXHIBIT C

OPERATION AND MAINTENANCE COMPONENT

1. The Operation and Maintenance Component shall be computed using only costs incurred by SMWD for the Project during the applicable Fiscal Year. The Operation and Maintenance Component shall be computed using only the following incurred costs:

   a. Professional consulting services for Project operation, maintenance and audit, excluding daily Project operation.

   b. SMWD paid salaries only for plant operators and distribution system maintenance staff directly related to the operation and production of Allowable Yield will be eligible up to the following amount:

   ($0[AM2]) X (CPI / 279.899)

   Where, CPI is the All Urban Consumers Consumer Price Index published by the U.S. Bureau of Labor Statistics in July for Los Angeles, Riverside and Orange County, CA for July in the applicable Fiscal Year and 279.889 is the CPI published for July 2020.

   c. Chemicals and supplies for Project operation and maintenance.

   d. Net electrical energy (recovered energy shall be deducted from energy purchased) for Project operations. If the Agency uses only one electric meter to measure the combined power usage of the project and other existing or future facilities, the electrical usage and costs for the Project must be prorated based on the total water deliveries measured by the Project and other facilities. Metropolitan shall not pay for electrical energy if SMWD fails to install electrical metering devices.

   e. Contractor services and supplies for Project facilities, operation, maintenance and repair to maintain reliable system operation and achieve regulatory compliance.

   f. Monitoring required by permits, including water quality sampling and analysis of Recycled Water produced by the Project.

   g. All contributions as outlined in Section 5.4 of this Agreement shall be treated as negative operation and maintenance cost values for the purpose of computing the Operation and Maintenance Component.

   h. Replacement costs of Project parts.

2. Costs of the following items shall not be used to calculate the Operation and Maintenance Component:

a. Operation and maintenance of any facilities beyond the Project's points of connection.

b. Payments made to another department or element of MWDOC or SMWD, unless otherwise approved in writing by Metropolitan.

c. Public outreach, education, and water marketing activities including but not limited to preparing brochures and handout materials, training, meetings, and workshops.

d. Fines, penalties, settlements, or judgments due to Project operation.

e. All others costs not specified in Section 1 of this Exhibit, unless otherwise approved in writing by Metropolitan.

3. The Annualized Operation and Maintenance Component (O&MC) in dollars per acre-foot for purposes of determining the actual Project Unit Cost each Fiscal Year shall be calculated using the following formula:

O&MC = (Actual Annual Cost of O&M) / (Recovered Water)

EXHIBIT D

PERFORMANCE PROVISIONS

1. The following performance provisions apply:

   a. Metropolitan will terminate this Agreement if construction has not commenced within two years after Agreement execution. The agreement was executed on _____, 2021. As opposed to Provision 1b below, there is no established appeal process for this outcome.

   b. Metropolitan will terminate this Agreement if Allowable Yield is not delivered within four years after Agreement execution. The Project sponsor(s) may appeal this decision to Metropolitan's Board of Directors.

   c. If the Allowable Yield during Fiscal Years 2025-2026 through 2028-2029 does not reach the target yield of 50% of the Ultimate Yield, then Metropolitan will reduce the Ultimate Yield by the target shortfall using the highest Allowable Yield produced in that four-year period. For example, the Ultimate Yield of a project with the following performance will be revised from 209 to 179.5 AFY for Scenario 1 while there would be no adjustment under Scenario 2:

      Project Ultimate Yield = 209 AFY

	Scenario 1	Scenario 2
Fiscal Year	Allowable Yield (AFY)	Allowable Yield (AFY)
2025 - 2026	40	40
2026 - 2027	55	60
2027 - 2028	70	105
2028 - 2029	75	90

      50% of the Ultimate Yield = 0.50 x 209 = 104.5 AFY

      Scenario 1: Shortfall = 104.5 - 75 = 29.5 AFY
      Revised Ultimate Yield = 209 - 29.5 AFY = 179.5 AFY

      Scenario 2: Since, the Allowable Yield in the Fiscal Year 6 is 105 AFY, no adjustment is required. Ultimate Yield remains at 209 AFY.

   d. If the Allowable Yield during Fiscal Years 2029-2030 through 2032-2033 does not reach the target yield of 75 percent of the Ultimate Yield (or the Revised Ultimate Yield), then Metropolitan will reduce the Ultimate Yield (or the Revised Ultimate Yield) by the target shortfall using the highest Allowable Yield produced in that period. For Example, the Ultimate Yield of the project in this example with the following performance will be reduced to 164.9 AFY for Scenario 1 and while there would be no adjustment under Scenario 2:

Fiscal Year	Scenario 1 Allowable Yield (AFY)	Scenario 2 Allowable Yield (AFY)
2029-2030	100	100
2030-2031	90	160
2031-2032	110	200
2032-2033	120	180

Scenario 1: Revised Ultimate Yield = 179.7 AFY (see above calculations in 1c)
75% of Ultimate Yield = 0.75 x 179.7 = 134.6 AFY
Shortfall = 134.6 – 120 = 14.6 AFY
Revised Ultimate Yield = 179.7 – 14.6 = 164.9 AFY

Scenario 2: Ultimate Yield = 209 AFY
75% of ultimate Yield = 0.75 x 209 = 156.8 AFY
Since, the Allowable Yield in the Fiscal Year 11 is greater than 156.8 AFY, no adjustment is required.

e. If the Allowable Yield during Fiscal Years 2033-2034 through 2036-2037 (and every four-year period thereafter) does not reach the target yield of 75 percent of the Ultimate Yield (or revised Ultimate Yield), then Metropolitan will reduce the Ultimate Yield (or the Revised Ultimate Yield) by the target shortfall using the highest Allowable Yield produced in that period. The adjustment will be made using the same methodology shown in the above examples.

EXHIBIT E

MWD Administrative Code Section 4401 (c)

§ 4401. Rates

(c) For purposes of agreements existing under the Local Resource Program, Local Project Program, Groundwater Recovery Program and other similar programs, references to the "full service water rate," "full service treated water rate," "treated non-interruptible water rate" or "other prevailing rate" or to the "reclaimed water rate" or "recycled service rate" shall be deemed to refer to the sum of the System Access Rate, Water Stewardship Rate, System Power Rate, the expected weighted average of Tier1 Supply Rate and Tier 2 Supply Rate (equal to the estimated sales revenues expected from the sale of water at the Tier 1 and Tier 2 Supply Rates divided by the total District sales in acre-feet expected to be made at the Tier 1 and Tier 2 Supply Rates), a Capacity Charge expressed on a dollar per acre-foot basis and Treatment Surcharge.

(The text in this exhibit cannot be modified. It is a quote taken from MWD's Admin Code)

EXHIBIT F

PAYMENT AND REIMBURSEMENT PROVISIONS

In addition to the performance provisions in Exhibit D, the following performance provisions apply. If SMWD fails to comply with this provision, Metropolitan, in its sole discretion, may require reimbursement for a portion of the previous LRP payments toward the Project as outlined below.

1. Agreement term is 25 years after the project starts operation
2. For operational years 1 through 15, LRP payments will be up to $475/AF, calculated annually per Section 1.4.
3. For operational years 16 through 25, the LRP payments will be zero.
4. Project must produce and use at least a minimum amount of recycled water (Baseline), as defined below, in the years 16 through 25.
5. Unless approved by Metropolitan in writing, the Baseline, in AFY, is the average of project production during years 1 through 15, calculated in year 16 of operation.
6. If Baseline production is not achieved, SMWD shall reimburse Metropolitan for the shortfall in that year as follows:

   Reimbursement ($) = $135/AF x Shortfall (AF)

7. Reimbursement calculations will be completed during annual Reconciliation Process, as outlined in Section 5 for each operational year of 16 through 25.
8. Maximum Reimbursement would be equal to the difference between the total payments under options 1 and 2 during the first 15 years, calculated in year 16 of operation.

Example for year 20

Baseline = 100 AF (calculated in year 16)

Total LRP payments received in years 1 through 15 under option 2 = $600,000

Calculated payments in years 1 through 15 under option 1 = $500,000

Maximum Reimbursement = $600,000 - $500,000 = $100,000 (calculated in year 16)

Total reimbursements to-date = $95,000

Remaining reimbursement = $100,000 - $95,000 = $5,000

Actual project production in year 20 = 60 AF

Shortfall = 100 - 60 = 40 AF

Reimbursement in year 20 = $135/AF x 40 AF = $5,400

Since the remaining reimbursement is only $5,000, reimbursement in year 20 is $5,000.

Since the Maximum Reimbursement is achieved, there will be no more calculations for years 21 through 25.

Item No. 3

ACTION ITEM
May 19, 2021

TO: Board of Directors

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

Robert Hunter, General Manager Staff Contact: Charles Busslinger

SUBJECT: **Board Approval of On-Call Technical Services Slate to Support Reliability Planning, Engineering & Resource Development**

STAFF RECOMMENDATION

Staff recommends the Board of Directors approve the list of pre-qualified consultants for on-call technical services to support Reliability Planning & Engineering, and MET Issues & Water Policy.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

Staff have completed a competitive process to develop a list of pre-approved firms to provide professional technical services to MWDOC. Staff is seeking Board approval of this pre-qualified list of consultants to provide professional services for Reliability Planning & Engineering, and MET Issues & Water Policy on an as-needed basis. The approval of this list does not commit to any expenditures and inclusion on the list does not guarantee a minimum amount of work or compensation for any consultant. The term for these on-call agreements would be for three years with two (2) one-year optional extensions.

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

DETAILED REPORT

MWDOC staff prepared and issued a Request for Qualifications (RFQ) on February 2, 2021 for on-call technical services to support Reliability Planning & Engineering, and MET Issues & Water Policy. The RFQ was posted to the MWDOC website and staff conducted outreach to parties who previously indicated interest. Responses were due back by March 25, 2021. MWDOC received responses from ten consultant teams. The RFQ included three areas of focus where technical assistance may be needed: Water and Environmental Planning / Management – Bay Delta Activities, Engineering, and Water Reliability Planning. Each team was allowed to submit for one, two, or all three areas of focus. Each team's response was scored for each area of focus the respondent team wished to apply for (the ten responding teams were scored for a total of 22 separate area scores). Staff was very pleased with the number and quality of responses received.

MWDOC's goal in this process is to have pre-qualified consultants available to provide technical assistance to MWDOC in order to help us better understand various technical issues generally, and also to follow-up on specific Board and member agency requests in an accelerated manner. The FY 2021-22 Engineering Budget has $200,000 budgeted for professional services (Exhibit J $50,000 - Economic Studies/Reliability Study, $75,000 - on-call technical services, $75,000 - East OC Feeder #2 Emergency Pilot Program). Staff intends to use this pre-approved list for technical support for these activities and intends to similarly use the approved list in subsequent years as subsequent budgets and activities are approved. Following MWDOC Administrative Code policy, any expenditures or combination of expenditures that would result in an exceedance of a budget line item in any fiscal year would first be brought to the Board for authorization.

A review panel consisting of MWDOC staff from the Engineering and MET Issues and Water Policy departments was set up to evaluate the received Statements of Qualifications (SOQs). Oral interviews were held with shortlisted teams based upon the panel's review and scoring of the submitted SOQs. Interviewed consultants had a wide-range of technical expertise including; hydraulic modeling, water quality and operational analysis, economic analysis, water policy planning, water demand analysis and forecasting, environmental planning and management, and Bay-Delta issues and activities. Staff is recommending the following consultants for the three areas of focus listed below:

Engineering	**Water Reliability Planning**	**Water and Environmental Planning/Management (Bay-Delta Activities)**
ABS Consulting	CDM Smith	Hazen & Sawyer
Black & Veatch	Dudek	Means Consulting
CDM Smith	Hazen and Sawyer	Water Systems Consulting
Dudek	Means Consulting	Woodard & Curran
Hazen and Sawyer	Raftelis	
Means Consulting	Water Systems Consulting	
	Woodard & Curran	

The list of consultants will also be available to assist with responses to Board requests for in-depth analysis of various issues should the Board choose to authorize such expenditures. The pre-approved list is not intended to be an exclusive or static list. Staff can amend the list by opening up a supplemental RFQ at any time and/or can issue an RFP on a specific project if desired.

Inclusion on the approved slate does not guarantee any minimum amount of work or compensation. Work shall be assigned by Contract Service Order (CSO) and staff will negotiate the specific scope of services, budget, deliverables, and timeline for each CSO issued. The list shall be valid for three years with options to renew for two one-year periods.

Attached are the SOQs from the list of recommended consultants.

BOARD OPTIONS

Option #1

- Approve the pre-qualified list of consultants.

Fiscal Impact: None

Business Analysis: Approving the recommended list of consultants will save staff time and resources by allowing highly specialized experts to address issues as soon as they arise.

Option #2

- Do not approve the pre-qualified list of consultants.

Fiscal Impact: None

Business Analysis: If the list of consultants is not approved, staff will continue to use the RFP process on an issue-by-issue and project-by-project basis which will continue to add time to staff's ability to respond to issues.

STAFF RECOMMENDATION

Option #1

Statement of Qualifications for Professional Services for On-Call Technical Services to Support Reliability Planning, Engineering, and Resource Development

RFQ ENG. 2021

Proposed Area of Focus

Owner's Representative Services – Program and Construction Management

March 25, 2021

ABS Consulting

MWDOC

ABSG Consulting Inc. • 300 Commerce Drive, Suite 150 • Irvine, CA 92602 USA
Tel: 714-734-4242 • Fax: 714-734-4272
www.abs-group.com

ABS Consulting

March 25, 2021

Charles Busslinger, P.E.
Director of Engineering, District Engineer
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
18700 Ward Street
Fountain Valley, California 92708

Telephone: (714) 593-5003
E-mail: cbusslinger@mwdoc.com

Subject: ***Statement of Qualifications for Professional Services for On-Call Technical Services to Support Reliability Planning, Engineering, and Resource Development – Owner's Representative Services for Program and Construction Management (RFQ ENG. 2021)***

Dear Mr. Busslinger:

ABSG Consulting Inc. (ABS Consulting) is pleased to present our statement of qualifications (SOQ) for professional services for on-call technical services to support reliability planning, engineering, and resource development – owner's representative services for program and construction management in response to Municipal Water District of Orange County's (MWDOC) revised Request for Qualifications (RFQ) ENG. 2021. We have received the revised RFQ and MWDOC's response to bid questions dated March 15, 2021 (Addendum 1).

We are confident that you will be impressed with the broad experience and qualifications of the ABS Consulting team presented in this proposal with regards to structural engineering.

Our SOQ has been prepared in strict compliance with the requirements of the MWDOC RFQ. The employees who are authorized to contractually obligate the firm, negotiate the contract on behalf of the company, and serve as the point of contact (POC) for clarifications is as follows:

POC: Mr. Daniel J. Dopudja, P.E., S.E., Group Manager
Tel.: (714) 734-2514 E-mail: ddopudja@absconsulting.com
Address: 300 Commerce Drive, Suite 150, Irvine, California 92602

We look forward to working with you and your team. If you have any questions regarding our SOQ, please do not hesitate to contact us.

Sincerely,
ABSG Consulting Inc.

Daniel J. Dopudja, P.E., S.E.
Group Manager

Enclosures: *As noted*

Table of Contents

List of Appendices

1. ABSG Consulting Inc. Firm Overview

American Bureau of Shipping (ABS) was founded in 1862 to provide risk assessment services to the U.S. marine insurance industry. ABS Group of Companies' (ABS Group) purpose is to expand the mission and diversify the activities of ABS by offering risk management, safety, quality, and environmental consulting and certification services to a wide range of facilities, industries, and companies worldwide.

ABS Group is wholly owned by ABS and was formed 49 years ago (a corporation incorporated in New York on October 4, 1971) to provide onshore risk assessment and management services to complement ABS' offshore risk assessment services. ABS Group is headquartered in Spring, Texas, and the operating subsidiaries of ABS Group are:

- ABSG Consulting Inc. (ABS Consulting) – a leading independent global provider of Risk Management Services that combines industry expertise, risk modeling, practical engineering, and technology-based solutions. Markets we work in include: Commercial and Mixed Use; Healthcare; Government, Educational, Power, Offshore; Marine; Oil, Gas, and Chemical.
  - ABS Consulting has been an independent global provider of Risk Management Services since the early 1970s. In 2000, ABS Consulting also acquired EQE International, Inc. (EQE), founded in 1981, to provide specialty earthquake and natural hazard risk engineering services to solidify our risk management expertise.
  - ABS Consulting's Extreme Loads and Structural Risk (ELSR) Division includes structural engineering assessment and natural hazards mitigation services as well as blast hazard assessment and mitigation services.
  - Our Southern California-based ELSR Division's Structural Engineering group is ideally suited to address construction management and owner's representative needs, including any value engineering and plan check assistance needs, and non-structural anchorage.
- ABS Quality Evaluations – a certification body providing services associated with the International Standards Organization (ISO) and industry-specific standards related to quality, safety, and environmental management systems.
- GenesisSolutions – provides best-in-class maintenance and asset management to the world's most sophisticated industrial organizations.

ABS Group's total worldwide staff is currently more than 1,000 individuals that are composed of managers, engineers, scientists, and support personnel. Currently, ABS Group maintains a worldwide network of 40 offices from which we provide specialized engineering and risk management services in the Americas, Europe, the Middle East, and Asia.

In 2015, ABS Group was ranked the #1 Property Loss Control Service Firm in the United States by *Business Insurance* based on risk consulting service revenues of over $200 million. Our total revenue in 2019 was approximately $142.9 million.

Mr. Daniel J. Dopudja, P.E., S.E., Group Manager, of our ELSR Division will be acting as the contact person, project manager, and technical lead for this qualifications package. He is based in ABS Consulting's Irvine, California, office located at:

300 Commerce, Suite 150
Irvine, California 92602

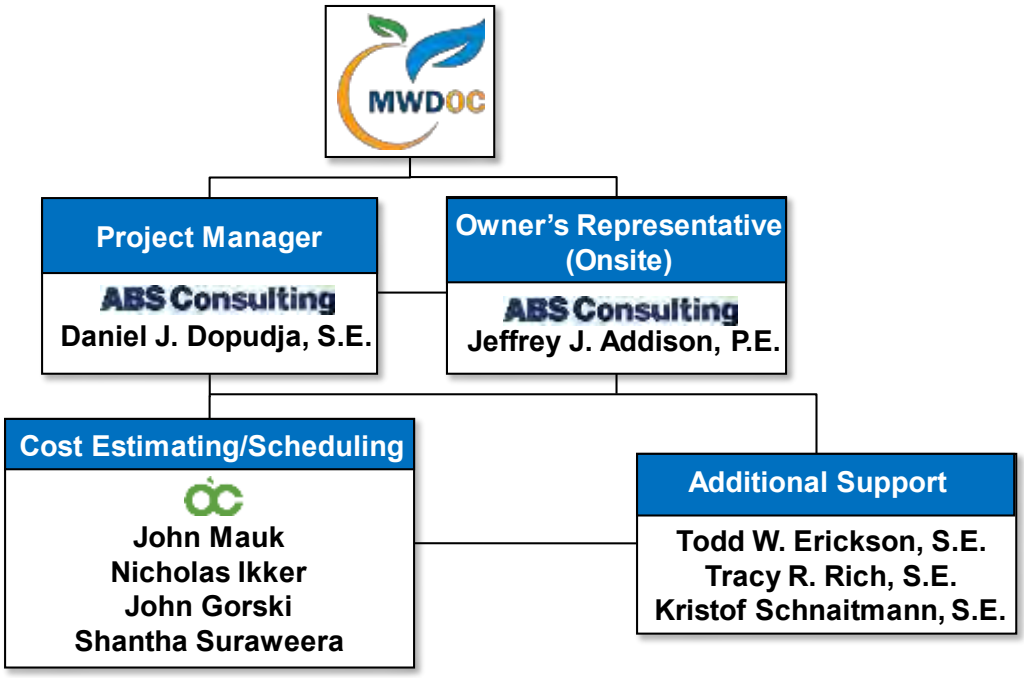
Direct: (714) 734-2514
ddopudja@absconsulting.com
www.abs-group.com/What-We-Do/Safety-Risk-and-Compliance/Extreme-Loads-and-Structural-Risk/

2. Project Organization

ABS Consulting understands that to provide the scope of owner's representative services desired by MWDOC, the project will necessitate a team of highly competent and specialized individuals. Thus, ABS Consulting proposes a team of knowledgeable and experienced construction management (CM) professionals to provide owner representative services to MWDOC. Each member of the team will bring their unique background and experience to focus on a specific facet of the overall construction management and inspection services that are needed by MWDOC. Joining with ABS Consulting's staff will be professionals from **O'Connor Construction Management, Inc. (O'Connor)**. The proposed team organization is shown in the enclosed organization chart. All individuals shown on this organization chart are available for the duration of the projects and will not be replaced without the prior written concurrence of MWDOC.

For a detailed description of key personnel and their roles, please see Section 3.4, Key Personnel.

2.1. Organizational Chart



3. Description of Firm

3.1. ABS Consulting Areas of Expertise

ABS Consulting operates through a network of global offices to provide management services, integrated safety, quantitative risk assessment, property, business interruption, quality and environmental management solutions to the commercial, educational, healthcare, hospital, governmental, insurance, manufacturing, high-tech, shipping, logistics, transportation, water and wastewater, energy and power generation, chemical process, pharmaceutical, pulp and paper, oil and gas, offshore, and marine markets for over 49 years. ABS Consulting's expertise focuses on assessing, quantifying, and helping their clients manage low probability, high severity risk.

ABS Consulting has complete capabilities for construction management, structural engineering services, including assessment, design, preparation of structural construction documents, and construction support and administration for new and existing facilities.

3.2. ABS Program and Construction Management Group

3.2.1. Program and Construction Management

Within ABS Consulting, the Advanced Engineering Group provides program management and construction management services. In particular, our group specialize in providing management services for seismic retrofit and tenant improvement projects. ABS Consulting's program/construction management (PM/CM) experience has ranged from simply coordinating and supervising the preparation of construction bid documents, to completely undertaking all project management and construction field-management responsibilities on behalf of the Owner. We have provided the following program and construction management services on a variety of projects, including the current MWDOC seismic and tenant improvement project:

- Project Management of Planning and Design Tasks
- Coordination and Supervision of Preparation of Construction Documents
- Preparation of Engineering Cost Estimates
- Preparation of Construction Phasing Plans
- Preparation of Construction Bid Packages
- Evaluation of General Contractor Bids and Recommendation of General Contractors
- Construction Management (including daily inspections and reviewing and resolving RFIs)
- Construction Change Orders and Shop Drawings, Reviewing and Approving Contractor Applications for Payment
- Public Funding Requirement Verification
- Project Close-Out Activities Involving Resolution of Punch-Lists and Approval of Final Payment to Contractors

ABS Consulting's ELSR Division has individuals especially qualified to manage the design and construction of new and renovation projects based on its recent performance on similar new, restoration, and renovation projects performed for both private and public sector clients. From these projects, ABS Consulting has the experience to address any of the issues normally encountered on construction projects like this. In particular, the ABS Consulting ELSR Division has valuable construction management experience in the following areas:

- Experience providing not only construction management services but also project team design management services.
- Our public building clients include every major public agency in Orange County (County of Orange, Orange County Transportation Authority, Orange County Fire Authority, and Orange County Water District, Metropolitan Water District) and numerous cities throughout Southern California (Cities of Anaheim, Orange, Placentia, San Clemente, Rancho Cucamonga, Upland, Riverside).
- Qualified experienced individuals who exhibit excellent job performance and communications skills. Evidence of these qualities is represented by our many successful award-winning projects. Our continued relationships with multiple governmental agencies have resulted in numerous project awards over a span of several years.
- Combines strong technical capabilities with experienced management expertise to provide superior project performance. Our project, design, and construction management services for the Cities of Rancho Cucamonga, Upland, and Riverside were successful largely due to this strong combination.
- All of our project and construction managers are licensed professional engineers in the State of California with extensive structural and construction backgrounds.

- Strong experience in working with architects, engineers, building specialty disciplines, and contractors of various sizes and specialties. Our experience on specialized projects including new design, renovation and retrofit provides us with a greater understanding of the design and construction process from several perspectives, including that of the client, the design consultant and the contractor. On more traditional projects, our understanding contributes to a successful transition between the design and construction phases, maximizing efficiency and productivity during construction.

The ABS Consulting ELSR Division has performed extremely well on its PM/CM projects, as witnessed by the confidence in our clients. While we have a substantial component of single-source return business, many of our projects are won competitively, indicating our abilities to provide capable, economical program and construction management services.

3.2.2. Plan Check and Value Engineering Services

ABS Consulting has provided code compliance review, for several State of California agencies for over 30 years. We have had several contracts for plan checking services of hospitals for OSHPD, K–12 schools for DSA, and for several universities. In addition, we have been retained by RESD to oversee large programs involving seismic evaluations, renovations, and upgrades of existing facilities. ABS Consulting staff is very familiar with the plan checking process including the code requirements and recent changes of the code.

The ABS Consulting Team provides value engineering to all design and PM/CM projects. In particular, we are currently part of several value engineering workshops for our current MWD Headquarters Seismic and Tenant Improvement project where we review architectural, kitchen, mechanical, electrical, plumbing, fire alarm, sound attenuation, cost, and schedule in order to provide our client with an optimum design within their budgetary constraints.

3.2.3. Codes and Standards

ABS Consulting staff is fully versed in the modern and historic U.S. building codes for new construction and existing buildings:

- New Construction: 2018 International Building Code (IBC), Title 24 2019 California Building Code (CBC), 2020 Los Angles Municipal Codes (LABC/LAMC), ASCE 7-16, GSA Standard P100, NEHRP, AWWA, PEI, USGBC, LEED V4
- Previous and Archaic Building Codes: UBC 1927–1997, IBC, SBC, BOCA
- Material Design Codes with Seismic Requirements: ACI, CRSI, AISC, ASCE, AWS, NDS, TMS, ASCE, SSINA, RMI, FM, NSF, ICC-ESR-AC
- Seismic Rehabilitation of Existing Buildings: ASCE 41-17, International Existing Building Code (IEBC) 2018, Federal Emergency Management Association (FEMA) 356, FEMA 350 Series, COLA Tall Buildings Council, COLA Divisions 88 through 96, GSREB, UCBC, NEHRP, ATC, NIST, California Accidental Release Program (CalARP), FEMA 413-414, Historical Building Code, Secretary of the Interior's Standards for Rehabilitation

- Specifications: ASTM, Construction Specifications Institute (16 or 50 Division format), SSPWC (Green Book), CRSI
- ICC Evaluation Service Standards: Externally Bonded Fiber Reinforced Polymers (FRP), Post-Installed Concrete Anchors, Other Proprietary Systems
- California Water Code (WAT) § 10632.5 – Seismic Risk Assessment

ABS Consulting employs a full suite of proprietary commercial software related to structure and foundation elastic and non-linear finite element analyses (SAP2000, ETABS, PERFORM-3D, RISA), 3D-modeling (Revit), material-specific structural component design, risk quantification engineering (RQE™), as well as an extensive array of proprietary in-house developed ABS Consulting design tools and analysis methodologies.

3.2.4. Non-Structural Items

ABS Consulting has extensive experience in assessing the vulnerability of non-structural items to wind and earthquake related damage and preparing strengthening programs to properly anchor/brace these items. Our engineers have designed, analyzed, and monitored the installation of non-structural anchorage and bracing and utility intensive facilities such as emergency power generating facilities, power generating stations, water treatment facilities, food and pharmaceutical manufacturing facilities, data centers, cement and petrochemical plants, open towers, storage and support racks, and nuclear facilities. As a result, we have developed a highly effective process to identify equipment items, perform the necessary analysis, identify deficient anchorage, prepare the necessary strengthening details and present the work on a clear set of strengthening drawings for construction bidding.

3.3. Design Schedule and Cost Considerations

ABS Consulting takes pride in developing cost effective structural solutions that match the need of a project, using compatible systems and materials. The final design depends on the building use, type of work and structural configuration, the magnitude of design wind, gravity, and seismic forces, whether the project is a new design or a retrofit design of an existing structure. There may also be architectural requirements, egress and Americans with Disabilities Act (ADA) concerns, and constructability requirements or material availability issues that will dictate the configuration and type of structural materials that can be utilized.

Scheduling and budgetary requirements for retrofit of existing buildings, such as historic structures, can be difficult to estimate with minimal information. As a result, ABS Consulting recommends a three phase structural evaluation and strengthening program. The three phases include Phase I – Preliminary Evaluation, Phase II – Detailed Structural Evaluation, and Phase III – Construction Documents Phase. After each phase, more information on the necessary strengthening requirements can be determined such that schedule and budgetary needs for design and construction can be estimated and refined.

Consideration of more than one structural solution is normal during the preliminary and detailed structural evaluation phases. A rough-order-of-magnitude cost estimate (for decision-making purposes) can be prepared for each alternative solution. ABS Consulting has internal cost estimating capabilities, and we can also retain local firms to assist in the development of cost estimates for our clients, if required by the scope of work. In addition, we often work with qualified local contractors to help assist us with construction cost development. Based on that information, the owner and design team can select the most appropriate structural alternative for final design based on schedule, funding, operations, and design criteria.

We find that many of our clients prefer to break larger projects into different phases, and we are well suited to assist with this type of planning. ABS Consulting is currently providing construction phase engineering services for our seismic retrofit of the Loma Linda University Medical Center's (LLUMC) main building. LLUMC must remain operational during the work, and ABS Consulting has assisted our client in breaking the work into small segments for a phased retrofit approach. Another example of maintaining operation was the Long Beach Public Safety Building where the booking area and jail operation was maintained during construction by splitting the work into phases.

Since it is uneconomical to field verify and test each structural member and all areas of an existing building, many clients prefer to defer field evaluation and testing of some of the more difficult to access portions of the work until the time of construction. This strategy can be cost effective, although it is more difficult to accurately determine the exact scope, budget, and schedule requirements. This methodology requires good coordination between the owner, design team, and contractor during construction.

3.4. Key Personnel

3.4.1. Project Manager

The ABS Consulting Team will be led by the Project Manager. The Project Manager will be responsible for ensuring that all required services are performed to the satisfaction of MWDOC. Specifically, the Project Manager will coordinate with MWDOC regarding the scope and timing of the services provided by the ABS Consulting Team. The Project Manager will ensure that the project team is staffed with the appropriate personnel. The Project Manager will provide technical oversight and direction to the project with regards to project schedule, cost estimates, value engineering, design alternatives, construction alternatives, and all

labor compliance requirements. The Project Manager will actively participate in the construction management activities, including onsite meetings, and participate in and lead any requested presentations to MWDOC's staff.

The ABS Consulting Team proposes Mr. Dopudja as the Project Manager. Mr. Dopudja brings a 26-year background in design, design management, procurement, project and construction management. Mr. Dopudja's educational background includes both a Bachelor and Master of Science in structural engineering. Mr. Dopudja is both a licensed civil and structural engineer in the State of California. Mr. Dopudja has managed the design and construction of numerous commercial, industrial and public sector facilities through the course of his career, and is currently working on the MWDOC seismic and tenant improvements project. His recent efforts have been focused on assisting city and county agencies on the design and construction of public facilities. Mr. Dopudja is currently located in ABS Consulting's Irvine office. Summary resumes for Mr. Dopudja and the rest of the ABS Consulting Team are included in Appendix A, Resumes of Key Personnel.

3.4.2. Subconsultant: O'Connor Construction Management, Inc.

Joining ABS Consulting to provide scheduling and as-needed costing services to the MWDOC project is O'Connor (headquartered at 8851 Research Drive, Irvine, California 92618), which was established in 1982 to provide owners, public authorities, architects, engineers, and contractors with expert, cost estimating, project scheduling and independent construction management services. O'Connor's corporate headquarters are located in Irvine, California, with branch offices in Las Vegas, San Diego, and Pleasanton. O'Connor currently employs nearly 40 construction management professionals including registered architects, licensed engineers, Certified Professional Estimators™, scheduling and project controls experts, chartered quantity surveyors, and post-construction specialists.

O'Connor's history in the municipal facility market sector extends back to 1982, and their clients include cities, counties, utility districts, port districts, and the State's top design and engineering firms. O'Connor has provided cost estimating and scheduling services for more than 2,000 projects worldwide. O'Connor's projects include every aspect of municipal building and infrastructure construction including government centers, courthouses, jails, corporate yards, community centers, parks and recreation, public safety facilities, libraries, office buildings, water supply and treatment projects, utilities, and infrastructure.

The contact for O'Connor is Mr. John Mauk whose telephone number is (949) 476-2094. For any MWDOC tenant improvement project, O'Connor will assist ABS Consulting with project scheduling and costing services.

3.4.3. Owner's Representative (onsite)

When the actual construction starts for the renovation project, the ABS Consulting Team will assign an onsite Project Owner's Representative who will be responsible for assuring the quality of the construction by providing periodic inspections of the site, receiving, distributing, tracking, reviewing and responding to all RFIs and submittals from the General Contractor, and by generating and resolving all non-conformance reports. The Project Owner's Representative will administer the General Contractor's contract. He will monitor and compare actual work progress against the General Contractor's "base line" schedule. He will also review and provide recommendation of approval for all Applications for Payment and Change Order Requests.

The ABS Consulting Team proposes Mr. Jeffrey J. Addison as the onsite Owner's Representative for the renovation project. Mr. Addison brings 7 years of design, management, and construction management experience to this project. Mr. Addison's recent experience includes managing the retrofit of Alcon and General Mills buildings. Mr. Addison's educational background includes both a Bachelor and Master of Science in structural engineering. Mr. Addison is a licensed civil engineer in the State of California. Mr. Addison is currently located in ABS Consulting's Irvine office and would be dedicated as the owner's onsite representative for any MWDOC renovation project. Currently Mr. Addison is the onsite Project Owner's Representative for the ongoing seismic and tenant improvement project at MWDOC Administration Building. Mr. Addison's summary resume is included in Appendix A.

3.4.4. Project Cost Estimator and Scheduler

During Pre-Construction, ABS Consulting will develop a project cost estimate for all work related to the tenant improvement projects for the Administration Building. The Project Cost Estimator will prepare a cost opinion that will include all hard and soft costs for both buildings for ABS Consulting and MWDOC's review and final approval. In addition, when construction commences, the Project Cost Estimator will review, at ABS Consulting's direction, unit costing included in proposed Contractor change orders. ABS Consulting's Project Cost Estimator will provide input relative to the reasonableness of the unit costing for labor, material, and equipment within the change order.

The ABS Consulting Team proposes Mr. Nick Ikker as the Project Cost Estimator. Mr. Ikker brings over 27 years background in project cost estimating to this project. Mr. Ikker's recent experience includes providing all required cost estimates for the MWD Headquarters building in Los Angeles. Mr. Ikker's educational background includes a Bachelor's Degree in Construction Technology and Architectural and Engineering. Mr. Ikker is a certified Professional Cost Estimator. He is currently located in O'Connor's Irvine office and is available to support MWDOC project. Mr. Ikker's summary resume is included in Appendix A.

In addition to the quality and cost of the project, the construction time span is just as important. If the project is not completed within the time frame established by MWDOC, not only could an impact result on the direct cost of the project, but also there could be impacts on indirect costs. The Project Scheduler will prepare an initial project schedule prior to bidding and will also periodically review the General Contractor's detailed construction schedule for the project. The Project Scheduler and Owner's Representative will review the monthly updates of the schedule submitted by the General Contractor showing work accomplished and forecast of future work. Finally, the Project Scheduler will review submitted CORs to determine if they impact the "base-line" schedule prepared by the General Contractor.

The ABS Consulting Team proposes Mr. John Gorski as the Project Scheduler. Mr. Gorski brings a 23-year background in project scheduling to this project. Mr. Gorski's recent experience includes providing all required scheduling support for the construction of the MWD Headquarters building in Los Angeles as well as the seismic and tenant improvement work at the MWDOC Administration Building. Mr. Gorski's educational background includes a Bachelor's Degree in City and Regional Planning. Mr. Gorski is a certified Planning and Scheduling Professional. He is currently located in O'Connor's Irvine office and is available to support MWDOC project. Mr. Gorski's summary resume is included in Appendix A.

All personnel offered in this proposal are either employed full-time by the firm or contractually obligated to the firm and available for the duration of the project at the person-hour level shown in the proposed fee schedule.

4. Firm's Capacity

4.1. ABS Consulting Team Personnel

Name, Project Title and Approx. Project Commitment	Education	License/Certifications	Years of Applicable Experience	Years with ABS Consulting
Daniel J. Dopudja *Project Manager (20%)*	B.S./Civil Engineering M.S./Structural Engineering	California #S5210 California #C58904	26	19
Jeffrey J. Addison *Owner's Representative (On-Site) (100%)*	M.S./Structural Engineering B.S./Civil Engineering	California #C89876	7	5
Todd W. Erickson *Director, Consulting (5%)*	B.S./Civil Engineering (Structures and Foundations)	California #S4154 California #C50837	30	23
Tracy R. Rich *Project Manager (5%)*	B.S./Structural Engineering M.S./Structural Engineering	California #S4831 California #C61064	26	18
Kristof Schnaitmann *Resident Engineer (5%)*	M.S./Civil Engineering	California #S6483 California #C79977	12	12
John Mauk *Cost and Schedule Principal (2%)*	B.S./Construction Management	L.C.P.E. 1,4-000246-0500 C.C.P 4233	31	N/A
Nicholas Ikker *Project Cost Estimator (10%)*	B.A./Construction Technology B.Sc./Architecture/ Engineering	C.P.E. 1.4-000200-0817	27	N/A
Shantha Suraweera *Project MEP Specialist (3%)*	M.A./Mechanical Engineering B.S./Mechanical Engineering	L.C.P.E 1.4-000394-0304	30+	N/A
John Gorski *Project Scheduler (10%)*	B.S./City and Regional Planning	P.S.P 29995	23	N/A

4.2. Resumes

Resumes for the ABS Consulting Team are included in Appendix A, Resumes of Key Personnel.

5. Quality Control Process

5.1. Project Management Approach

ABS Consulting's basic project management approach is covered by a written in-house ISO-compliant procedure. All proposals are reviewed first by ABS Consulting senior management to approve the scope content, internal and externals resource needs, project team organization, and sets the necessary project controls. Once an agreement is made and the work commences, the overall project budget, schedule, and progress are reviewed on a regular basis by the project manager. For larger projects of extended duration, the work progress is reviewed either monthly or bi-annually by ABS Consulting senior management as appropriate. Work product quality is reviewed by qualified senior staff prior to retuning to the client as a part of our regular quality assurance/quality control (QA/QC) review process. The procedure includes the basic parameters:

1. Set project goals with regards to budget, schedule of progress, and phased deliverables with the client.
2. Establish the project team and QA/QC procedure based on the project needs; get buy-in from ABS Consulting management.
3. Establish and utilize lines of communication with the client and various external team members on a regular basis.
4. Monitor ABS Consulting work-progress, quality of work, budget drawdown, and delivery dates.
5. Track critical scope items. Correct work or provide extra resources where needed such as in the case of unknown conditions.
6. Provide coordinated QA/QC reviewed progress documents at the various stages as agreed.
7. Solicit client feedback and make any necessary adjustments for correction or improvement.

ABS Consulting utilizes a Project Control Schedule System (PCS) to track and monitor project progress through its various stages. Using task-subtask-activity designations, every task to be performed is listed and assigned a budget and design schedule for necessary tracking. Budget performance status is checked on a biweekly basis, when individual labor-hours against each activity are totaled and compared with budgeted amounts. For larger projects, the budget drawdown versus projected use for critical components of the work is tracked using a subtask definition and then potted versus time along with milestones. These tools are very useful for rapidly determining if there is a problem associated with the project as a whole or with a particular task and allows for the implementation of preemptive or early corrective measures.

In addition, ABS Consulting uses an effective in-house QA/QC procedure. This procedure is in a corporate manual, developed by senior management, to ensure the professional delivery of accurate design documents on time and within budget. The ABS Consulting QA/QC procedure includes five essential elements:

1. Thorough check of documents by the project manager and selective review by the QA/QC manager for completeness, accuracy, and adherence to client standards.
2. Overall QA/QC coordination of all information provided by the ABS Consulting design team, and any subconsultants, to ensure coordination, consistency, and adherence to project criteria.
3. Maintain contact with the pertinent client representatives, providing information on progress, findings, unknown conditions, etc. Track each task order's budget and schedule of deliverables, making periodic adjustments as necessary to deliver services that meet the agreed to design milestones and address scope creep.
4. Listen to and incorporate client feedback to successfully resolve issues and to improve on our work-product.
5. Implement these procedures at all pertinent stages of the project.

6. Professional Liability Insurance

Page 1 of 1

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 09/16/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Willis Towers Watson Northeast, Inc. c/o 26 Century Blvd P.O. Box 305191 Nashville, TN 372305191 USA	CONTACT NAME: Willis Towers Watson Certificate Center PHONE (A/C, No, Ext): 1-877-945-7378 FAX (A/C, No): 1-888-467-2378 E-MAIL ADDRESS: certificates@willis.com
	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A: ABS Boiler & Marine Insurance Company — 10401
INSURED ABSG Consulting Inc. 1701 City Plaza Drive Spring, TX 77389	INSURER B: INSURER C: INSURER D: INSURER E: INSURER F:

COVERAGES **CERTIFICATE NUMBER:** W17800619 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC OTHER:						EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ $ $ $ $ $
	AUTOMOBILE LIABILITY ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ $ $ $
	UMBRELLA LIAB EXCESS LIAB DED RETENTION $						EACH OCCURRENCE AGGREGATE	$ $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N N/A If yes, describe under DESCRIPTION OF OPERATIONS below						PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ $ $
A	Professional/Errors & Omissions			ABS - ELL - 20-21	09/15/2020	09/15/2021	Limits Retention:	$1,000,000 $300,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER	CANCELLATION
ABSG Consulting Inc. 1701 City Plaza Drive Spring, TX 77389	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

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7. ABS Consulting Experience

The ABS Consulting Team brings a unique mix of program and construction management, retrofit and renovation building experience to MWDOC's On-Call Services Program. Following are descriptions of selected ABS Consulting Team projects which are similar in content and construction to MWDOC's On-Call Services Program.

7.1. Project Experience*

Program and Construction Management Services for Administration Building Seismic Improvements

Municipal Water District of Orange County (MWDOC)

Location: Orange County, California Date: 2020–Ongoing
Key Personnel: D. Dopudja, J. Addison
Reference: Charles Busslinger, (714) 593-5003, cbusslinger@mwdoc.com

ABS Consulting was selected to provide Program Management and Construction Management (Owner's Representative) Services for the seismic renovation and tenant improvements of the MWDOC Administration Building. The facility is a one-story, 16,000-square-foot brick masonry wall with timber roof structure having a center garden area. ABS Consulting's pre-construction phase scope included performing a value engineering review of architectural, structural, mechanical, electrical, and plumbing system drawings, as well as developing the project budget and schedule. The bidding phase scope included the development of bidding procedures, generating bidder interest though outreach, assisting with the expedited bidding package organization, reviewing the bid addenda, and evaluating the contractor bids with recommendations. Current construction-phase services include providing as-needed owner's representative (construction management) services such as reviewing Contractor Change Order Requests, RFIs, Submittals, Payment Applications, Construction Activities as well as coordinating with MWDOC, the General Contractor, and the Designer.

Voluntary Seismic Renovation Design and Construction Support Services and Seismic and Tenant Improvements Studies for Metropolitan Water District Headquarters

Metropolitan Water District Headquarters (MWD)

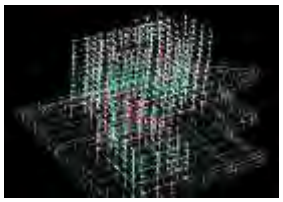
Location: Los Angeles, California Date: 2012–Ongoing
Key Personnel: T. Erickson, D. Dopudja, K. Schnaitmann, T. Rich, M. Riley, M. Kallros, D. Barker, L. Lontoc
Reference: Dr. Winston Chai, Team Manager Facility Design, (213) 271-6672

ABS Consulting is acting as the SEOR and A/E Team Lead for the voluntary seismic retrofit and tenant improvement project for an irregular 12-story non-ductile concrete frame tower on a 2-story subterranean podium. To successfully accomplish the objectives for this large complex project, ABS Consulting managed a large interdisciplinary team that included an architect, interior designer, MEP and IT engineers, structural, geotechnical, and civil engineers, kitchen consultant, security consultant, cost estimator, scheduler, fire alarm, smoke control consultants, move and relocation planning consultant, noise and vibration consultant, and a materials testing company. ABS Consulting is currently managing the entire design team during the project's phased-construction.

Design renovation drawings and specifications were prepared, which included structural strengthening, and strengthening of non-structural cladding system connections to improve retention under interstory seismic drifts, as well as a café and refrigeration renovation and restroom expansions. For ths project, both ASCE 41 linear and non-linear time history structural analyses were performed, and structural beam and cladding specimen cyclical testing was conducted. The detailed analysis criteria document, state-of-the art analysis, computer models, calculations, beam/cladding specimen cyclical testing programs, and construction documents that included components of external Fiber Reinforced Polymer (FRP) beam strengthening and shear wall additions at the podium levels were recently approved by the peer reviewer and the local building official after rigerous reviews.

The revolutionary FRP concrete strengthening concepts developed by ABS Consuting for the project have been the subject of several recently published technical papers, including Erickson, T. W., and W. Chai, "*Comprehensive Seismic Upgrade of a Non-Ductile Concrete Moment-Resisting Frame Building Applying FRP*", 17th World Conference on Earthquake Proceedings, September 2020.

* All references are CONFIDENTIAL.



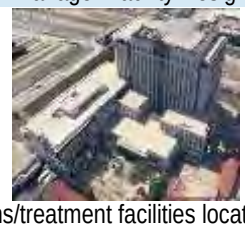
ABS Consutling also prepared several independent planning-phase building improvements feasibility studies for MWD, along with a full interior reprogramming and relocation study. The Improvements scope included developing feasibilty study reports related to: café and cook-line hood renovations, restroom expansions, fire-smoke life safety system modernizations, solar/security window film improvements, HVAC system improvements, WiFi, cellular reception and other information technology improvements, EV station additions, rainwater capture/treatment options, roof patio additions, security, and energy code analysis, to name a few.

Seismic Evaluation Services

Metropolitan Water District of Southern California (MWD)

Location: Southern California Date: 2004–Ongoing
Key Personnel: T. Erickson, D. Dopudja, K. Schnaitmann, T. Rich, M. Riley, M. Kallros, L. Lontoc
Reference: Dr. Winston Chai, Team Manager Facility Design, (213) 271-6672






ABS Consulting has performed multiple structural seismic assessments of Metropolitan facilities. Projects include numerous facilities of varying vintage and construction type, including Colorado River Aqueduct pumping stations and operations/treatment facilities located in the LA Basin. Detailed seismic assessments include large multi-story water operation/control buildings, large subterranean vault pressure-control or hydraulic-turbine structures, office buildings, and large hydraulic basin structures. Tier 1 Rapid seismic assessments include multiple buildings located at desert pumping sites in Riverside County and at Weymouth Filtration Plant. Seismic performance was evaluated using either the older ASCE 31 "rapid assessment" standard or the ASCE 41 detailed seismic evaluation standard. In most cases, preliminary design "feasibility" reports were prepared.

Seismic Assessment, Renovation, and Program/Construction Management

Main Manufacturing Buildings – General Mills

Location: Carson, California Date: 2012–2017
Key Personnel: D. Dopudja, J. Addison K. Schnaitmann
Reference: C.B. Wang, Project Manager, (310) 605-6128, cb.wang@genmills.com

ABS Consulting performed preliminary and detailed seismic assessments, developed seismic retrofit recommendations, prepared seismic renovation Construction Documents, and provided related post-design engineering and Program/Construction Management (PM/CM) services for General Mills Inc. The earthquake risk assessments included several concrete masonry block wall buildings at the facility identified as at-risk for excessive structural damage. In addition, ABS Consulting evaluated the structural integrity of existing wood- and steel-framed roofs while carrying additional sustained process piping and equipment loads due to future modifications. Upon completion of the initial seismic and gravity framing assessments, ABS Consulting performed detailed structural analyses and developed construction drawings for the seismic retrofits and structural roof system strengthening. During bidding and construction, ABS Consulting assisted with general contractor selection, and provided PM/CM services for two of the main upgrade projects.

Seismic Retrofit and Program/Construction Management Services

Alcon Warehouse and Processing Areas

Location: Irvine, California Date: 2018–Ongoing
Key Personnel: J. Addison, D. Dopudja
Reference: Tim Unger, Facilities Engineer, (949) 788-7220, tim.unger@alcon.com

ABS Consulting conducted a seismic retrofit of a single-story tilt-up warehouse with wood framing for a medical device manufacturer. Prepared all construction documents for plan check review through the City of Irvine. Developed bid documents, conducted all formal bid invitations, and led pre-bid meetings and constructability walkthroughs. Responded to technical and non-technical questions from bidders, developed post-bid questionnaires and conducted post-bid interviews with bidders. Additionally, ABS Consulting acted as the full-time Construction Manager and managed all daily construction activities at night and informed the client's key personnel of future activity requirements to minimize operational impact and hazards. Reviewed and responded to all technical and non-technical requests for information and submittals for general compliance to project specifications and drawings prior to sending to design team. Approved all applications for payment and updated Schedule of Values based on project completeness. Ensured that project schedule was maintained and conducted weekly construction meeting with contractors and key personnel.

Design and Construction Management Services

Orange County Transportation Authority

Location: Anaheim, California Date: 2005
Key Personnel: D. Dopudja

ABS Consulting provided design and construction management services for renovations and modifications to the Orange County Transportation Authority's three bus operations and maintenance facilities located in Anaheim, Garden Grove, and Irvine, and to bus transit centers located in Laguna Hills and Santa Ana.

These renovations consist of ADA upgrades, a total remodeling of the Administrative Building at the Garden Grove facility, HVAC upgrades, roof replacements, LNG system and venting systems.

Seismic Evaluation and Strengthening and Construction Support Services for City Hall

City of Anaheim

Location: Anaheim, California Date: 2012–Ongoing
Key Personnel: D. Dopudja, T. Rich
Reference: Jose Cortez, Associate Engineer, (714) 765-5039, jcortez@anaheim.net

Anaheim City Hall is a seven-story pre-Northridge welded steel moment frame structure originally constructed in 1978. ABS Consulting performed a preliminary seismic assessment and developed seismic strengthening schemes to retrofit the structure, including shear wall additions at the podium, and strengthening of some of the existing welded beam-column moment connections. Services also included preparation of a building strengthening assessment report. Based on associated costing developed and the Owner's preferences, construction documents to strengthen the building were prepared, and were approved and are currently pending construction.

Seismic Retrofit and Construction Support Services

Foothill Transit Administration Headquarters

Location: West Covina, California Date: 2014
Key Personnel: D. Dopudja
Reference: Sharlene Bailey, (626) 931-7253, sbailey@foothilltransit.org

ABS Consulting performed a seismic evaluation and analysis of the Foothill Transit Administration Headquarters building, which is a six-story, non-ductile concrete shear wall and frame structure. The seismic assessment was based upon the ASCE/SEI Standard 41-06 (Seismic Rehabilitation of Existing Buildings). Evaluations of the structure and non-structural elements were performed. Site visits were conducted during the initial evaluation of the building to make visual observations of the current conditions. A final evaluation and assessment report summarizing the findings and strengthening recommendations and cost estimates of the proposed strengthening schemes was provided. Cladding removal and a new louver system was installed as part of ABS Consulting's non-structural report findings.

Seismic Retrofit Design and Construction Support Services

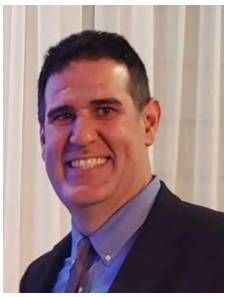
San Bernardino County Courthouse

Location: San Bernardino, California Date: 2008–2011
Key Personnel: D. Dopudja, T. Erickson, T. Rich

ABS Consulting was the A/E team lead for the seismic retrofit of this courthouse and the adjacent T-Wing Building. On the National Register of Historic Buildings, the courthouse is a four-story reinforced concrete building constructed in 1926. In addition to developing the seismic strengthening, ABS Consulting's team addressed the architectural, ADA, historical preservation, and MEP scopes. Work included the building historical inventory, programming, ADA compliance, a fire safety study, pre-engineering testing and reports, and relocation programming for construction phasing. ABS Consulting also assisted the County in obtaining a California Heritage Fund Grant for historical repairs and improvements. This renovation project received multiple awards, including the 2011 ENR Western Region Best Renovation/Restoration Project Award.

Appendix A
Resumes of Key Personnel

Mr. Daniel J. Dopudja has over 26 years of related structural engineering design, evaluation, analysis, and program/construction management experience for commercial, industrial, educational, religious, and state-owned buildings. He has performed both the design of facilities and the management of their construction. Mr. Dopudja provides all cost estimating services for seismic upgrade and improvement projects within the local Southern California office as well as business development. He also currently manages all operations within the local Southern California office, including hiring process, management of project managers and engineers, training, coordination, and allocation of project workload.



Daniel J. Dopudja
P.E., S.E., M.ASCE
Group Manager

RELEVANT PROJECT EXPERIENCE

Municipal Water District of Orange County

Project Manager for Program and Construction Management (Owner's Representative) Services for Administration Building Seismic Improvements (2020–Ongoing)

City of Anaheim

Seismic Evaluation and Strengthening Drawings for City Hall (2012–Ongoing)

Seismic Evaluation of Administration Building (2012–2016)

Seismic Evaluation and Strengthening Drawings for Council Chambers Building (2012–2016)

Parking Structure Seismic Evaluation and Prioritization (2012–2016)

Metropolitan Water District of Southern California

A/E Coordinator for Headquarters Building Improvements and Interior Reprogramming Study (2016–2017)

A/E Coordinator for Headquarters Building Detailed Evaluation and Voluntary Seismic Renovation (2011–2016)

City of Orange Public Works Department

Seismic Strengthening Concept of City Hall and Council Chambers (2019)

Foothill Transit

Project Manager for Seismic Evaluation of Foothill Transit Administration Headquarters (2014)

San Bernardino County Courthouse

Project Manager for Seismic Retrofit Design* (2008–2011)

City of Long Beach

Project Manager for Seismic Upgrade of Public Safety Building and Fire Station No. 1 (2003–2004)

EDUCATION

M.S., Structural Engineering, University of Southern California

B.S., Civil Engineering, University of Southern California

REGISTRATIONS

California

Civil Engineer No. C58904
Structural Engineer No. S5210

MEMBERSHIPS

American Society of Civil Engineers

Structural Engineering Association of Southern California

Construction Management Association of America

Western Council of Construction Consumers

American Institute of Steel Construction, Inc.

SCHEDULING EXPERIENCE

Primavera

Microsoft Project

Sure-Trak

Bluebeam

Office 365

* 2011 ENR Western Region Best Renovation/Restoration Project Award

Mr. Jeffery J. Addison is a highly qualified engineer with design experience ranging across a variety of building and non-building structures. His 7 years of experience includes seismic design of single and multistory reinforced concrete, reinforced masonry, and steel buildings. Mr. Addison has experience developing and coordinating construction documents with multiple engineering and architectural disciplines on design teams as well as advising architect and clients on structural implications of design. He has several years of experience in construction management, construction scheduling, and activity coordination as well as bidding services for several types of construction projects.

As a communications technician and communications maintenance chief in the United States Marine Corps, Mr. Addison managed, maintained, and supervised thousands of hours of technical support and evaluation for mechanized vehicles in both training and combat environments. He is the recipient of two Navy Achievement Medals and has conducted missions and training in four different countries with the Marines.

Jeffrey J. Addison
P.E.
Engineer II

EDUCATION

M.S., Civil and Environmental Engineering, California State University, Fullerton, 2016

B.S., Civil and Environmental Engineering, California State University, Fullerton, 2015

REGISTRATIONS

California
Civil Engineer No. 89876

PRESENTATIONS

Poster Presentation at 2015 Structures Congress

Subject: Vibration and Displacement Control for Seismic Protection of Bridges Using Sequence Energy Dissipation

Speaker at 2014 Southern California Conference for Undergraduate Research

Subject: Ambient Vibration Control of Long Span Bridges Using Self Centering Friction Dampers

RELEVANT PROJECT EXPERIENCE

Municipal Water District of Orange County

Program and Construction Management (Owner's Representative) Services for Administration Building Seismic Improvements (2020–Ongoing)

Metropolitan Water District of Southern California

Engineer on Headquarters Building Improvements Bidding and Construction Documents, Construction Administration (2017–Ongoing)

Engineering on U.S. Headquarters Building Seismic and Tenant Improvements (2016–2017)

Alcon Laboratories

Project Engineer and Construction Manager for Irvine Manufacturing Facility Seismic Improvements Bidding and Construction Documents, Construction Administration (2019–Ongoing)

County of Los Angeles Department of Public Works

Design Engineer for Structural Support of Hydraulic Lines for the Spillway Modification at Santa Anita Dam (2018–2019)

Orange County Sanitation District

Design Engineer of Pipe Support and Seismic Bracing at the Orange County Sanitation District Ocean Outfall System Rehabilitation (2018–2019)

General Mills Yoplait

Project Engineer for Private Sewer Demolition in Southern California Edison Easement (Carson, California) (2019–Ongoing)

Project Engineer and Construction Manager for Material Optimization Improvements (2018)

Construction Manager for Seismic Strengthening of Auto Processing Building (Carson, California) (2017)

Texas Instruments Inc.

Design Engineer for Seismic Support and Anchorage of Manufacturing Equipment at Various Semi-Conductor Facilities (Clark, Philippines; Santa Clara) (2015–2016)

Mr. Todd W. Erickson is a licensed California Structural Engineer with 30 years of design experience. His career emphasis has been focused on structural risk evaluation, seismic retrofit, earthquake-resistant construction, and historical renovation of various structures, most notably, complex, older-vintage non-ductile concrete, and masonry buildings. He has extensive experience in structural/civil design and analysis, water and waste-water structure design, Office of Statewide Health Planning and Development hospital plan review and design, peer review, structural and non-structural specimen testing, cladding system retrofit, retained earth systems. He is also experienced with program/project management and the coordination of small to large-scale construction and retrofit projects of regional importance, in some cases acting as the A/E team lead.

Todd W. Erickson
P.E., S.E.
Director, Consulting

RELEVANT PROJECT EXPERIENCE

Metropolitan Water District of Southern California

DPOR/SEOR for Headquarters Building Improvements Bidding and Construction Documents, Construction Administration (2017–Ongoing)

A/E Team Lead for Headquarters Building Improvements and Interior Reprogramming Study (2016–2017)

A/E Lead and SEOR for Headquarters Building Detailed Evaluation and Voluntary Seismic Renovation Using Non-Linear Time History (2011–2016)

Seismic Risk Assessments and Preliminary Design Reports for Filtration Basins, Pressure Control and Hydroelectric Structures (2012–2018)

Rapid Seismic Assessments for Desert Region Aqueduct Facilities (2006)

City of Orange Public Works Department

Seismic Strengthening Concept of City Hall and Council Chambers (2019)

Loma Linda University Medical Center

Hospital Seismic Renovation for B-Wing and AC-Tower (2001–Ongoing)

Texas Instruments Inc./PageSoutherlandPage

SE for Design of Base-Isolated Semiconductor Facility: Base-Build Design (2008) and Various Facility Expansions (Clark, Philippines) (2010–2016)

Earthquake Damage Repair and Strengthening Drawings Parking Structures (San Jose, California) (2011–2013)

Peer Reviewer for 100-Foot-Tall Hillside Tie-Back Wall (Baguio, Philippines) (2012)

Historic Grenada Theatre and Tower (Santa Barbara, California)

Structural Seismic SEOR for Historic Seismic Renovation and Stage Expansion (2003–2006)

City of Long Beach

SEOR for Seismic Upgrade of Public Safety Building and Fire Station No. 1 (2003–2004)

City of Santa Monica

Lead SE for Strengthening of Franklin Street Reservoir Traffic-Loaded Roof (2002)

Los Angeles Department of Water & Power, Water Engineering Design Division

Various Structural and Civil Engineering Design and Repair Projects for Water Treatment and Conveyance (1990–1995)

Emergency Response Team Member during the Northridge Earthquake

EDUCATION

B.S., Civil Engineering, University of Utah, 1990
Emphasis: Structures and Foundations

REGISTRATIONS

California

Civil Engineer No. 50837
Structural Engineer No. 4154

MEMBERSHIPS

American Society of Civil Engineers

International Code Conference

Earthquake Engineering Research Institute

American Concrete Institute

American Institute of Steel Construction

RECENT PUBLICATIONS

Erickson, T. W., and W. Chai, "Comprehensive Seismic Upgrade of a Non-Ductile Concrete Moment-Resisting Frame Building Applying FRP," 17th WCEE World Conference on Earthquake Engineering Proceedings, September 2020

Mr. Tracy R. Rich has more than 26 years of related engineering experience in commercial and industrial projects. He has performed structural calculations and analysis of various types of structures including those for commercial buildings and industrial power plants. He has design and analysis experience working with a variety of materials including concrete, steel, masonry, and wood. His expertise includes finite element analysis, spreadsheet calculations, computer-aided design, and the use of many computer software packages related to structural engineering.

Tracy R. Rich
P.E., S.E.
Project Manager

RELEVANT PROJECT EXPERIENCE

City of Anaheim

Seismic Evaluation and Strengthening Drawings for City Hall (2012–Ongoing)

Seismic Evaluation of Administration Building (2012–2016)

Seismic Evaluation and Strengthening Drawings for Council Chambers Building (2012–2016)

Parking Structure Seismic Evaluation and Prioritization (2012–2016)

Metropolitan Water District of Southern California

Structural Engineer for Headquarters Building Detailed Evaluation and Voluntary Seismic Renovation Using Non-Linear Time History (2011–2016)

Structural Engineer for Seismic Risk Assessments and Preliminary Design Reports for Filtration Basins, Pressure Control and Hydroelectric Structures (2012–2018)

Structural Engineer of Record (SEOR) for Structural Modifications and Equipment Anchorage for Audio/Video Upgrades at the Headquarters Building (2019–Ongoing)

El Centro Regional Medical Center

SEOR for SPC-4D Seismic Strengthening for Five Buildings (2018–Ongoing)

Edwards Lifesciences

Structural Engineer for the Seismic Strengthening of the Two-Story Steel Frame MLE Building (2016–2018)

SEOR for the Seismic Strengthening of the One-Story Concrete Tilt-Up Daimler Building (2016–2018)

Structural Engineer for the Seismic Strengthening of the Two-Story Concrete T&D Building (2011–2013)

Texas Instruments Inc.

Structural Engineer for Seismic Strengthening of the Central Utility Buildings (Chengdu, China) (2018–Ongoing)

Structural Engineer for the Design of a Steel Pedestrian Bridge (Baguio, Philippines) (2012)

Gildan

Structural Engineer for Seismic, Wind, and Settlement Strengthening of One-Story Steel and Masonry Buildings (Rio Nance, Honduras) (2014–Ongoing)

Structural Engineer for Peer Review and Strengthening of Water Treatment Plant (Rio Nance, Honduras) (2014–2018)

Structural Engineer for Peer Review and Design of New Buildings (Dhaka, Bangladesh) (2014–Ongoing)

EDUCATION

M.S., Structural Engineering, University of California, San Diego, 1998

B.S., Structural Engineering, University of California, San Diego, 1996

REGISTRATIONS

California

Civil Engineer No. C61064
Structural Engineer No. S4831

Mr. Kristof Schnaitmann performs design and analysis of various buildings, structures, and equipment. Projects require extensive use of the California Building Code, International Building Code, and American Society of Civil Engineers design standards and the individual material construction codes referenced therein. He has 12 years of experience working with a variety of building materials including concrete, steel, masonry, and wood. In addition to structural analysis, Mr. Schnaitmann also prepares and reviews construction documents for new and retrofit design. He is proficient in a variety of computer analysis software packages including SAP2000, ETABS, and PERFORM-3D.

Kristof Schnaitmann
P.E., S.E.
Lead Engineer

RELEVANT PROJECT EXPERIENCE

Metropolitan Water District of Southern California

Lead Structural Engineer for Headquarters Building Improvements Bidding and Construction Documents, Construction Administration (2017–Ongoing)

A/E Team Engineer for Headquarters Building Improvements and Interior Reprogramming Study (2016–2017)

Design Engineer for Headquarters Building Detailed Evaluation and Voluntary Seismic Renovation using Non-Linear Time History (2011–2016)

San Bernardino County

Lead Structural Engineer for Analysis and Seismic Strengthening Concept of Court Street Building (2019)

Loma Linda University Medical Center

Structural Team Engineer to show Alternate Means of Compliance to CBC Chapter 34A for closeout of OSHPD permit (Loma Linda, California) (2014)

Texas Instruments Inc./PageSoutherlandPage

Design Engineer for Analysis and Seismic Strengthening Concept of Admin Building (Chengdu, China) (2017)

Design Engineer for Design of Base-Isolated Semiconductor Facility: Various Facility Expansions (Clark, Philippines) (2010–2016)

Design Engineer for Parking Structures Earthquake Damage Repair and Strengthening Drawings (San Jose, California) (2011–2013)

Gildan Activewear

Lead Structural Engineer for New Design of Knitting Facility Steel Building (Dhaka, Bangladesh) (2018)

Onsite Investigation and Condition Assessment Services (Dhaka, Bangladesh) (2016)

Lead Structural Engineer for Concrete Analysis and Strengthening Drawings of Textile Facility (Dhaka, Bangladesh) (2015)

Stepan Company

Post-2017 Central Mexico Earthquake Onsite Investigation and Condition Assessment Services (Mexico City, Mexico) (2017)

California Department of Corrections & Rehabilitation

Condition Assessment Services of Existing Structures (various locations) (2014–2019)

EDUCATION

M.S., Civil Engineering, California State University, Fullerton, 2009
Structural Engineering Focus

B.A., Communications, William Paterson University, 1999

REGISTRATIONS

California
Civil Engineer No. C79977
Structural Engineer No. S6483

John Gorski, PSP

Regional Scheduling Manager

John Gorski has worked on site for some of the largest public works projects in the western United States. He has performed CPM scheduling and project controls at all project stages from conceptual planning and design through construction and post-contract claims analysis. John's scheduling background includes more than 11 years of consistent applications of the Primavera Project Planner.

John Gorski's experience includes highly technical, complex infrastructure and telecommunication facilities, as well as public schools, aviation, municipal, and hospitality projects. He is extremely knowledgeable of all aspects of scheduling and his skills include generating and evaluating baseline schedules, monitoring field progress and updating schedules, verifying payment applications, analyzing time impact claims, performing cost and resource loading, and creating useful tabular and graphical reports.

EDUCATION

B.S. City and Regional Planning
Cal Poly, San Luis Obispo

CERTIFICATIONS

Planning and Scheduling Professional
AACE International

Project Experience

- BART: Line R Aerial Guideway Structures
- City of Sacramento: Convention Center
- Gallaudet University: MSSD Residence Hall
- Metropolitan Water District Headquarters – Seismic Upgrade (ABS)
- Metropolitan Water District Headquarters: Building Voluntary Seismic Renovation
- Metropolitan Water District Headquarters: Final Design of USJQ Voluntary Seismic Reno & Bldg Improvements
- Metropolitan Water District Headquarters: Smoke and Fire Alarm Systems
- Metropolitan Water District Headquarters: Physical Security Upgrade
- Metropolitan Water District Orange County: Admin Bldg – LA
- Port of Long Beach: Middle Harbor Terminal Redevelopment Plan
- San Diego State University: South Campus Plaza
- San Mateo County Transportation Authority: Program Management
- Scottsdale Quarter: Block L Multifamily
- U.S. General Services Administration, Region 9: Phillip Burton FBCH Infrastructure Projects, San Francisco, CA

Nick Ikker, CPE, LEED, GA

Senior Cost Estimator

Nick Ikker is a Senior Estimator at OCMI Inc. corporate headquarters. He is the lead Senior Cost Estimator on projects from conceptual design through construction documents. Nick brings a broad knowledge of the industry through his experience on the contractor, design, and construction management sides of the industry. Nick has more than 27 years of proven track record for delivering successful projects to clients. His completed project portfolio involves diverse type of projects, of which a large portion is renovation and retrofit requiring seismic upgrades. His project experience includes highly secure facilities for government buildings, ports, and administrative buildings.

EDUCATION

B.S. Construction Technology
University of Akron
Degree in Architecture and Engineering —
PMMF Pecs

CERTIFICATIONS

Certified Professional Estimator
ASPE

LEED Green Associate
USGBC

Project Experience

- City of Long Beach: Colorado Lagoon
- City of Richmond: Wastewater Treatment Plant Seismic Analysis
- City of Santa Monica: Water Resources Tenant Improvements
- Clark County Real Property Management (NV): Desert Inn Park Water Feature
- County of Los Angeles, Dept of Public Works: On Call Cost Estimating
- County of San Diego: San Pascual Academy Flood Water Drainage Repairs/Improvements
- Davis Monthan Air Force Base: Visitors Quarters
- LA Metro: Feasibility Studies for Development
- Long Beach CCD: Water Conservation, Liberal Arts Campus
- Metropolitan Water District Headquarters – Seismic Upgrade
- Metropolitan Water District Headquarters: Seismic Renovations
- Metropolitan Water District Headquarters: Building Voluntary Seismic Renovation
- Metropolitan Water District Headquarters: Final Design of USJQ Voluntary Seismic Reno & Bldg Improvements
- Metropolitan Water District Headquarters: Smoke and Fire Alarm Systems
- Metropolitan Water District Orange County: Admin Bldg – LA
- Orange County Public Works: Year-Round Emergency Shelter
- Port of Long Beach: On-Call Estimating Services
- Port of Long Beach: Double Track RR from Pier G to Pier J
- Port of Los Angeles: On-Call Estimating Services
- U.S. Department of State: Beirut Embassy

John Mauk, LCPE, CCP, LEED AP

Estimating Manager

John Mauk is a Senior Vice President of OCMI, Inc. and has more than 30 years of cost estimating experience. His experience includes on-site field supervision, contract administration, change order analysis, preparing budgets, cost estimating, claims analysis and negotiation.

John has provided estimates at all levels of design, from conceptual through construction documents. John has experience in a wide breadth of project types including many Water Districts and related projects including infrastructure, government, municipal buildings and education projects.

EDUCATION

B.S. Construction Management
Cal Poly, San Luis Obispo

CERTIFICATIONS

Certified Estimating Professional
AACEI

Lifetime Certified Professional Estimator
ASPE

Construction Control Professional
NACA

LEED Accredited Professional
USGBC

Project Experience

- Caltrans Historic Transportation Museum
- City of Corona: Corporation Yard
- City of Corona: Riverside Metrolink Station Garage
- City of Los Angeles: San Pedro Multimodal Facility
- County of Los Angeles, Department of Public Works: On-Call Cost Estimating
- Foothill Transit: Irwindale Maintenance Facility
- Metro Wastewater Reclamation District Administration Building
- Metropolitan Water District Headquarters – Seismic Study
- Metropolitan Water District Headquarters – Seismic Upgrade
- Metropolitan Water District Headquarters: Bldg Seismic Renovation & Improvements Final Design
- Metropolitan Water District Headquarters: Building Voluntary Seismic Renovation
- Metropolitan Water District Headquarters: Final Design of USJQ Voluntary Seismic Reno & Bldg Improvements
- Metropolitan Water District Headquarters: Smoke and Fire Alarm Systems
- Metropolitan Water District Orange County: Admin Bldg – LA
- Metropolitan Water District Southern California: Mills Plant VE
- Orange County Fire Authority: Regional Fire Operations and Training Center
- Orange County Transportation Authority: BRT Shelters
- Orange County Transportation Authority: Bus Maintenance Facility
- Port of Long Beach Double Track Railroad from Pier G to Pier J
- Port of Long Beach: On-Call Cost Estimating Services
- Port of Long Beach: Pier G Marine Terminal Redevelopment
- Port of Los Angeles: On-Call Cost Estimating Services
- Port of Los Angeles: Southwest Marine Campus
- Port of Los Angeles: Waterfront Red Car
- Southern California Regional Rail Authority: Railroad Corridor & Pedestrian Trail
- U.S. Dept. of State, Overseas Building Operations: A/E IDIQ for Construction Consulting Services
- U.S. General Services Administration: Nationwide Cost Estimating IDIQ

Shantha Suraweera, LCPE

Sr. MEP Estimating Manager

Shantha has more than 30 years of experience in the construction industry as an estimator, project manager, and project engineer. He has worked on hundreds of projects in the United States as well as overseas. With a broad range of project experience, Shantha specializes in heavy civil and MEP estimates. He has a strong understanding of MEP design and the coordination required between all disciplines.

Shantha will work with the team to verify that project elements are consistent with the project scope; identify and promote areas of unnecessary costs without compromising quality or service life; provide recommendations to improve the design.

EDUCATION

M.S. Mechanical Engineering
Technical Institute, Astrakhan

B.S. Mechanical Engineering
Technical Institute, Astrakhan

CERTIFICATIONS

Licensed Mechanical Engineering
Sri Lanka

Lifetime Certified Professional Estimator — American Society of Professional Estimators

Project Experience

- City of Los Angeles Department of Water & Power: River Supply Conduit
- City of Los Angeles Department of Water & Power: Water Distribution System
- Coachella Valley Water District: Silver Rock Canal Water Conveyance System
- Colorado Metro Wastewater Reclamation District Administration Building
- County of Los Angeles, Dept. of Public Works: As-Needed Cost Estimating
- Dana Point Harbor Revitalization
- Las Vegas Valley Water District: West Craig Pipeline
- Los Angeles Sanitation District: Water Quality Lab, HVAC System Renovation
- Metropolitan Water District Headquarters – Seismic Upgrade
- Metropolitan Water District Headquarters: Building Voluntary Seismic Renovation
- Metropolitan Water District Orange County: Admin Bldg – LA
- Metropolitan Water District Southern California: Metropolitan Headquarters Physical Security Improvements
- Metropolitan Water District Southern California: Mills Plant & Jensen Plan
- San Diego County Water Authority: Mission Trails Pipeline & Tunnel
- Municipal Water District of Orange County: RMV Buy-In Study
- Port of Long Beach: Administration & Operations Building
- Port of Long Beach: East Terminal Site Redevelopment
- Port of Long Beach: Maintenance & Repair Complex
- Port of Long Beach: Pier G, Berth G234 & G230 Formation
- Port of Long Beach: Pier G, Berth G234 North Slip Backlands Development
- Port of Long Beach: Pier G, Berth G236 Shore Power Retrofit
- Port of Long Beach: Pier G, Terminal Redevelopment
- Port of Long Beach: Pier J Power Distribution
- Port of Los Angeles: On-Call Estimating Support
- Port of Los Angeles: Southwest Marine Campus
- Port of Oakland: Domain Awareness Center
- San Diego County Water Authority: San Vicente Bypass Pipeline
- San Diego County Water Authority: San Vicente Dam Raise
- U.S. Dept of Interior, BOR: Anderson Ranch Dam, Boise River Basin Feasibility Study
- U.S. Dept of Interior, BOR: Los Vaqueros Reservoir Expansion Investigation Project
- U.S. Dept of Interior, BOR: Yolo Bypass Salmonid Habitat Restoration and Fish Passage

Appendix B
Standard Billing Rates

As a part of our SOQ for on-call technical services to support reliability planning, engineering, and resource development for Municipal Water District of Orange County, ABS Consulting is pleased to offer MWDOC the following discounted hourly rates for the individuals listed in Section 2 of this SOQ. Where personnel not listed below are approved for the project, an appropriate rate will be established subject to **MWDOC's** approval and consistent with the below rates.

This schedule of rates is confidential information for use directly by MWDOC only.

ABS Consulting Team Hourly Rates and Fees						
ABS Consulting[1]						
Name	Current Classification	Year 1	Year 2	Year 3		
Daniel J. Dopudja	Principal in Charge	$260	$272	$284		
Todd W. Erickson	Principal in Charge	$264	$277	$291		
Tracy R. Rich	Sr. Structural Engineer	$205	$215	$226		
Kristof Schnaitmann	Structural Engineer	$154	$162	$170		
Jeffrey J. Addison	Design Engineer	$118	$124	$130		
O'Connor Construction Management[2]						
Executive	Principal	$250	Director	$225	Project/Construction Executive	$200
	Associate Director	$200	-	-	-	-
Management	Program Manager/ PMCM Manager	$190	Cost Manager	$180	Scheduling Manager	$180
	Project Controls Manager	$185	-	-	-	-
Senior Professional	Senior Constructability Reviewer	$180	Senior Project/Construction Manager	$175	Senior Estimator	$175
	Senior Scheduler	$175	Senior Project Controls Engineer	$175	Senior Software Engineer	$175
Professional	Constructability Reviewer	$160	Project/Construction Manager	$160	Quality Assurance	$150
	Cost Estimator II	$155	Cost Estimator I	$145	Scheduler II	$155
	Scheduler I	$145	Project Controls Engineer	$145	Software Engineer	$145
	Assistant Project/ Construction Manager	$145	Data Engineer/Analyst	$125	Project Engineer	$125
	Document Control Specialist	$90	Administrative Assistant	$75	-	-

Notes:

1. *The rate escalation past Year 3 is 5% per year for ABS Consulting staff.*
2. *OCMI rates are valid through 30 May 2024. The rate escalation past three years is 3% for OCMI staff.*

Hourly rates shown in the table above are representative of current labor classifications, are valid through May 30, 2024, and take account of normal yearly escalation due to inflation during the period of performance. Where an individual merits a change in classification due to licensure, promotion, or other change that justifies a pay increase beyond normal escalation, ABS Consulting reserves the right to submit a classification/rate change for affected individuals to MWDOC for review and approval.

Direct expenses that are directly attributable to the performance of the work (mileage, external reproduction charges, outside services, subconsultant invoices, and equipment rentals) will be charged at cost plus 10%, unless other arrangements at the task level are agreed upon with MWDOC in accordance with their Travel and Reimbursement Policy.

MWDOC will be billed monthly based upon the actual incurred charges for Time & Materials Basis tasks, or percentage of work completed for Lump Sum Basis tasks. Invoices are payable net 30 days.

Appendix C
Proposed Modifications to the Standard Agreement for Consultant Services

ABS Consulting proposes the following exception and modifications to the Standard Agreement for Consultant Services for MWDOC's consideration:

VI INSURANCE REQUIREMENTS

B. Professional Liability Insurance

Paragraph 2:

Such coverage shall be placed with a carrier with an A.M. Best rating of no less than A: VII, or equivalent. The retroactive date (if any) of such insurance coverage shall be no later than the effective date of this AGREEMENT. In the event that the CONSULTANT employs sub-consultants as part of the SERVICES covered by this AGREEMENT, CONSULTANT shall be responsible for requiring and confirming that each sub-consultant meets the minimum insurance requirements specified herein.

ABS Consulting Comment: Our primary professional liability coverage is maintained through ABS BMIC, a captive insurance company which is not rated (though ABS BMIC's reinsurers [e.g., Beazley] would be so rated). Therefore, we request an exception. Under the current Owner's Representative Agreement between MWDOC and ABS Consulting, MWDOC acknowledged that they would accept our professional liability insurance under the "or equivalent" language.

C. Other Insurance

CONSULTANT will file with DISTRICT, before beginning professional SERVICES, ACORD certificates of insurance, or other certificates of insurance satisfactory to DISTRICT, evidencing general liability coverage of not less than $1,000,000 per occurrence for bodily injury, personal injury and property damage; automobile liability (owned, scheduled, non-owned or hired) of at least $1,000,000 for bodily injury and property damage each accident limit; workers' compensation (statutory limits) and employer's liability ($1,000,000) (if applicable); requiring 30 days (10 days for non payment of premium) notice of cancellation to DISTRICT. For the coverage required under this paragraph, the insurer(s) shall waive all rights of subrogation against DISTRICT, and its directors, officers, agents, employees, attorneys, consultants or volunteers. CONSULTANT's insurance coverage, except Professional Liability, shall be primary insurance as respects DISTRICT, its directors, officers, agents, employees, attorneys, consultants and volunteers for all liability arising out of the activities performed by or on behalf of the CONSULTANT. Any insurance pool coverage, or self-insurance maintained by DISTRICT, and its directors, officers, agents, employees, attorneys, consultants or volunteers shall be excess of the CONSULTANT's insurance and shall not contribute to it.

ABS Consulting Comment: It is not possible to endorse anyone as primary under a professional liability policy.

VII INDEMNIFICATION

Paragraph 8:

CONSULTANT's obligation to indemnify shall survive the termination or completion of this agreement for the full period of time allowed by law and shall not be restricted to insurance proceeds, if any, received by DISTRICT, or its directors, officers, employees, or authorized volunteers. Neither party shall be liable to the other for consequential, incidental, punitive, exemplary, special or indirect damages, whether arising in tort, contract, under any statute, under any indemnity provision or otherwise. The parties intend that the limitations under this section imposed on remedies and the measure of damages be without regard to the cause or causes related thereto, including, without limitation, the negligence or strict liability of any party, whether such negligence be sole, joint or concurrent, or active or passive.

For the avoidance of doubt, whether or not it is determined that CONSULTANT's performance qualified as a "design professional", DISTRICT shall reimburse any defense costs assumed by CONSULTANT at the time of claim resolution to the extent the claim results from DISTRICT's active negligence or willful misconduct.

ABS Consulting Comment: ABS Consulting proposes to add a mutual waiver of consequential damages to the indemnity.

ABSG CONSULTING INC.
300 Commerce Drive, Suite 150
Irvine, CA 92602
Telephone 714-734-4242
Fax 714-734-4272

ABS Consulting

ABS GROUP OF COMPANIES, INC.
1701 City Plaza Drive
Spring, TX 77389
Telephone 281-673-2800
Fax 281-877-5946

NORTH AMERICA

1525 Wilson Boulevard, Suite 625
Arlington, VA 22209
Telephone 703-682-7373
Fax 703-682-7374

10301 Technology Drive
Knoxville, TN 37932
Telephone 865-966-5232
Fax 865-966-5287

1360 Truxtun Avenue, Suite 103
North Charleston, SC 29405
Telephone 843-297-0690

140 Heimer Road, Suite 300
San Antonio, TX 78232
Telephone 210-495-5195
Fax 210-495-5134

8976 Saint Andrews Drive
Seminole, FL 33777
Telephone 801-699-4987

55 Westport Plaza, Suite 700
St. Louis, MO 63146
Telephone 314-819-1550
Fax 314-819-1551

MEXICO

Ciudad del Carmen, Mexico
Telephone 52-938-382-4530

Mexico City, Mexico
Telephone 52-55-5511-4240

Monterrey, Mexico
Telephone 52-81-8319-0290

Reynosa, Mexico
Telephone 52-899-920-2642

Veracruz, Mexico
Telephone 52-229-980-8133

UNITED KINGDOM

111 Old Broad Street
London, EC2N 1AP, UK
Telephone 44-1925-287300

EQE House
The Beacons
Warrington Road, Birchwood,
Warrington
Cheshire WA3 6WJ, UK
Telephone 44-1925-287300

MIDDLE EAST

Dhahran, Kingdom of Saudi Arabia
Telephone 966-3-868-9999

Ahmadi, Kuwait
Telephone 965-3263886

Doha, State of Qatar
Telephone 974-44-13106

Muscat, Sultanate of Oman
Telephone 968-597950

Istanbul, Turkey
Telephone 90-212-6614127

Abu Dhabi, United Arab Emirates
Telephone 971-2-6912000

Dubai, United Arab Emirates
Telephone 971-4-3306116

SOUTH AMERICA

Rio de Janeiro, Brazil
Telephone 55-21-3179-3182

Sao Paulo, Brazil
Telephone 55-11-3707-1055

Viña del Mar, Chile
Telephone 56-32-2381780

Lima, Peru
Telephone 51-1-437-7430

Chuao, Venezuela
Telephone 58-212-959-7442

EUROPE

Sofia, Bulgaria
Telephone 359-2-9632049

Hamburg, Germany
Telephone 49-40-300-92-22-21

Rotterdam, The Netherlands
Telephone 31-10-206-0778

ASIA-PACIFIC

Ahmedabad, India
Telephone 079 4000 9595

Navi Mumbai, India
Telephone 91-22-757-8780

New Delhi, India
Telephone 91-11-45634738

Yokohama, Japan
Telephone 81-45-450-1250

Busan, Korea
Telephone 82-51-852-4661

Seoul, Korea
Telephone 82-2-552-4661

Kuala Lumpur, Malaysia
Telephone 608-6212320888

Beijing, PR China
Telephone 86-10-58112921

Shanghai, PR China
Telephone 86-21-6876-9266

Kaohsiung, Taiwan, Republic of China
Telephone 886-7-271-3463

Alexandra Point, Singapore
Telephone 65-6270-8663

Bangkok, Thailand
Telephone 662-399-2420

INTERNET

Additional office information can be found at *www.abs-group.com*

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

PROPOSAL FOR

ON-CALL TECHNICAL SERVICES TO SUPPORT RELIABILITY PLANNING ENGINEERING & RESOURCE DEVELOPMENT

RFQ ENG. 2021 | MARCH 25, 2021

BLACK & VEATCH

BLACK & VEATCH CORPORATION
5 Peters Canyon, Suite 300 Irvine, CA 92606
P +1 949 788 4250 | E ThomasML@bv.com

March 25, 2021

Mr Charles Busslinger
Municipal Water District of Orange County
18700 Ward Street
Fountain Valley, CA 92708

RE: Request for Qualifications for On-Call Technical Services to Support Reliability Planning, Engineering and Resource Development, RFQ Eng. 2021

Dear Mr. Busslinger,

Black & Veatch is extremely proud of our on-going partnership with the Municipal Water District of Orange County (MWDOC). As you are well aware, we have collaborated with you and the MWDOC team, Metropolitan Water District of Southern California (Metropolitan), and many of MWDOC's member agencies over the last several years to help evaluate new water supply integration into the Orange County (OC) Distribution System, and to construct a hydraulic model of the system that will be used for water quality analyses and operational planning going forward.

> Black & Veatch brings the combination of new water supply integration expertise, background knowledge about your projects, Metropolitan and member agency relationships, and unmatchable knowledge of your hydraulic model to continue our successful partnership.

Your Request for Qualifications (RFQ) identified several categories of potential services needed under your On-Call Services Program. While Black & Veatch can certainly assist in all of those areas, our Statement of Qualifications (SOQ) emphasizes the Engineering category. Our team and expertise will be familiar to MWDOC, as it is the same team who has worked with you, Metropolitan, and your member agencies to develop the OC Distribution System hydraulic model and the New Water Supply Integration White Paper. Black & Veatch provides MWDOC:

- **Knowledge of your OC Distribution System Hydraulic Model.** As we have prepared the model, we have been collaborating with several member agencies and you to develop scopes of work for the hydraulic and water quality analyses they need for their projects. Together with our OC hydraulic model expertise, and our south OC and Metropolitan system operation and facilities knowledge, we are ideally suited to start the next phase of system integration analyses and distribution system facility planning to support those projects.
- **Metropolitan System Expertise.** From our wide-ranging experience with them and with you, we bring unmatched expertise in how Metropolitan operates, maintains, and hydraulically controls their system; their engineering requirements; and their water quality protocols and procedures. This knowledge and our relationships will be critical in evaluating new water supply and system water quality/performance issues and developing technically feasible solutions that meet everyone's requirements.
- **World-Class Desalination Experience.** Black & Veatch was named the Desalination Company of the Year at the 2016 Global Water Summit. We bring direct knowledge of the proposed Huntington Beach Desalination Plant and the Doheny Ocean Desalination Project.

It has been our pleasure to have assisted MWDOC so far in its efforts to manage a reliable water supply and develop new local water sources for Orange County. We look forward to the opportunity to continue our partnership. If you have any questions about the details of our proposal, please feel free to contact me at (949) 788-4250 or thomasml@bv.com. Thank you for the opportunity.

Very truly yours,
Black & Veatch Corporation

Matt Thomas, P.E.
Associate Vice President/Contract Manager

Section 1

1 Firm Information

Black & Veatch brings a proven five-year track record as MWDOC's trusted partner for evaluating engineering, operations, and water quality issues associated with the Orange County (OC) Distribution System – we are the right team to move your efforts forward.

We have had the privilege to collaborate with you, Metropolitan Water District of Southern California (Metropolitan), and your Member Agencies on several key projects highlighted in the inset box below. All of these projects directly relate to the services contemplated under the Engineering category in your Request for Qualifications (RFQ). As a result, we are high on the learning curve and ready to "hit the ground running" to support MWDOC under this new On-Call agreement. We bring:

- Direct working knowledge of all of the facilities in the OC Distribution System and how they are operated.
- Unmatched familiarity with the OC Distribution System Hydraulic Model, how it works and how to use it.
- Deep understanding of your new water supply project concepts, the related issues associated with their integration into your system, and relationships with Metropolitan and key MWDOC member agency stakeholders to help resolve issues and coordinate efforts.
- Familiarity with system operational issues currently facing MWDOC, including those on the Allen-McColloch Pipeline (AMP) and Orange County Feeder, having developed approaches to help you analyze and solve these under this next contract.
- Knowledge of Metropolitan's facilities, engineering standards, system operations, and new supply integration requirements; including experience with numerous large diameter pipeline, flow control, and water quality projects for them.

A CONTRACT MANAGER MWDOC TRUSTS

Matt has served as Contract Manager/Project Manager on water resources projects for some of Black & Veatch's most valued clients, including MWDOC. Matt's philosophy is: "Quality happens when you have the right expertise, clear communications, good organization, and feel ownership of our client's needs." He has successfully executed this approach on several recent projects of particular relevance to MWDOC's proposed assignments:

- Municipal Water District of Orange County:
  - Conceptual Design for South Orange Coastal Desalination Plant (2006 - Boyle Engineering)
  - Conceptual Evaluation for Integration of Huntington Beach Desalination Plant Supply into East Orange County Feeder No. 2 (2016)
  - Evaluation of Metering Options for MWDOC Member Agencies (2018)
  - New Local Water Supply Integration White Paper (2019)
  - OC Distribution System Hydraulic Model - Phase 1 Evaluation (2020)
  - OC Distribution System Hydraulic Model - Phase 2 Model Development (2021)
- Metropolitan Water District of Southern California (Metropolitan) Second Lower Feeder Preliminary and Final Design
- Metropolitan Regional Recycled Water Supply Program Feasibility-Level Study Analysis
- Metropolitan Rialto Feeder Preliminary Design

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Section 2

2 Project Team

In assembling the Black & Veatch Team, we drew from our highly qualified resource pool to select the right individuals based not only on technical capabilities, but also on their proven past performance in delivering your projects.

STRONG PROJECT MANAGEMENT TEAM

Our Team will be led by **Matt Thomas**, who will serve as Contract Manager, and Project Managers/ Engineering Managers **Karen Burgi, Derek Kurtti, Lee Portillo**, and **Andy Stanton**. Matt brings nearly 30 years of experience in leading project execution, and he will leverage his recent experience with MWDOC to successfully complete each task. Our four Project Managers/Engineering Managers will apply their nearly 95 years of experience to assist Matt in providing high quality deliverables.

- **Karen Burgi** brings 28 years of experience in hydraulic modeling for both water and wastewater facilities and coordinates company-wide resources in hydraulic modeling and master planning. She served as lead hydraulic modeler for your OC Distribution System.
- With 15 years of professional experience in water, wastewater, and reclaimed water engineering and general contracting, **Derek Kurtti** brings extensive experience coordinating with project owners, design engineers, city officials, and stakeholders to deliver projects successfully on schedule and within budget.
- **Lee Portillo** is a Senior Process Technologist with 18 years of experience specializing in water quality modeling, process design, and the application of filtration and desalination membranes to treat groundwater, recycled water, and municipal wastewater. Lee was a lead author for the MWDOC New Local Water Supply Integration White Paper.
- **Andy Stanton** is a Project Manager with 33 years of worldwide experience in the planning, design, and start-up of large public works facilities. He has been Project Manager on major projects for more than 15 years and has executed major pipeline projects including Metropolitan's Second Lower Feeder Pipeline Replacement Project.

The entire management team brings an in-depth understanding of engineering programs and the requirements needed to meet MWDOC's needs and expectations. Matt and the Project Managers/Engineering Managers will be in lock-step to ensure clear communication and close collaboration with MWDOC and task leads. Our Project Management team brings the specialized skills needed to support your on-call projects.

UNPARALLELED TECHNICAL SUPPORT

As shown on our organization chart, our team also includes a deep bench of technical support, most of whom have previous experience with MWDOC. All of these individuals are excited about the opportunity of working on your engineering development projects. Our team's depth and breadth will ensure delivery of a high-quality project.

ORGANIZATION CHART

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

CONTRACT MANAGER
MATT THOMAS, PE★

PROJECT MANAGERS/ ENGINEERING MANAGERS
KAREN BURGI, PE★
DEREK KURTTI, PE★
LEE PORTILLO★
ANDREW STANTON, PE, PMP

HYDRAULIC MODELING
KEVIN LAPTOS, PE★
KAREN BURGI, PE★
MEGHAN MERLIHAN, EIT★
JAMES MAHER, PE★

PIPELINE DESIGN
KRISTI KUHLMANN, PE
ROB KAESSNER, PE★
JEREMY CLEMMONS, PE
JENNIFER THOMPSON, PE

DESALINATION EXPERTS
BOB HULSEY, PE★
VASU VEERAPANENI, PHD, PE
LEE PORTILLO★

WATER QUALITY
LEE PORTILLO★
BOB HULSEY, PE★
VASU VEERAPANENI, PHD, PE
JEFF NEEMANN, DENG, PE★
GIL HURWITZ, PHD, PE★
AUSTIN CUNNIFF, PE★

PROJECT SUPPORT

ELECTRICAL
KEENE MATSUDA, PE

I&C
ANDREW FRANKLIN, PE

STRUCTURAL
MARK LOWE, PE

ESTIMATING
KIRK JOHNSON

★ *Previous MWDOC Experience*

THE BLACK & VEATCH TEAM BRINGS

- MWDOC Experience
- OC Distribution System Knowledge
- Modeling Expertise
- Water Quality Experts
- System Integration Experts
- Desalination Experience
- Metropolitan Experience and Relationships
- Member Agency Relationships
- Larger Diameter Pipeline Expertise

Section 3

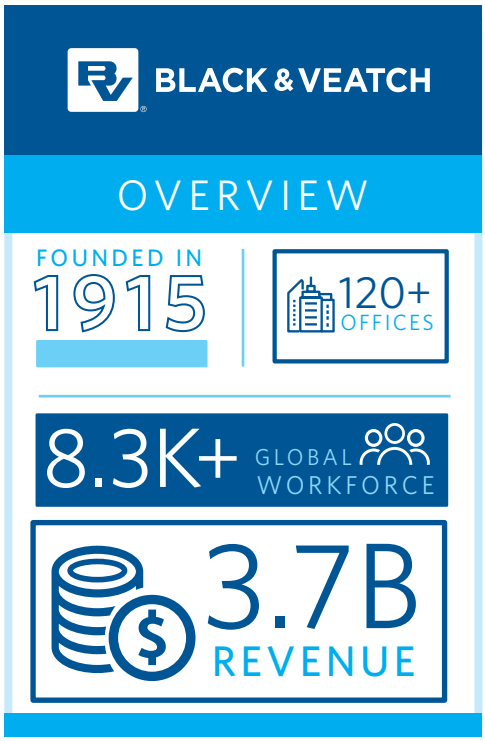
3 Description of Firm

Black & Veatch is the engineer of choice for numerous water providers throughout Southern California because of our high level of service and our ability to meet goals, similar to our history with MWDOC.

Although you already know who we are, this Section will remind you why we are the right choice to serve your projects. You also have seen the quality we deliver with every task, and we look forward to continuing this level of service as we help you achieve your goals.

Black & Veatch is a leading global engineering, consulting and construction company specializing in infrastructure development in energy, water, telecommunications, management consulting, federal and environmental markets. Founded in 1915, Black & Veatch develops tailored infrastructure solutions that meet clients' needs and provide sustainable benefits. Solutions are provided from the broad line of service expertise available within Black & Veatch, including conceptual and preliminary engineering services, engineering design, procurement, construction, financial management, asset management, program management, construction management, environmental, security design and consulting, management consulting and infrastructure planning. With over $3.7 billion in revenue, the employee-owned company has 8,300 employees in more than 120 offices worldwide and has completed projects in more than 100 countries on six continents.

Having been in business for the last 100 years, we've built the capabilities and experience required to successfully serve an array of water districts and agencies including MWDOC.



> *Matt and B&V are very responsive and have demonstrated significant understanding of water issues in Orange County. Matt regularly suggests options and alternatives that are well considered, and we regularly recommend B&V to others. We have found Matt to be extremely knowledgeable and responsive on all of our projects."."*

CHARLES BUSSLINGER, P.E.
PRINCIPAL ENGINEER | MWDOC

Your expectations, and our ability to meet those expectations, are already known because of the ongoing working relationship between our team and yours. To summarize our capabilities presented in this SOQ, we have prepared the following table to respond directly to the evaluation requirements provided in Section 3.2.1 of the RFQ. Like we have done before, we will continue to be your Trusted Partner and help you make decisions that will result in technically-sound, cost-effective, and stakeholder friendly projects.

Black & Veatch's capabilities reflect our local team's technical excellence and knowledge of MWDOC requirements. We have the depth and breadth to provide the highest level of engineering services from day one through the contract's duration.

Summary of Black & Veatch Team's Ability To Meet or Exceed MWDOC Requirements

EVALUATION CRITERIA	HOW WE MEET THE CRITERIA	WHERE WE HAVE DONE IT	BENEFITS TO MWDOC

As-Needed/Technical Approach
▪ Understanding of On-call Professional Services Contracts required by MWDOC
▪ Approach to addressing and completing the tasks to be assigned on an as-needed basis
▪ Project Management capability and understanding of as-needed Contract Administration
▪ Ability to work with MWDOC as a team; including other hired consultants
	Our SOQ describes Black & Veatch's approach to providing as-needed and technical services in several places: Section 1 summarizes our on-call experience for MWDOC and additional California agencies: Section 3 presents a flow chart of our typical approach to providing on-call services; and Section 5 briefly describes our wide range of project management tools. We have proven our team-oriented approach working with you on a number of recent projects discussed throughout this SOQ.	▪ Proven track record with on-call services for MWDOC and others clients such as:
		  ▪ Metropolitan Water District of Southern CA
		  ▪ City of Anaheim
		  ▪ Inland Empire Utilities Agency
		  ▪ City of Los Angeles
		  ▪ Orange County Sanitation District
		  ▪ City of San Diego
			▪ Assurance that work will be performed by individuals who understand your contract management approach.
			▪ Satisfaction that assignments will be completed to the highest industry standards.
			▪ Compliance with schedule and budget.

Prime Consultant and Team Experience
▪ Expertise of the Consultant/Team in the fields necessary to complete the tasks listed in this RFQ
▪ Experience and results with similar professional services contracts involving the nature of work anticipated under this RFQ
▪ Demonstrated capability to complete deliverables within the agreed budget and timeline
▪ Depth of available sub-consultant resources in each specified discipline and commitment to the contract.
	As shown on the Organization Chart in Section 2, our team encompasses the expertise required for successful delivery of the engineering projects. Of the 17 people listed on the Organization Chart, 12 individuals have worked with MWDOC; 13 have worked with Metropolitan Water District; and 8 have worked for both agencies. Sections 3, 4, and 7 discuss the team's added value. We: (1) have recent, relevant experience developing water system models as well as evaluating water system integration issues in Orange County, (2) have worked with you, your member agencies, and other major stakeholders such as Metropolitan Water District, and (3) have gained "hands-on" experience with the studies and preliminary engineering from which the current model update has evolved. We retain a strong depth of subconsultant relationships beyond what is presented herein. Your projects will always have a failsafe within our team.	▪ Five MWDOC Projects over the past four years.
		▪ Numerous work for other Southern California agencies, discussed throughout this proposal, including:
		  ▪ Metropolitan Water District of Southern California
		  ▪ Coachella Valley Water District
		  ▪ EMWD, and others
			▪ Confidence in experts who have executed successful projects for Southern California agencies, including MWDOC, Metropolitan Water District, Orange County Water District, and Irvine Ranch Water District.
			▪ Team that is high on the learning curve and understands the complexities of integrating new water supplies into Orange County's water system.
			▪ Comprehensive knowledge of MWDOC's hydraulic model.
			▪ Strong local presence to ensure timely responses and deliverables within budget.
			▪ Team who will leverage lessons learned on MWDOC's behalf.

EVALUATION CRITERIA	HOW WE MEET THE CRITERIA	WHERE WE HAVE DONE IT	BENEFITS TO MWDOC
Assigned Project Staff ■ Relevant experience of staff assigned to the type of work anticipated in the RFQ ■ Professional qualifications ■ Availability of assigned staff ■ Demonstrated capability in producing cost-effective project results	Black & Veatch does not take lightly the assignment of key personnel to any project team, and we have selected the team proposed for MWDOC's assignments with special care. As described in Section 2 our team members bring expertise in all of the engineering services envisioned in your SOQ, including a majority with direct experience with MWDOC. Section 4 highlights their full availability to continue being of service. The team members are assigned to the project for the duration and will be available to you as needed. We place a high value on your satisfaction and will go that extra mile to assume the long term commitment and integrity of the team.	■ Five MWDOC Projects over the past four years. ■ Numerous work for other Southern California agencies, discussed throughout this proposal, including: ■ Metropolitan Water District of Southern California ■ Coachella Valley Water District ■ EMWD, and others	■ Confidence in experts who have executed successful projects for Southern California agencies and who understand local and regional water management issues. ■ Team who will leverage lessons learned on MWDOC's behalf.
Organization ■ Current workload and resources ■ Capacity and flexibility to complete high quality work in a timely manner ■ Ability to perform on short notice ■ Presentation, clarity, organization of submittal, and responsiveness to project approach submittal requirements	Our proposed team has the capacity to meet your needs on short notice; each team member's estimated availability is shown in the teams section. We understand your process and are ready to quickly respond to RFPs and rapidly initiate new tasks, following through to project completion and your approval.	■ In addition to working for MWDOC, the proposed team has served a variety of on-call contracts highlighted throughout this SOQ.	■ Your expectations are already known and ingrained into our approach. Knowing how to deliver from day 1 means (1) easier project initiation, (2) improved communication, and (3) a stronger focus on quality.
Contracting Processes ■ Demonstrated commitment to cost effective and accountable contracting processes	Our team is, and aways has been, committed to an effective and efficient contracting process. We bring this commitment to each project and the benefit to our clients is clear in the numerous on-call contracts we serve.	■ Over the last five years of assignments for MWDOC we have completed every assignment within budget.	■ You know what to expect because you've seen us consistently facilitate the contracting process; we know how to deliver to your needs and requirements.

TRACK RECORD ON PROVIDING ON-CALL TECHNICAL SERVICES

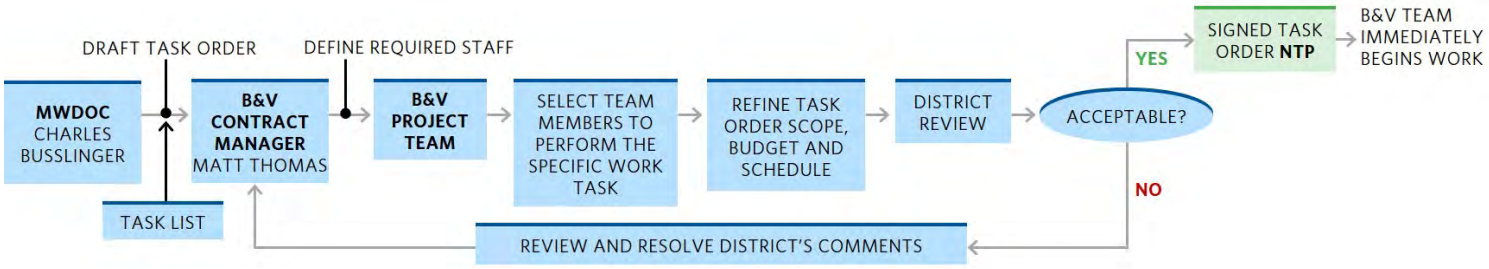
Black & Veatch has delivered high quality technical on-call services for numerous agencies throughout Southern California, including MWDOC, as shown to the right. We have resolved technical issues and coordinated with regulator agencies, community groups, and other project stakeholders. From these experiences, we understand how to successfully deliver on-call projects. In fact, MWDOC has already seen us deliver high quality technical services in recent, and ongoing, projects:

- Evaluation of Metering Options for MWDOC Member Agencies
- Conceptual Evaluation for Integration of Huntington Beach Desalination Plant Supply into East Orange County Feeder No. 2
- New Local Water Supply Integration White Paper
- OC Distribution System Hydraulic Model - Phase 1 Evaluation
- OC Distribution System Hydraulic Model - Phase 2 Model Development

Black & Veatch's high quality of service makes us the Engineer of Choice for On-Call Services to numerous clients throughout Southern California.

Our On-Call Technical Services Approach

Black & Veatch understands MWDOC's on-call technical services approach. The flow chart below illustrates how Black & Veatch executes on-call projects for MWDOC and others. Once MWDOC requests a task order, Matt will work with the management team to identify the right ream for your project. Our team will propose an approach that will provide MWDOC with confidence that the task has a well thought-out scope, budget, and schedule and that it will be executed by a fully qualified staff. We understand that the tasks may require immediate action on short notice, and we stand ready to respond as needed. We are excited about the opportunity of continuing our relationship with MWDOC as you move forward on your reliability planning, engineering, and resource development efforts.



Black & Veatch's task order management process ensures your scope is fully developed and accurately planned prior to project start.

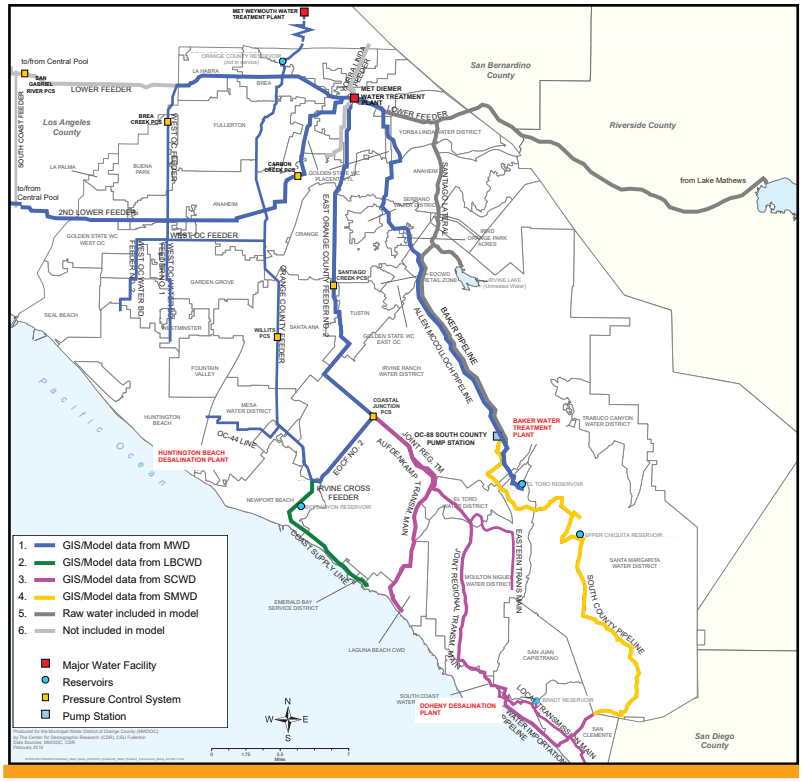
RELEVANT QUALIFICATIONS

The expertise of our team is the reason we are fortunate to serve MWDOC on several recent and on-going projects. We have passed the learning curve and have enjoyed good working relationships and high quality services. Listening to MWDOC staff during meetings and throughout projects, our team has heard your goals and concerns, we understand where you are going and have shown you our ability to help get there.

Helping You Define Your Path to Greater System Reliability

Black & Veatch is proud to have been MWDOC's partner in supporting technical evaluation of potential new water supply projects. As described in Section 7, we have assisted MWDOC with four recent projects setting the stage for the currently-envisioned tasks. The team members proposed in this SOQ worked on these past projects, enabling us to hit the ground running on day one. We bring Added Value in several ways:

- Our hands-on knowledge will enable us to move forward immediately – saving you time.
- We will leverage relationships established through workshops with MWDOC, your member agencies, Metropolitan, and others – expediting stakeholder buy-in.
- We know how to use the model – saving costly training time.
- We already have ideas about what needs to be done to resolve the specific concerns identified in your RFQ and are excited about the opportunity to move forward with you.



Black & Veatch has analyzed GIS data from the agencies shown above and understands how to transform this information into useful planning tools.

The following table identifies some of the common topics MWDOC encounters and Black & Veatch's approach.

TOPIC	BLACK AND VEATCH APPROACH	MWDOC PROJECT
Maintenance Issues, Hydraulic Control, and Hydraulic Transient	We have investigated the Orange County Conveyance Network with an emphasis on the Allen-McColloch Pipeline and South County Pipeline.	PHASE 2- MODEL DEVELOPMENT 2021
Metropolitan Engineering, Operations, and Water Quality Protocols and Procedures	We understand how Metropolitan's system connects to and interacts with the MWDOC system, and we have already worked with Metropolitan's operations staff during the model build to discuss the different operating scenarios of their system.	PHASE 2- MODEL DEVELOPMENT 2021
Hydraulic and Water Quality Modeling	We know the capabilities of the InfoWater modeling software platform and what tools can be used to supplement the development of additional water quality analysis	PHASE 1-EVALUATION 2020
GIS	Our years of experience in GIS and modeling applications, and Infowater specifically, is based on Esri's ArcGIS Desktop platform and can accept various spatial data formats including updated GIS information.	PHASE 1-EVALUATION 2020
Water Distribution System	We have investigated the various sources of new water supplies into the Orange County system and identified potential impacts of these new water supplies.	WHITE PAPER (2019)
Water Quality Issues	Our review of physical and water quality issues related to system integration allowed us to target potential issues related to ensuring a stable finished water supply capable of resisting changes within the system.	WHITE PAPER (2019)

Leading the Industry in Hydraulic Modeling and Master Planning

Our goal is to make you successful in both answering your questions and helping communicate results and recommendations to member agencies and other stakeholders. Black & Veatch performs numerous water and wastewater master plans and studies each year, and we are excited to use our vast planning experience to help MWDOC leverage their hydraulic model. We will help you address operational and planning questions related to moving water throughout available transmission mains. Through this on-call, MWDOC will better understand the impacts of planned changes on the system, improving flexibility and optimizing existing operations. Our team will bring an understanding of the overall system learned from the model build and calibration. In addition, our team brings experience from helping other communities throughout the United States address their operational and emergency planning concerns.

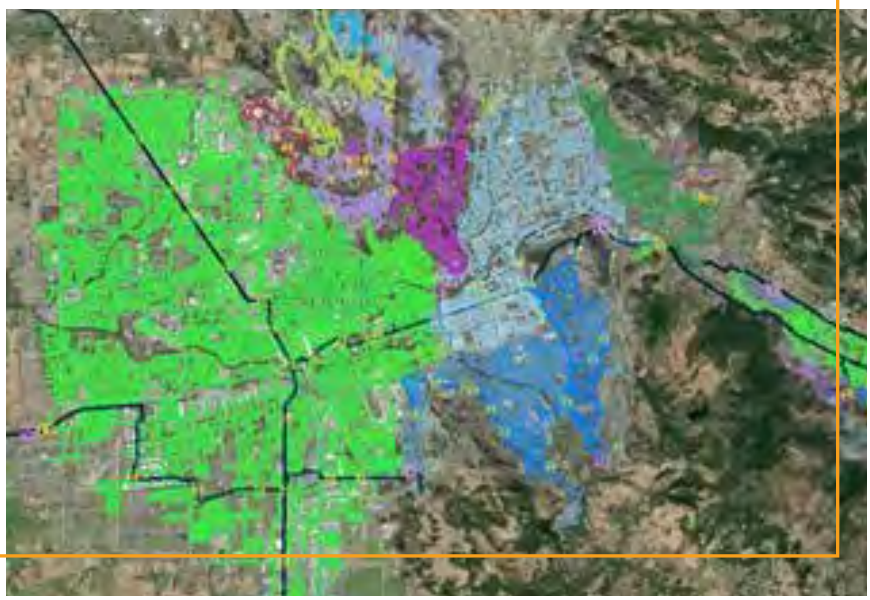
Black & Veatch has extensive experience across the United States and locally, in developing, using and analyzing water distribution system models and documentation. We will continue providing you with high quality analysis as the foundation for sound planning.

Prove it

We understand how to take complex data sets and turn that into a tool for you and our other clients to use when planning for future conditions like in the following project sample.

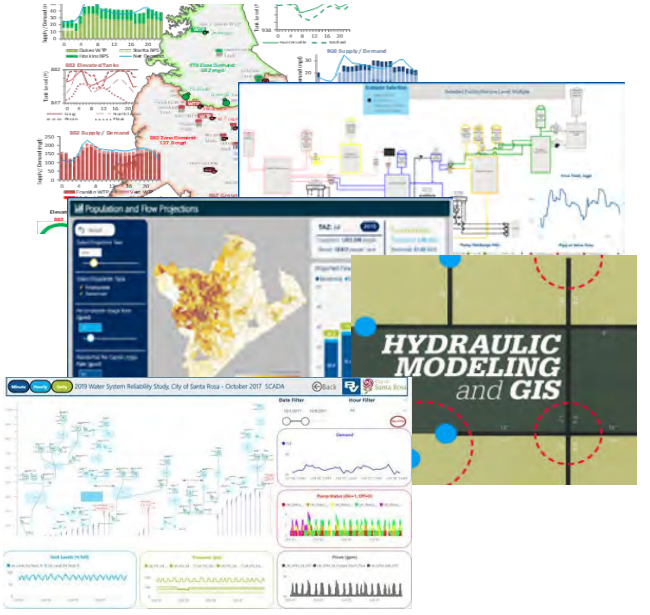
CITY OF SANTA ROSA 2019 WATER RELIABILITY STUDY

After the 2017 Tubbs Fire, the City of Santa Rosa wanted to "see" what had occurred and to understand the system behavior in the hours before, during, and after the fire. Black & Veatch created dashboard tools in Microsoft Power BI using links to SCADA data, modeling data, and water quality monitoring data and provided them to City Staff. These tools helped the City to develop a reliability-focused improvement plan for communications, technology, infrastructure, and emergency response.



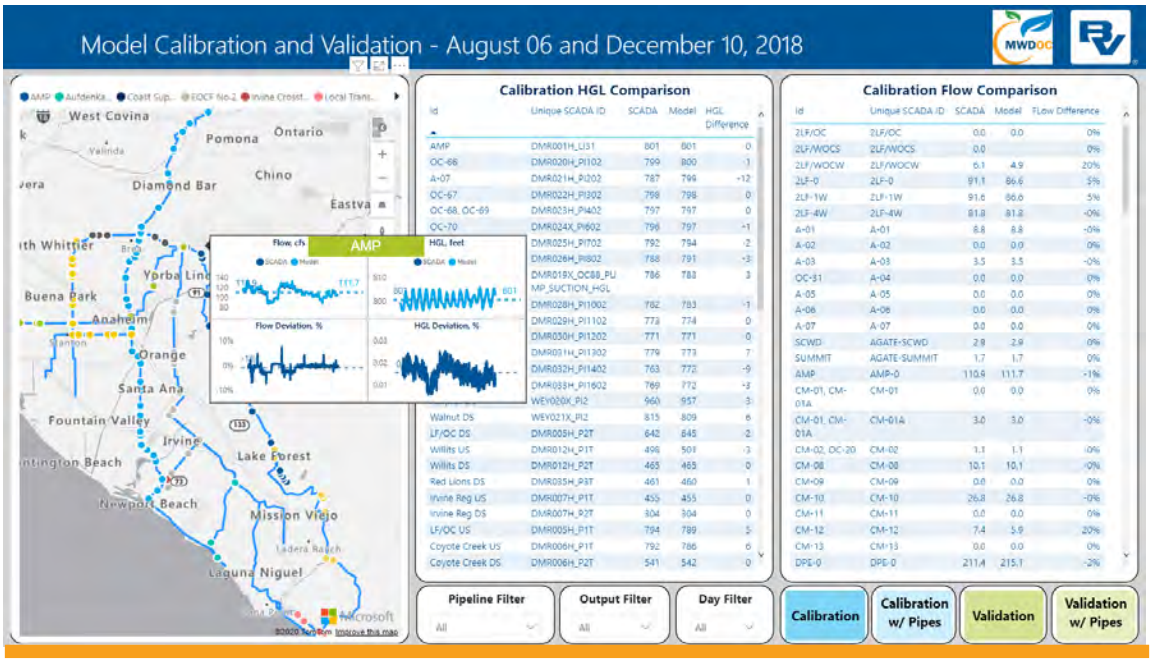
Leading in Technology, Partners with MWDOC

We see one of the critical ways we can help MWDOC is to continue to develop the hydraulic model and work with you for a developing a technology vision for the future. Black & Veatch planning and asset management engineers are leading experts in leveraging and integrating our hydraulic models with many different software technologies and enterprise systems. Our experience with this goes back three decades and includes our contributions to the landmark "Hydraulic Modeling and GIS" handbook which was a collaborative effort with ESRI in 2011. More recently, we have continued to develop innovating methods for leveraging information from SCADA, CIS, CMMS, and other enterprise data systems in addition to GIS to integrate with our hydraulic models.



Black & Veatch has successfully used technology to provide the best products for our clients.

As MWDOC has seen in our performance, these integrations have improved our ability to help calibrate your models and share critical model outputs. Beyond the integration of software technologies, we routinely utilize sophisticated water quality modeling, risk-based prioritization, and system optimization software tools to support our system modeling analysis. This improves our ability to help you make informed decisions regarding and operational improvements. Most recently over the past couple years, we have become leaders in leveraging Business Intelligence (BI) technology to greatly improve our data analytics and visualization, dynamic data connections to various enterprise software systems including hydraulic models, as well as to develop a user-friendly and dynamic platform for delivering our planning and asset management solutions. As shown below, you have already seen our ability to hear your needs and deliver a dashboard customized to your specific uses and preferences.

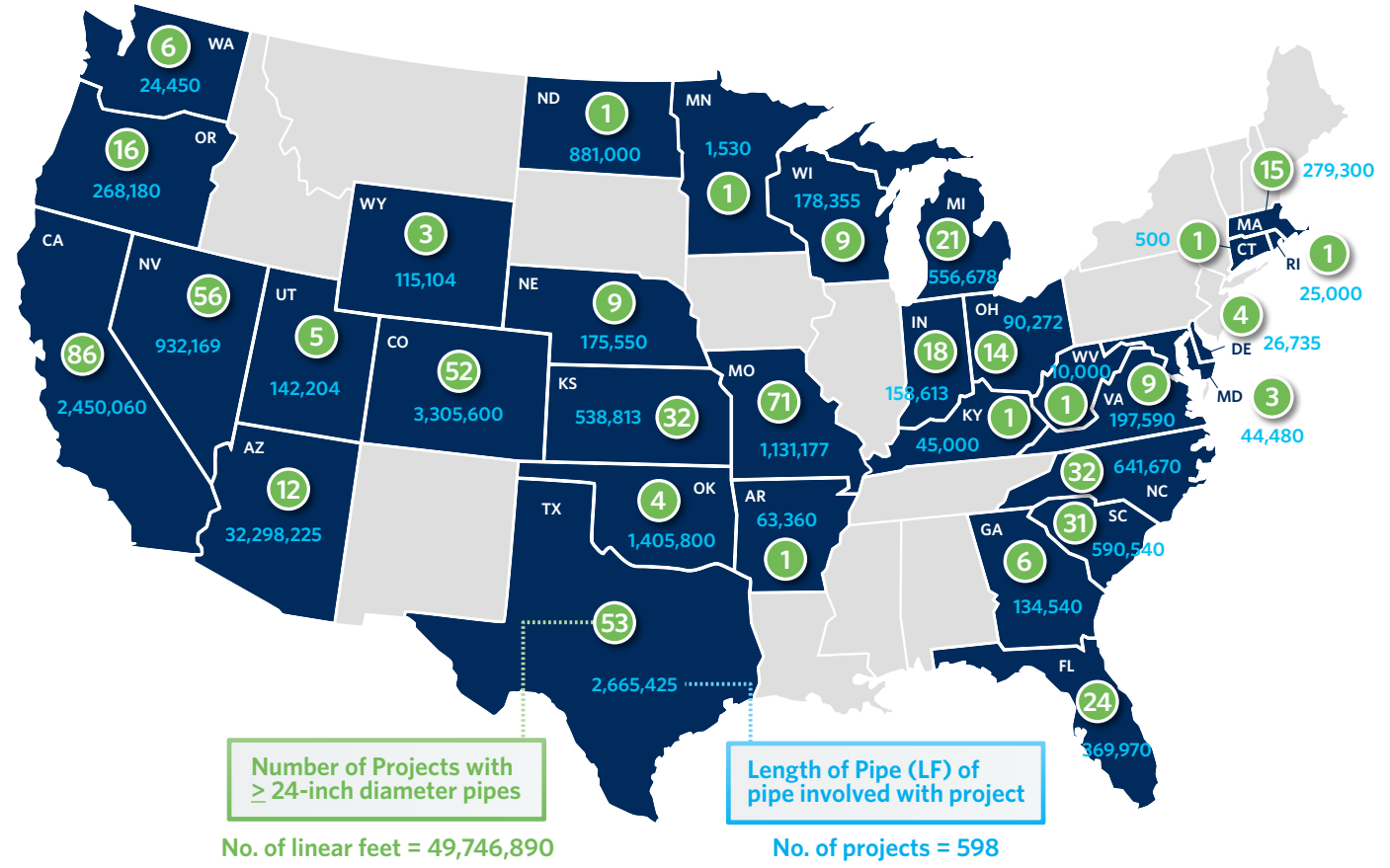


As part of the OC Distribution System Hydraulic Model Phase 2, Black & Veatch organized data from multiple agencies into a Power BI Dashboard. This tool was critical to help identify data gaps, anomalies in SCADA data, and to illustrate the accuracies of the model calibration.

Unmatched Pipeline Experience

When expert planning and design are needed for water conveyance, proof of performance matters. Black & Veatch studies, plans, routes, designs, constructs, inspects and maintains water conveyance pipelines. Black & Veatch has a track record spanning over a century of success, with over 10,000 projects and 12,000 miles of water, wastewater, and stormwater buried infrastructure worldwide, with diameters ranging from 2 to 144 inch with virtually every pipe material. No matter what technology or approach it takes to route, control, channel, or store water, Black & Veatch can deliver.

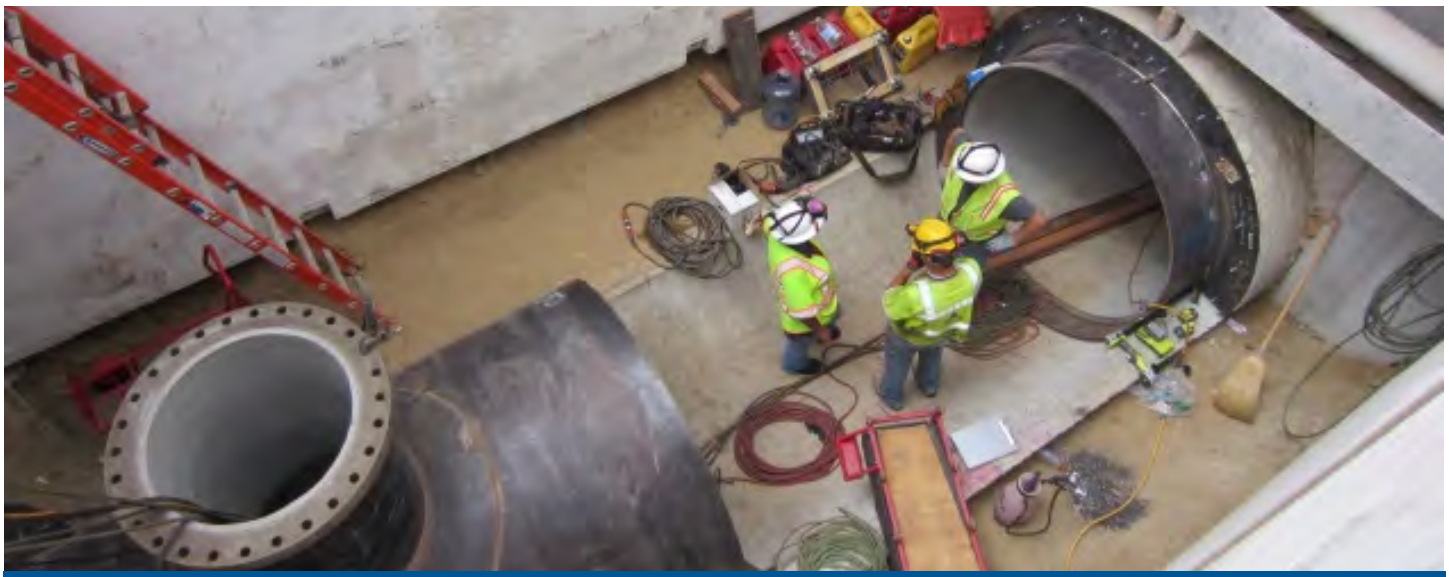
Black & Veatch has developed a strong presence in Southern California and has a proven track record on pipeline projects. Black & Veatch's pipeline team, **Jeremy Clemmons, Kristi Kuhlmann, Rob Kaessner,** and **Jennifer Thompson**, have assisted many major California utilities on alignment studies, pipeline conveyance, and tunneling projects including: Metropolitan's Second Lower Feeder and Rialto Pipeline PCCP Rehabilitation, Orange County Water District Groundwater Replenishment System Expansion as well as Eastern Municipal Water District's Cactus II Feeder Pipeline and Perris Boulevard Pipelines.



Black & Veatch has extensive pipeline experience across the United States and worldwide, including a design-build group who often provides constructability reviews and cost estimates, helping more clearly define the scope and budget for future planning.

As designers and design-builders, we understand what goes into pipeline design and construction, as well as key pitfalls that go along with the process. From this experience we provide a strong foundation upon which future plans and costs can be accurately determined.

In addition to designing and constructing new pipelines, the Black & Veatch condition assessment and asset management design group is ready to tackle any type of project that involves MWDOC's existing piping systems. As existing underground infrastructure continues to age, utilities worldwide are investing in rehabilitation and replacement of pipelines. Black & Veatch uses the latest technologies to perform condition assessment of pipelines and we are experts in trenchless technologies for pipeline rehabilitation. Our design approach is focused on replacing the right pipe, at the right time, with the right material.



METROPOLITAN SECOND LOWER FEEDER

The Metropolitan Water District of Southern California is implementing a Rehabilitation and Replacement Program (Program) for prestressed concrete cylinder pipe (PCCP). The Program includes prioritization and rehabilitation of the PCCP portions of five at-risk feeders, starting with the Second Lower Feeder (SLF), the pipeline estimated to have the highest risk of failure. Black & Veatch completed preliminary design in March 2015 and final design and construction support services began in 2016 and are ongoing. The SLF Pipeline is approximately 39 miles long and is comprised of about 30 miles of PCCP that has experienced deterioration over its service life. The Project consists of relining significant lengths of 78-inch and 84-inch diameter PCCP pipe with new steel liner suitable for a maximum working pressure of 270 psi. Other components of the SLF Rehabilitation include sectionalizing valve isolation structures, flow meters, pipeline appurtenances, isolation valves, and temporary bulkheads. The Project will be implemented through 11 construction contracts completed over 15 years and will result in a transmission pipeline with a renewed service life in excess of 50 years.

Black & Veatch has provided consulting engineering services to Metropolitan for more than 30 years. The company's significant experience with the design of large-diameter pipeline, coupled with our knowledge of Metropolitan's people, policies, and procedures, led to the quick development of a collaborative workshop approach to streamline and coordinate both preliminary and final design. Regular focus meetings between Black & Veatch and Metropolitan have resulted in coordination of parallel design efforts and have facilitated stakeholder buy-in as the Project has evolved.

Worldwide Desalination Experts

Black & Veatch's background in desalination makes us the right partners to accurately plan and forecast the impacts of adding a desalinated water source into the OC distribution system. Our team has the right background such as our experience with one of the largest seawater desalination plant in the Western Hemisphere, 76-mgd pressure filter/RO with deep water intake for BHP mining in Chile. Our range of expertise also includes one of the smallest desalination units; a specialty-built 1-mgd facility, beach well/RO with limits on construction practices and materials, for the arid Gaza Strip for USAID.

Whether it be due to the need for consistent desalinated water supplies for industry, arid climates, or international treaties; Black & Veatch is the leader in state-of-the-art seawater desalination design and construction. Black & Veatch had done the first thermal desalination plant in Hong Kong several decades ago. To further emphasize our expertise in desalination, making us the right planning partners for MWDOC, when Hong Kong decided to have a new desalination plant with RO technology, they turned to Black & Veatch for a new 36-mgd desalination facility. Black & Veatch is also conducting a major pilot study for Tampa Bay seawater desalination plant expansion.

PUB SINGAPORE'S NATIONAL WATER AGENCY

Our Reference:

23 Mar 2018

Black & Veatch (SEA) Pte Ltd
491B River Valley Road
#05-01 Valley Point
Singapore 248373

Dear Sir/Mdm,

**TESTIMONIAL FOR 70 MGD DE
PROJECT AT TUAS**

We are pleased to confirm
PUB to provide engineering consul
at Tuas under a design-build-own-

2 Black & Veatch provided co
the project:

(a) Stage 1 – Preparation of
(b) Stage 2 – Clarification, E
(c) Stage 3 – Financial closu
(d) Stage 4 – Professional a

3 The plant has successfully
the performance of B&V throughou

Yours faithfully

Ong Han Hai (Mr)
Chief Engineer
Water Supply (Plants) Department
PUB, Singapore's National Water A

BHP

January 2020

Cindy Wallis – Lage, Black & Veatch President:

Dear Cindy,

On behalf of the NPI Program, I would like to thank you for the outstanding commitment and transcendental contribution made by the workers of Black & Veatch to the successful completion of the Escondida Water Supply Expansion (EWSE) project.

I would like to highlight their interest and good will in reaching each goal with team work, in an integrated manner and their willingness to share their knowledge with their BHP colleagues and the collaborating companies.

I highly value the professionalism and dedication that your team put into overcoming each of the challenges that EWSE presented, and in meeting, without accidents, safety and efficiently, the scheduled milestones to expand the desalination plant that supplies processed water to Escondida.

I hope that you can transmit our congratulations and profound recognition to the entire Black & Veatch team that participated in this important project.

Warm regards,

Ricardo Sadir
Director NPI Program

Marcos Bastias
Vice President Mam Project

It is because of our high quality service that we receive letters of recommendation from our clients like those above. MWDOC can feel certain Black & Veatch brings the right approach to every project.

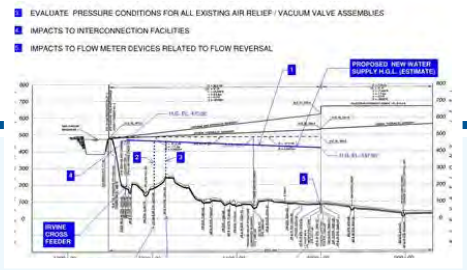
ESCONDIDA WATER SUPPLY

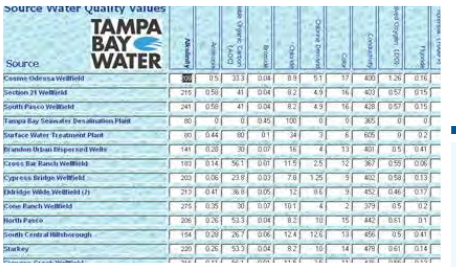
A reverse osmosis plant is a series of simple processes put together in an incredibly complex pattern. For the Escondida project, it required all aspects on a project delivery; from a 220 kV transmission lines to a technically advanced treatment facility and coordination of controls and communications to deliver that water to the mine through a long, high-pressure pipeline with pump stations in series. With Black & Veatch's expertise in power generation/transmission, water treatment, energy recovery, pipeline construction, and telecommunications; BHP Billiton was able to provide 75 mgd of desalinated seawater miles inland and 112 miles up the side of a mountain range to an elevation of 2 miles, 42-inch diameter pipeline at pressures up to 2000 psig to meet schedule, budget, and water quality.

Strong, Local Water Quality Experience and Capabilities

Providing high-quality water sources is fundamental to MWDOC's mission, therefore understanding and anticipating water quality impacts and issues are critical to planning studies that MWDOC undertakes. As MWDOC looks at the future, there are a number of water quality issues that could be important to understand, such as blending new supplies into the MWDOC network. Blending new supplies will require evaluating and projecting many different water quality constituents while working with the MWDOC member agencies and Metropolitan Engineering, Operations, and Water Quality staff. One the critical aspects will be how to maintain adequate alkalinity concentrations and appropriate pH conditions, as they are critical in providing a stable finished water that is capable of resisting changes within the system that may lead to corrosive degradation and/or encourage growth of nitrifying bacteria.

Our team has experienced local water quality experts supported by additional national leaders in the field to help MWDOC plan for the future water quality issues it is facing. Our water quality work will be led by **Lee Portillo, Dr. Gil Hurwitz,** and **Dr. Jeff Neemann** who are local to Southern California and recognized experts. Their recent work with MWDOC on the New Local Water Supply Integration White Paper showed their expertise, their insights and how they can work with the Metropolitan staff. The same team recently developed a statistical water quality blending model that used Monte Carlo simulation and probabilized water quality projections to support the Final Expansion of Orange County Water District's Groundwater Replenishment System. This same team developed a similar statistical water quality modeled for Eastern Municipal Water District's Perris II Desalter that modeled 12 wells, RO treatment and then projected finished water quality and blending. Regardless of the water quality issues, our team has the resources to support MWDOC's source planning efforts.





MWDOC

New Local Water Supply Integration White Paper

The White Paper reviewed the water quality and hydraulic concerns with integrating a 50 mgd desalinated water source into the Orange County drinking water system.

- The white paper provided an in-depth analysis of potential physical and water quality impacts to the existing drinking water system and wastewater/ water recovery facilities in the region.
- Addressed critical water quality issues with desalination, such as boron concentrations and their impact on water uses and downstream impacts.
- Collaborated with Metropolitan operations and engineering on critical water quality issues and their impact on Metropolitan procedures and requirements.

TAMPA BAY WATER

Water Quality Modeling Support

Over a period of years, our team developed a water quality blending model to act as a tool for Tampa Bay Water (TBW) to select different sources and project water quality parameters for its member agencies.

- Modeled 15 different water sources for meeting water quality requirements at 9 turnouts.
- Developed a spreadsheet model that was later integrated with the hydraulic model.
- A critical aspect of that model was integrating it with the hydraulic model and projecting alkalinity and pH conditions to address corrosion control and evaluate nitrification potential within their and their member agencies distribution system.

Section 4

4 Firm's Capacity

The Black & Veatch team members have been selected with availability in mind, ensuring your projects are given the appropriate resources.

OUR TEAM'S QUALIFICATIONS ARE THE KEY TO MWDOC'S SUCCESS

The qualifications of our team, and their experience in working together to deliver complex projects, are second to none. As defined in our organization chart in Section 2, our team has will be led by our Contract Manager, **Matt Thomas**, who will work closely with our four highly qualified Project Managers/Engineering Managers - **Karen Burgi, Derek Kurtti, Lee Portillo** and **Andy Stanton** - to identify the right team to complete all engineering tasks.

Black & Veatch has a deep bench of personnel with expertise to meet all your project needs; water quality, treatment, hydraulic modeling, system integration, electrical, I&C, structural, cost estimating, system operation, and business intelligence solutions. We have selected a few of those professionals who are ready to help with all necessary aspects of your tasks.

As highlighted in the brief biographies below, many of our staff members have hands on experience working with MWDOC, Metropolitan, and other agencies influencing Orange County water supplies. We will leverage this value-added experience when performing MWDOC's engineering tasks. More detailed resumes can be found in the Appendix A: Resumes.

MATT Thomas, P.E.

CONTRACT MANAGER

Technical and institutional insights from managing all of Black & Veatch's recent work for MWDOC as well as a proven track record as a facilitator and consensus builder in addition to project management and execution.

Matt has nearly 30 years of professional experience in planning, design, and rehabilitation of water and wastewater pipelines using both traditional and alternative delivery. His understanding of MWDOC's system is bolstered by his understanding of other Orange County water systems. Another asset Matt brings to the project is his knowledge of Metropolitan Water District's system and how its management affects successful implementation of MWDOC's proposed projects. Most recently he was Conveyance Team Leader of the Second Lower Feeder Preliminary Design and Project Manager of the Rialto Feeder Preliminary Design. Currently, he is leading Black & Veatch's effort to assist Metropolitan's in-house asset management staff to implement asset management practices across the entire organization.

EDUCATION BS, Civil Engineering	**PROF REGISTRATION** PE - CA
YRS EXPERIENCE 30	**AVAILABILITY** 15%

Thanks to a collaborative approach from MWDOC, I can forecast and prepare for your projects, ensuring the right people are ready at the right time."

- MATT THOMAS

KAREN Burgi, P.E.

PROJECT MANAGER/
ENGINEERING MANAGER/
HYDRAULIC MODELING

Valuable insights into MWDOC's system and stakeholder requirements from her role as Technical Lead on your OC Distribution System Hydraulic Model Phase 2.

Karen has extensive experience in master planning of both water and wastewater facilities. Her "big picture" understanding contributes to her ability to serve as a liaison between project needs and company-wide resources in hydraulic modeling and Master Planning. She interacted extensively with MWDOC and your stakeholders during the Phase 2 project and will build on knowledge gained to focus on hydraulic modeling in support of future system planning, system operations, and water quality in the next phase of the work.

EDUCATION
BS, Civil Engineering

PROF REGISTRATION
PE - CO & WY

YRS EXPERIENCE
28

AVAILABILITY
30%

DEREK Kurtti, P.E.

PROJECT MANAGER/
ENGINEERING MANAGER

Extensive experience overseeing the organization/ execution of project work and multidiscipline coordination.

Derek has 15 years of professional experience in water, wastewater, and reclaimed water engineering and general contracting. He has overseen the planning, design, and/or construction of water pipelines, pump stations, and other facilities and worked with Matt and Karen to support Phase 2 of MWDOC's OC Distribution System Hydraulic Model project. He also has worked with other members of our proposed team on projects for Moulton Niguel Water District, IRWD, and other Orange County Water agencies.

EDUCATION
BS, Civil Engineering

PROF REGISTRATION
PE - CA

YRS EXPERIENCE
15

AVAILABILITY
30%

LEE Portillo

PROJECT MANAGER/
ENGINEERING MANAGER/
DESALINATION EXPERT/
WATER QUALITY

Lead researcher and author of the White Paper prepared for MWDOC on the water quality issues related to integration of new water supplies into the EOCF#2/OC Distribution System.

Lee is a Senior Process Technologist specializing in water quality modeling, process design, and the application of filtration and desalination membranes to treat ground water, recycled water, and municipal wastewater. In addition to this experience for MWDOC, Lee understands Orange County water system water quality issues based on recent projects for Orange County Water District and Irvine Ranch Water District. He also has played a major role on Black & Veatch's desalination work for Eastern Municipal Water District.

EDUCATION
BS, Mechanical Engineering

PROF REGISTRATION
N/A

YRS EXPERIENCE
18

AVAILABILITY
25%

ANDY Stanton, P.E., PMP

PROJECT MANAGER/
ENGINEERING MANAGER

Thirty-plus years of pipeline experience and thorough understanding of Metropolitan's water treatment and distribution system.

Andy has been involved in every aspect of project development from preliminary engineering studies through final design, construction, and start-up and has a proven track record. He is the Project Manager and Contractor Administrator of Black & Veatch's current on-call contract with Metropolitan. Assignments have included facilities to address drought and emergency situations; strategies to minimize disruptions to plant operations; and precedent reports on equipment and methodologies. Recent, relevant experience includes serving as Project Manager on Preliminary and Final Design of the Second Lower Feeder.

EDUCATION
MSc, Environmental Engineering

PROF REGISTRATION
PE - CA; PMP; C.Eng

YRS EXPERIENCE
33

AVAILABILITY
25%

BIO INFORMATION	VALUE TO THIS PROJECT
 KEVIN LAPTOS, PE *Hydraulic Modeling* 30%	**Hands-on knowledge and experience with MWDOC system through his participation on OC Distribution System Hydraulic Model Phase 1 and Phase 2 projects.** Kevin has over 30 years of professional experience in engineering practice and management involving the planning, design, construction, operation, and rehabilitation of water and wastewater systems. He specializes in planning and modeling of water distribution and wastewater collection systems and transient analysis.
 MEGHAN MERLIHAN, EIT *Hydraulic Modeling* 40%	**Experience for MWDOC on the OC Distribution System Hydraulic Model Phase 1 and Phase 2 projects that well positions her for the next phases of the work.** Meghan has wide-ranging water resources experience including detailed design, planning, and engineering services during construction. She also understands the complexities of MWDOC's hydraulic model as well as the concerns of your member agencies.
 JAMES MAHER, PE *Hydraulic Modeling* 30%	**Ability to leverage gained during his experience as Lead Hydraulic Modeler on MWDOC's OC Distribution System Hydraulic Model Phase 2 Model Development.** James has more than 15 years of experience with developing, calibrating, and updating computer models of water systems. He knows how systems operate and how to develop ways to communicate with stakeholders through dashboards and other methods.
 KRISTI KUHLMANN, PE *Pipeline Design* 25%	**Expertise in managing large complex water pipeline rehabilitation projects, such as Metropolitan Water District's Second Lower Feeder.** Kristi is experienced in the design for a wide variety of municipal public works facilities for Southern California water systems. On the Second Lower Feeder, she coordinated the design for the rehabilitation of a segment of the existing PCCP within 15 jurisdictions in Los Angeles and Orange Counties.
 ROB KAESSNER, PE *Pipeline Design* 35%	**Extensive knowledge of Orange County water systems and expertise in maintenance issues, hydraulic control, and hydraulic transient control.** Rob worked on the initial studies for MWDOC and also has experience with Metropolitan Water District, giving him good insight into the interrelationship between the two systems. Other recent relevant projects include assignments for Orange County Water District, Irvine Ranch Water District, and the City of Tustin (OC-43 Vault Replacement Project).
 JEREMY CLEMMONS, PE *Pipeline Design* 15%	**Expertise in leading several complex large diameter pipelines including projects for the Metropolitan Water District of Southern California.** Jeremy has served as lead engineer on projects for Metropolitan, Eastern Municipal Water District, and other Southern California agencies. His focus has been on managing design and quality control teams on pipelines, flow control valves, and metering facilities.
 JENNIFER THOMPSON, PE *Pipeline Design* 25%	**Southern California experience focus including Metropolitan Water District's Second Lower Feeder.** Jennifer is experienced in a wide range of projects including general civil, mechanical, pipeline, water resource related projects and site development related projects. As a Lead Project Engineer on the Second Lower Feeder Final Design, she was responsible for three different pipeline relining contracts within a number of Southern California jurisdictions.
 BOB HULSEY, PE *Desalination Expert/ Water Quality* 25%	**Major contributor to White Paper for MWDOC (Initial Study, New Water Supply Integration into the MWD Utilizing the EOCF#2)** Bob leads engineers dealing with advanced treatment technologies such as oxidation and removal of micro-contaminants (EDCs, PPCPs, algal toxins, trace inorganics), taste and odor control, high rate sedimentation and flotation, membrane and biological filtration, ozone/UV/ClO2 disinfection, distribution system water quality, and desalination.

BIO INFORMATION	VALUE TO THIS PROJECT
 VASU VEERAPANENI, PHD, PE *Desalination Expert/Water Quality* 20%	**Pioneering work in desalination projects throughout the world both for Black & Veatch clients and for industry-acknowledged research foundations.** Vasu is a water treatment expert with focus on separation processes. In the Southern California arena, he has served as a process consultant on projects for Orange County Water District (GWRS Initial and Final Expansions), Eastern Municipal Water District, and the City of Long Beach.
 JEFF NEEMANN, PE *Water Quality* 15%	**Major contributor to White Paper for MWDOC (Initial Study, New Water Supply Integration into the MWD Utilizing the EOCF#2)** Jeff specializes in the development and application of advanced water treatment evaluation, pilot and demonstration testing, design, and operations. Recent relevant experience includes the GWRS Initial and Final Expansions, the EMWD Desalter, and the IRWD well treatment alternatives study.
 GIL HURWITZ, PHD, PE *Water Quality* 35%	**Major contributor to White Paper for MWDOC (Initial Study, New Water Supply Integration into the MWD Utilizing the EOCF#2)** Gil is a Process Specialist that specializes in membrane filtration and trace pollutant remediation. Dr. Hurwitz has experience in the research, design, and optimization of water treatment technologies in both the municipal and industrial sectors. Gil's recent process experience includes the EMWD Desalter, the IRWD well treatment alternatives study, and the Soquel Pure Water Program.
 AUSTIN CUNNIFF, PE *Water Quality* 35%	**Major contributor to White Paper for MWDOC (Initial Study, New Water Supply Integration into the MWD Utilizing the EOCF#2)** Austin is experienced in design of water, wastewater, and recycled water systems performing both in-plant and pipeline hydraulic analysis as well as process mechanical and civil site design.
 KEENE MATSUDA, PE *Electrical* 20%	**Extensive experience with Southern California water agencies including the Metropolitan Water District of Southern California.** Keene has extensive experience with electrical power distribution systems for a wide variety of utility, industrial, energy, and water resources projects including assignments for Orange County Water District, Irvine Ranch Water District, and Eastern Municipal Water District.
 ANDREW FRANKLIN, PE *I&C* 20%	**Extensive experience with Southern California water agencies including the Orange Count Water District and Eastern Municipal Water District.** Andrew is an I&C systems engineer with experience designing and implementing control systems including master planning, design, programming, scheduling, vendor selection, acquisition, installation, technical writing and technical presentation.
 MARK LOWE, PE *Structural* 15%	**Lead Structural Engineer on the majority of Black & Veatch's Southern California water projects.** Mark has managed structural design, and construction support for numerous water projects including assignments for the Metropolitan Water District of Southern California, Orange County Water District, Irvine Ranch Water District, and the Los Angeles Department of Water and Power.
 KIRK JOHNSON *Estimating* 15%	**Proven track record for producing reliable estimating services on projects well over a billion dollars.** Kirk has experience in field construction, project management and estimating on energy, chemical, refining, water, wastewater and oil field projects up to $1 Million.

Section 5

5 Project Management

Black & Veatch's primary project management goal is to successfully deliver services and practices to meet MWDOC's requirements and expectations. We understand the challenges associated with delivering successful as-needed services.

SCOPE

Our approach to project management is adaptable to meet any of the service needs defined by MWDOC. We will develop work packages to assign staff to associated subtasks for which progress, budget, and schedule will be tracked. It will also include a procedure for modification of project requirements – detailing cost and schedule impact assessment and justification for the proposed change.

SCHEDULE

We will develop a project schedules to integrate with our team resources to ensure that MWDOC's projects are sufficiently staffed. Our management team will ensure that for each project, the right personnel will be assigned to the task.

COST CONTROL

The development of level of effort and cost estimates by task and tracking costs are fundamental to budget management responsibilities. The key is breaking the tasks and budgets down into small enough units and having earned value criteria to be able to monitor performance and progress accurately. The main tool in monitoring the budget will be earned value analyses to compare the amount of work planned with the actual amount of work accomplished.

QUALITY ASSURANCE

Quality management is an essential aspect of our Project Management Plan. Procedures required to be followed prior to the issuance of deliverables will be documented in the project's QA/QC Manual. To maximize MWDOC staff review time, independent quality reviews of all the deliverables will be performed prior to each submittal to ensure that the deliverables are complete and meet the MWDOC's specific requirements.

RESOURCE PLANNING

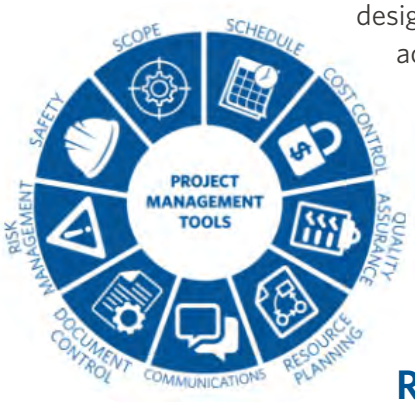
Resource planning is embodied in Section 2 describing the selective assignment of skilled and experienced staff to efficiently execute the work.

COMMUNICATIONS MANAGEMENT

Communication is one of the most important aspects, it includes correspondence protocols, meetings and workshops and standard document templates to ensure consistent, reliable, and clear communication takes place.

DOCUMENT CONTROL

We will use ProjectWise – Black & Veatch's web-based document management system – to ensure that our design team and MWDOC staff have real time access to the latest technical information, standards, design drawings, calculations, specifications, schedules, and other project documentation. ProjectWise is accessible from anywhere at any time, and provides a single place where all project information will be stored minimizing design inconsistencies.



RISK MANAGEMENT

Risk management involves risk identification as well as how these risks will be avoided, mitigated, or allocated throughout the project. The primary tool used to capture and manage risk is a Risk Management Plan. The plan includes risk management planning, identification, analysis, responses, monitoring, and control. The objective is to increase the probability of positive events and decrease the probability and impact of adverse events.

SAFETY

Safety By Design is Black & Veatch's motto and a practice followed by our designers, design-build teams, and all our teams. With safety in mind, we understand and have insight to the requirements of future projects, supporting your planning efforts with higher levels of accuracy and completeness.

Section 6

6 Insurance

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 11/1/2021 — 3/3/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER: Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000	CONTACT NAME: PHONE (A/C, No, Ext): FAX (A/C, No): E-MAIL ADDRESS:
INSURED 1482177 BLACK & VEATCH CORPORATION 11401 LAMAR OVERLAND PARK KS 66211 THOMAS, MATTHEW L. (MATT)	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A : Zurich American Insurance Company — 16535 INSURER B : Lexington Insurance Company — 19437 INSURER C : INSURER D : INSURER E : INSURER F :

COVERAGES **CERTIFICATE NUMBER:** 17398146 **REVISION NUMBER:** XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY	Y	Y	GLO 4641358	11/1/2020	11/1/2021	EACH OCCURRENCE	$ 2,000,000
A	CLAIMS-MADE X OCCUR			GLO 1365630	11/1/2020	11/1/2021	DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
							MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 2,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 4,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ 4,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY	Y	Y	BAP 4641355 (AOS)	11/1/2020	11/1/2021	COMBINED SINGLE LIMIT (Ea accident)	$ 2,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$ XXXXXXX
	X OWNED AUTOS ONLY; SCHEDULED AUTOS						BODILY INJURY (Per accident)	$ XXXXXXX
	X HIRED AUTOS ONLY; X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$ XXXXXXX
								$ XXXXXXX
	UMBRELLA LIAB OCCUR			NOT APPLICABLE			EACH OCCURRENCE	$ XXXXXXX
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ XXXXXXX
	DED RETENTION $							$ XXXXXXX
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY		Y	WC 4641353 (AOS)	11/1/2020	11/1/2021	X PER STATUTE OTH-ER	
A	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N: N	N/A		WC 4641354 (ID, MA, WI)	11/1/2020	11/1/2021	E.L. EACH ACCIDENT	$ 1,000,000
A	(Mandatory in NH)			WC 1365632	11/1/2020	11/1/2021	E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
A	If yes, describe under DESCRIPTION OF OPERATIONS below			WC 1365631 (NE)	11/1/2020	11/1/2021	E.L. DISEASE - POLICY LIMIT	$ 1,000,000
B	PROFESSIONAL LIABILITY	N	N	026030198	11/1/2020	11/1/2021	$10,000,000 PER CLAIM $10,000,000 ANNUAL AGGREGATE	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
PROPOSAL NUMBER: 835155.0032; PROJECT NAME: ON-CALL TECHNICAL SERVICES TO SUPPORT RELIABILITY PLANNING, ENGINEERING, AND RESOURCE DEVELOPMENT, RFQ ENG. 2021; PROJECT MANAGER: THOMAS, MATTHEW L. (MATT); GENERAL LIABILITY AND AUTO LIABILITY ARE PRIMARY AND NON-CONTRIBUTORY. DISTRICT, ITS DIRECTORS, OFFICERS, AGENTS, EMPLOYEES, ATTORNEYS, CONSULTANTS AND AUTHORIZED VOLUNTEERS ARE INCLUDED AS AN ADDITIONAL INSURED ON THE GENERAL AND AUTO POLICIES. WAIVER OF SUBROGATION IN FAVOR OF THE ADDITIONAL INSURED ON THE GENERAL, AUTO, AND WORKER'S COMPENSATION POLICIES.

CERTIFICATE HOLDER	CANCELLATION: See Attachments
17398146 MUNICIPAL WATER DISTRICT OF ORANGE COUNTY 18700 WARD STREET, FOUNTAIN VALLEY CA 92708	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE: Joseph M Arnello

ACORD 25 (2016/03) The ACORD name and logo are registered marks of ACORD

Section 7

7 Firm Experience

Black & Veatch brings a unique combination of recent, relevant experience with MWDOC and your member agencies; a 30+ year track record with the Metropolitan Water District of Southern California; and world-class expertise in water quality and seawater desalination. The brief project profiles below highlight the experiences we will draw on to help MWDOC implement the engineering tasks outlined in your RFQ. Our proposed team members worked together on one or more of these projects and are excited about the opportunity to collaborate with you as you move forward.

EXPERIENCE WITH MWDOC

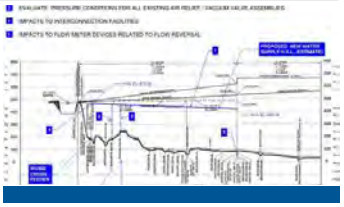
Since 2016, Black & Veatch has been providing engineering services on projects that have helped to build the foundation of the currently-envisioned engineering tasks. The assignments have given our team recent, hands-on knowledge of issues associated with Orange County water supply integration and water quality, modeling technologies, hydraulic control, and system operation.

Conceptual Evaluation for Integration of Huntington Beach Desalination Plant Supply into East Orange County Feeder No. 2

Black & Veatch conducted an evaluation of the potential blending of ocean desalination or groundwater basin water sources into the East Orange County Feeder No. 2 (EOCF2) facilities. Multiple strategies were developed to address water quality concerns focused on blending and finished water treatment solutions. A preliminary cost evaluation was prepared for EOCF2 lower reach facility improvements.

KEY TEAM MEMBERS
Matt Thomas, Rob Kaessner

New Local Water Supply Integration White Paper



The White Paper reviewed the water quality and hydraulic concerns with integrating a 50 mgd desalinated water source into the Orange County drinking water system. The paper provided an in-depth analysis of potential physical and water quality impacts to the existing drinking water system and wastewater/water recovery facilities in the region. The completed paper documented the research and provided recommendations on next steps and presented a proposal for modeling techniques required for integration.

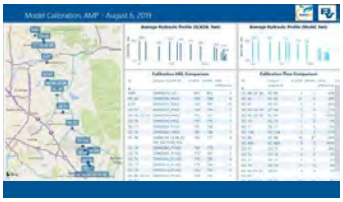
KEY TEAM MEMBERS
Matt Thomas, Jeff Neemann, Lee Portillo, Gil Hurwitz, Rob Kaessner, Austin Cunniff

OC Distribution System Hydraulic Model - Phase 1 Evaluation

Building on the recommendations in the White Paper, Black & Veatch performed the Hydraulic Model Phase 1 Evaluation. We collected model and GIS data from MWDOC member agencies and participated in workshops to with MWDOC and your member agencies to discuss their concerns. We also met with MWDOC and Metropolitan to coordinate modeling efforts.

KEY TEAM MEMBERS
Matt Thomas, Kevin Laptos, Meghan Merlihan

OC Distribution System Hydraulic Model - Phase 2 Model Development



Black & Veatch is currently updating the hydraulic models for the Allen-McColloch and South County Pipelines. This project will provide an updated, user-friendly model that is readily expandable to connect member agency systems (when needed). This project will act as the foundation for MWDOC's future planning studies and support new water supply integration projects.

KEY TEAM MEMBERS
Matt Thomas, Karen Burgi, Kevin Laptos, James Maher, Megan Merlihan, Derek Kurtti

EXPERIENCE WITH METROPOLITAN WATER DISTRICT

Black & Veatch has provided consulting engineering services to Metropolitan for more than 30 years. Early assignments ranged from studies and investigations as part of Metropolitan's pioneering Oxidation Retrofit Program (ORP) to planning, design, and construction support for major public works facilities, such as Diamond Valley Reservoir. More recently, our track record has included facilities to address drought and emergency situations, strategies to minimize disruptions to plant operations, augmentation of Metropolitan's in-house technical resources, and precedent reports on equipment and methodologies. Our experience demonstrates knowledge of Metropolitan's system, relationships/collaboration with Metropolitan staff, and an understanding of their hydraulic modeling capabilities, hydraulic control procedures, system operations, and water quality issues.

Second Lower Feeder PCCP Rehabilitation

Metropolitan is implementing a comprehensive PCCP Rehabilitation Program, which involves rehabilitation of five major pipelines. The first project to be implemented is the rehabilitation of the existing Second Lower Feeder (SLF). The SLF is approximately 40 miles long, operates at a pressure of up to 270 psi, and is located within more than 15 jurisdictions in Los Angeles and Orange Counties in a heavily congested urban environment. The project included an evaluation of construction cost, contract packaging and prioritization to develop a framework for implementation. Because the SLF is the first pipeline to be rehabilitated, it was paramount to get the process right the first time and create an efficient path forward for the remaining pipelines. SLF design is being used to establish overall PCCP Rehabilitation Program standards and common methodologies for design as well as communication with stakeholders.

KEY TEAM MEMBERS

Andy Stanton, Kristi Kuhlmann, Matt Thomas, Jeremy Clemmons, Jennifer Thompson, Mark Lowe, Keene Matsuda, Rob Kaessner

Rialto Pipeline Rehabilitation

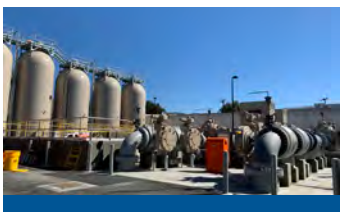
Black & Veatch performed preliminary design of the project, another key part of Metropolitan's PCCP Rehabilitation Program. The 30-mile pipeline, which operates at pressures up to 160 psi with a maximum static head of 270 psi, conveys each branch of the California State Water Project (SWP) water from the Devil Canyon Facility to Metropolitan's San Dimas Flow Control Facility. When the Pipeline is out-of-service, Metropolitan has no other means to deliver water to these points. Black & Veatch developed a robust evaluation of rehabilitation alternatives that would allow Metropolitan to continue delivering water for regional usage with minimal interruptions. Key issues included addressing capacity constraints and minimizing operational and community impacts.

KEY TEAM MEMBERS

Matt Thomas, Andy Stanton, Kristi Kuhlmann

As-Needed Engineering Services

In recent years, Black & Veatch has managed as-needed services for more than 30 on-call projects with fees ranging from $40,000 to $1.3 million and construction costs up to $30 million. Projects included the Etiwanda Pipeline, Lining Study, Perris Pumpback Facility – Surge Control System; Sepulveda Canyon Tanks Long Term Liquefaction Mitigation Concept Evaluation; and Palos Verdes Reservoir Inlet and Outlet Facility Modification Study.



KEY TEAM MEMBERS

Andy Stanton, Matt Thomas, Kristi Kuhlmann, Jeremy Clemmons, Rob Kaessner, Mark Lowe, Keene Matsuda

DESALINATION EXPERIENCE

As displayed in Section 3, Black & Veatch has assisted with numerous key desalination projects throughout the world, as a global leader in seawater salination. We have been a leader in California as well. Throughout the 1990s, we worked with pioneering agencies such as Metropolitan Water District of Southern California, San Diego County Water Authority (SDCWA), and others investigating ocean water desalination opportunities at Southern California coastal power plants. In 2008, we teamed with another engineering consultant to form the Colorado River Water Consultants Joint Venture to assist the seven Colorado River Basin States conduct a study of Long-Term Augmentation Options for the Water Supply of the Colorado River System. Among other tasks, Black & Veatch led the development of a technical memorandum evaluating sites on the Pacific Ocean Coast of California and Baja California. We continue to be a leader as desalination technologies and management/partnership arrangements evolve. The profiles describe representative experience of three members of our proposed project team.

Tampa Bay Water (TBW) Desalination

KEY TEAM MEMBERS
Vasu Veerapaneni, Bob Hulsey

Through our service as Tampa Bay Water's System Engineer, Black & Veatch has provided services to TBW since its inception. This includes oversight on the Surface Water Treatment Plant (recently expanded to 120 mgd) and its 25 mgd seawater desalination plant. While not involved in the original design of the desalination plant, Black & Veatch has been involved in every step of its modification and upgrade; evaluation of pilot data on modifications, selection of the contractor, addition of DE filter pretreatment, monitoring operations, upgrades to the original Pelton wheel energy recovery system, and many more. Black & Veatch recently conducted an energy audit of the desalination plant and evaluated changes to the associated Big Bend Power Plant and its impact on operations. We are currently leading a team to conduct piloting of further optimization of the facility with an eye to expand capacity to 35 mgd.

Carlsbad/Huntington Beach Desalination Plants – Independent Engineer and Technical Assessment

KEY TEAM MEMBERS
Bob Hulsey, Vasu Veerapaneni, Rob Kaessner

Black & Veatch provided project evaluation, review, and oversight as the Independent Engineer on the Carlsbad Desalination Plant. The project includes a reverse osmosis (RO) seawater desalination facility and the associated delivery water transmission pipelines which converts seawater into approximately 50 mgd of fresh water for sale to San Diego County Water Authority (SDCWA) under the terms of a long term Water Purchase Agreement. The Project was financed through an approximate $1,000,000,000 public bond offering from the California Pollution Control Financing Authority and achieved financing close on December 3rd, 2012. As the Independent Engineer, Black & Veatch provided services to review the design, operations plan, team and financial structure for the project. Black & Veatch was key in addressing risk issues that resulted in favorable bond ratings and lower financing expenses for SDCWA and continues to perform annual due diligence services/review for the bond holders.

For a similar project, Black & Veatch was retained by confidential clients to provide a technical and environmental assessment of the proposed Huntington Beach Seawater Desalination Project to be located in Huntington Beach. The project would consist of a seawater RO seawater desalination facility and associated facilities to convert seawater into approximately 50 mgd of fresh water for sale to the Orange County Water District under the terms of a long term Water Purchase Agreement.

Appendix A – Resumes

Appendix A Resumes

Resumes for all team members can be found in this section in alphabetical order by firm.

Karen Burgi, Project Manager/Engineering Manager/ Hydraulic Modeling

Jeremy Clemmons, Pipeline Design

Austin Cunniff, Water Quality

Bob Hulsey, Desalination Expert/Water Quality

Gil Hurwitz, Water Quality

Rob Kaessner, Pipeline Design

Kristi Kuhlmann, Pipeline Design

Derek Kurtti, Project Manager/Engineering Manager

Kevin Laptos, Hydraulic Modeling

James Maher, Hydraulic Modeling

Meghan Merlihan, Hydraulic Modeling

Jeff Neemann, Water Quality

Lee Portillo, Project Manager/Engineering Manager/ Desalination Expert/Water Quality

Andrew Stanton, Project Manager/Engineering Manager

Matt Thomas, Contract Manager

Jennifer Thompson, Pipeline Design

Vasu Veerapaneni, Desalination Expert/Water Quality

Matt Thomas, P.E., Assoc. DBIA

Contract Manager

Matt is not only Black & Veatch's Irvine office leader, but he's also a company officer charged with maintaining the highest levels of client satisfaction through quality of service. Over nearly 30 years of professional experience Matt has successfully delivered engineering project in planning, design, and rehabilitation of water and wastewater pipelines in Southern California, frequently located in urban settings.

VALUE ADDED

- Since 2016, Project Manager or Contract Manager on a series of projects for MWDOC that have led the way to the currently-proposed engineering assignments. He understands your history, goals, and expectations.
- Extensive experience managing multi-discipline teams and collaborating with project stakeholders with large public agency clients, municipalities and regulatory agencies, and the public.
- Effective communicator, collaborator, and consensus builder within the team. Matt understands how to guide team focus and execute project tasks.

OFFICE LOCATION

Irvine, CA

EDUCATION

B.S., Civil Engineering, California Polytech State, 1991

PROFESSIONAL REGISTRATION

PE – 1994, CA, #C52858

PROJECT EXPERIENCE

Municipal Water District of Orange County (MWDOC) | New Local Water Supply Integration into the Metropolitan Water District (Metropolitan) System Utilizing the East Orange County Feeder No. 2; Fountain Valley, CA

Project Manager. Responsible for the Initial Study (completed), Hydraulic Model Phase 1 (completed), and OC Distribution System Hydraulic Model Build and Calibration Phase 2 (underway) to assess the potential impact of integrating a new water source into the Orange County system. Specifically, the project is evaluating the physical constraints (hydraulics), water quality, and regulatory compliance impacts associated with introducing water from the proposed Huntington Beach Desalination Plant into the East Orange County Feeder No. 2. Under Phase 1, Matt and his team prepared a White Paper developing conceptual strategies. Tasks included collaborative workshops with MWDOC's Member Agencies and Metropolitan to discuss their issues and concerns. While focusing on Huntington Beach, the White Paper provided an overview of water quality related issues and technical solutions that are applicable to any new water supply integration. The Phase 1 investigation included; collection of model and GIS data from MWDOC's Member Agencies; participation in meetings with Metropolitan to coordinate modeling efforts and establish a basis for non-disclosure agreements between parties; and participation in workshops with MWDOC Member Agencies to continue to build support for the modeling effort. Black & Veatch is currently developing the model as part of Phase 2.

Metropolitan Water District of Southern California | Second Lower Feeder (SLF) Lower Feeder Rehabilitation Preliminary and Final Design, Los Angeles Los Angeles, CA

Senior Team Leader. Matt's key responsibilities on this major program have included: 1) construction phasing and contract packaging to allow the SLF to be kept in operation during phased implementation of the rehabilitation, 2) final design of valve and flowmeter replacements, and 3) preparation of the preliminary design documents for the overall project. Project drivers include environmental permitting coordination and community impact analysis.

Metropolitan Water District of Southern California, Rialto Feeder Preliminary Design, Los Angeles, CA

Project Manager. Matt directed the preliminary design of the project, which is part of Metropolitan's PCCP Rehabilitation Program. The 30-mile pipeline, which operates at pressures up to 160 psi with a maximum static head of 270 psi, conveys each branch California State Water Project (SWP) water from the Devil Canyon Facility to Metropolitan's San Dimas Flow Control Facility. When the Pipeline is out-of-service, Metropolitan has no other means to deliver water to these points. For these and other reasons, the timing and duration of any shutdown to rehabilitate the pipeline are critical. Matt's team focused on innovative solutions that would allow Metropolitan to continue delivering water for regional usage with minimal interruptions. Key issues included addressing capacity constraints and minimizing operational and community impacts.

Karen Burgi, P.E.

Project Manager/Engineering Manager/Hydraulic Modeling

Karen is a Regional Planning Leader and Project Manager within the Planning & Asset Management Department. Her “big picture” understanding of utility needs and goals contributes to her ability to match project needs and company-wide resources in hydraulic modeling and master planning.

VALUE ADDED

- Recent, relevant experience on MWDOC’s Phase 2 Study (Hydraulic Model Development and Calibration) that will be leveraged during the next phase of the work.
- Extensive experience in water facilities master planning, including population projections, regulatory compliance, hydraulic modeling, vulnerability analysis, and developing improvement alternatives.

OFFICE LOCATION

Denver, CO

EDUCATION

MS, Civil Engineering, Colorado State University, 1993

BS, Civil Engineering, Colorado State University, 1991

BA, Engineering Physics, Westmont College, 1991

PROFESSIONAL REGISTRATION

PE – 2012, WY, #13750
PE – 1996, CO, #31252

YEAR CAREER STARTED

1993

YEAR STARTED WITH B&V

1993

PROJECT EXPERIENCE

Municipal Water District of Orange County | OC Distribution System Hydraulic Model - Phase 2 Model Development; Fountain Valley, CA

Technical Lead. The goal of this project is to create and calibrate a transmission system hydraulic model that covers the area served by MWDOC from the MWD system in Orange County to the service connections. This included gathering data from multiple sources and bringing it into a single hydraulic model. The goal of this project is to develop a model that can then be used for investigating potential changes in water sources, resource sharing, or demand patterns.As Technical Lead, Karen interacted extensively with MWDOC and your stakeholders during the Phase 2 Project and will build on knowledge gained to focus on hydraulic modeling in support of future system planning, system operations, and water quality in the next phase of the work.

City of Henderson | Horizon Lateral Integration; Henderson, NV

Technical Advisor. The project used the City's hydraulic model to evaluate the impact of the proposed SNWA Horizon Lateral on operations and facilities through 2050 for both normal and emergency operating conditions.

City of Santa Rosa; Water System Reliability Study; Santa Rosa, CA

Project Manager. Led the efforts to evaluate the impact of October 2017 fires on water system operations before, during, and following the fire. Following the initial investigation, Black & Veatch was selected to perform additional distribution system investigations using the City’s InfoWater model to validate fire flow recommendations, identify opportunities to improve distribution system reliability and resiliency, identify water quality areas of concern, and investigate options to improve SCADA communications under emergency operating conditions.

Eastern Municipal Water District; Winchester Specific Plan; Perris, CA

Project Manager. The project updated the EMWD InfoSewer model to incorporate the proposed changes in land use, evaluated the impact of changes on recommendations, and evaluated alternative concepts to accommodate changes in development timing.

Dominion Water & Sanitation District | Development Review; Sterling Ranch, CO

Technical Advisor. Provided oversight to the hydraulic modeler as we worked with DWSD to evaluate development plans and ensure that they were compatible with the overall plan for service to DWSD.

Derek Kurtti, P.E.

Project Manager/Engineering Manager

Derek has 15 years of professional experience in water, wastewater, and reclaimed water engineering and general contracting and has overseen the planning, design, and construction of water pipelines, pump stations, and other facilities. He has had extensive interaction with project owners, design engineers, city officials, and stakeholders and has developed highly adept organizational skills and follow through necessary to deliver projects on schedule.

VALUE ADDED

- Supporting Matt and Karen on the execution of MWDOC's Phase 2 Project (Hydraulic Model Development and Calibration). .
- Additional knowledge of Orange County water systems from experience on projects for Moulton Niguel Water District, Irvine Ranch Water District, and other local agencies.
- Extensive experience overseeing the organization/execution of project execution and multidiscipline coordination.

OFFICE LOCATION
Irvine, CA

EDUCATION
B.S., Civil Engineer, California Polytechnic State University, San Luis Obispo, 2006

PROFESSIONAL REGISTRATION
PE – 2015, CA, C84676

YEAR CAREER STARTED
2006

YEAR STARTED WITH B&V
2020

PROJECT EXPERIENCE

Coachella Valley Water District | Booster Pump Station 3501 Replacement Project; Desert Hot Springs, CA

Project Engineer. Preparation of the preliminary design for the replacement booster pumping station consisting of four 500 horsepower vertical turbine pumps delivering a maximum flow of 3,320 GPM from the ID Pressure Zone to the Sky Valley Pressure Zone. Project design tasks and components include new pumps, piping, electrical building, and connections to the existing above grade steel reservoirs and two lower pressure zones; hydraulic analysis; surge tank; pump selection; site layout; electric service provider coordination; emergency generator sizing/selection; site survey; utility potholes; and geotechnical borings and testing.

City of San Diego | Pump Station No. 2 Power Reliability and Surge Protection Project; San Diego, CA

Project Engineer. Responsible for the design of the mechanical piping and system components for this 430 MGD, $40 million pump station expansion project. Performed heat transfer analysis for sizing of large scale heat exchange units, design piping for all mechanical equipment within the project including, but not limited to, performing flow analysis, determining pipe materials, thickness, coatings, lining, supports, and pipe routing. Equipment manufacturer coordination and design assistance. Verified existing plant utility locations for pipe routing. Developed a temporary cooling system process to reuse existing large scale heat exchangers to service both existing and new equipment prior to decommissioning and demolition of existing facilities.

City of Burbank | Beachwood Sparks Forcemain and Pump Station Replacement; Burbank, CA

Project Engineer. Provided project and construction management support throughout the lifecycle of the project. Assisted in quality control reviews prior to bid and construction. Reviewed and responded to submittals and RFI's, assisted in resolution of field construction issues and public outreach. The project included 12,000 linear feet of 24-inch HDPE pipe along the Sparks-Chandler alignment, replacement of three dry-pit submersible 150 HP pumps, construction of a new valve vault, removal and replacement of valves and appurtenances, and recoating the pump station wet well. The project also included construction of new sewer maintenance manholes, air relief valves, blow-off assemblies, and tie-in to the new 24-inch force main.

Lee Portillo

Project Manager/Engineering Manager/ Desalination Expert/Water Quality

Lee is a Senior Process Technologist Specializing in water quality modeling, process design, and the application of filtration and desalination membranes to treat ground water, recycled water, and municipal wastewater. He has served as the water quality and process lead for many of Black & Veatch's keystone projects and was the winner of The Black & Veatch 2018 New Business Incubator "Shark Tank" Competition. His recent experience includes serving as the Lead Researcher and author of MWDOC's Local Water Supply Integration White Paper.

VALUE ADDED

- Understands water quality issues related to integrating new water supplies into the Orange County system through work for MWDOC, Metropolitan Water District, Orange County Water District, and Irvine Ranch Water District.
- Has developed site-specific probabilistic water quality models and operations cost-modeling, including quantifying the value of water.
- Extensive experience in team building, workshops and partnering with project owners, stakeholders, and the general public.

OFFICE LOCATION
Los Angeles, California

EDUCATION
BS, Mechanical Engineering, Texas Christian University, 2003

YEAR CAREER STARTED
2003

YEAR STARTED WITH B&V
2016

PROJECT EXPERIENCE

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA
Lead Researcher and Author. Lee led the investigation and documentation of water quality and hydraulic impacts from the proposed 50 mgd Huntington Beach Desalination Plant into the East Orange County Feeder No. 2. . Included an in-depth analysis of potential physical and water quality impacts to the existing Orange County drinking water system. Water quality issues included blending, regulatory compliance (particularly chloramine disinfection and bromide), and residual stability. Lee also was the Technical Lead for a series of workshops between MWDOC, MWDOC Member Agencies, Metropolitan Water District, and engineering consultants to work through the direction of the study.

Orange County Water District | Groundwater Replenishment System (GWRS) Final Expansion; Fountain Valley, CA
Lead Process Engineer. Lead influent water quality modeling used to establish the basis of design for the final expansion. Influent quality modeling incorporated four secondary effluent flows and the removal of contributions from the Santa Ana River Interceptor. Responsible for coordination of all process specialists required for design of multi-barrier MF – 10- AOP and post treatment equipment for a 30 mgd AWTF expansion (from 100 mgd to 130 mgd).

Irvine Ranch Water District | Groundwater Treatment Evaluation; Irvine, CA
Project Manager/Technical Lead. Served as Project Manager and Technical Lead for evaluation and study of groundwater treatment and distribution improvements needed to treat four new wells so that they could be treated and blended into the existing distribution system. Study included assessment of previous groundwater study, developing treatment alternatives, distribution alternatives, decision making process, and planning level cost estimates. Key water quality parameters of concern were color, TDS, and disinfection residuals. Decisions were made based on dollars per acre-feet to get the most water into the distribution system.

Eastern Municipal Water District | Perris II Desalter and Brine Demonstration Testing; Perris, CA
Process Lead/Technology Manager (Demo Testing). Lead influent water quality modeling, RO and RO permeate post-treatment design optimization for the Perris II desalter.

Los Angeles Department of Water and Power | Condition Assessments for Two Microfiltration Plants; Los Angeles, CA
Engineering Manager. Described condition assessment of Lower Stone MF Plant and Encino MF Plant. Conducted process design review and recommended operational monitoring.

Andrew Stanton, P.E., PMP

Project Manager/Engineering Manager

Andy is an experienced Project Manager with more than 30 years of worldwide experience in the planning, design, and start-up of water facilities. He has been involved in every aspect of project development from preliminary engineering studies through final design, construction, and start-up. He has a long track record on projects for the Metropolitan Water District of Southern California, where he has served as Project Manager or Contract Administrator on facilities to address drought and emergency situations; strategies to minimize disruptions to plant operations; augmentation of Metropolitan in-house technical resources, and precedent reports on equipment and methodologies. .

VALUE ADDED

- Strong combination of technical expertise and understanding of Southern California water issues.
- Successful track record resolving complex technical and instructional implementation issues including regulatory compliance, site constraint, public involvement/stakeholder requirements, and coordination of multiple construction contracts on major water resource projects.
- Proven relationship with stakeholders, regulatory agencies, local governments, area residents, environmental groups and others.

OFFICE LOCATION

Los Angeles, CA

EDUCATION

M.Sc., Environmental Engineering, Imperial College, UK, 1994

B. Eng.(1st), Civil Engineering, Bristol University, UK, 1988

PROFESSIONAL REGISTRATION

PE –2001, CA, #62263

Chartered Civil Engineer 1993, UK, #470735-18

PMP – 2007, CA #452922

YEAR CAREER STARTED

1988

YEAR STARTED WITH B&V

1988

PROJECT EXPERIENCE

Metropolitan Water District of Southern California | Second Lower Feeder Rehabilitation , Los Angeles, CA

Project Manager. Responsible for preliminary and final design (completed) and construction support services (underway) for a project to reline a significant portion of the Second Lower Feeder (SLF) to rehabilitate 78-inch and 84-inch diameter prestressed concrete cylinder pipe (PCCP) with a new steel liner. The SLF Pipeline is approximately 40 miles long and is located within more than 15 jurisdictions in Los Angeles and Orange Counties. The pipeline is comprised of about 29 miles of PCCP that has experienced deterioration over its service life. The project will provide long-term reliability of a critical pipeline within Metropolitan's distribution system. Because of the criticality of the SLF pipeline to the delivery of treated water in the service area, the project also involved an evaluation of construction cost, contract packaging and prioritization to develop a framework for implementation.

Metropolitan Water District of Southern California | Preliminary Design for Rialto Feeder PCCP Rehabilitation; CA

Project Manager. Fast track preliminary design of relining of 16 miles of 96-inch to 120-inch precast concrete cylinder pipe (PCCP) through urban environment in greater Los Angeles. The existing pipeline is to be relined using collapsible steel pipe liner inserted into position, expanded, welded and then grouted into place to provide a fully structural lining solution to completely rehabilitate the existing pipeline. Project necessitated close interaction with client engineering, operational and planning staff to minimize impact to the existing system operations. .

Metropolitan Water District of Southern California | On-Call Projects; Greater Los Angeles, CA

Project Manager. Managed as-needed services for more than 30 on-call projects with fee ranging from $40,000 to $1.3M and construction costs up to $30M. Projects included the Rialto Feeder PCCP Rehabilitation, Etiwanda Pipeline, Lining Study, Perris Pumpback Facility – Surge Control System; Sepulveda Canyon Tanks Long Term Liquefaction Mitigation Concept Evaluation; and Palos Verdes Reservoir Inlet and Outlet Facility Modification Study.

Metropolitan Water District of Southern California | Feasibility-Level Engineering Analysis of Regional Recycled Water Supply Program; Los Angeles, CA

Project Manager. Conceptual design for conveyance portion of regional recycled water project includes 60 miles of 84-inch-steel pipe and three 150 mgd pump stations.

Kevin Laptos, P.E.

Hydraulic Modeling

Kevin serves as the National Distribution & Collection System Planning Practice Leader for Black & Veatch Water Americas. He specializes in planning and modeling of water distribution and wastewater collection systems and hydraulic transient analysis. He has over 30 years of professional experience in engineering practice and management involving the planning, design, construction, operation, and rehabilitation of water and wastewater systems. He has served as a Project Advisory Committee member for an AWWARF-sponsored research project (Verification and Control of Pressure Transients and Intrusion in Distribution Systems). Mr. Laptos also currently serves on the AWWA Engineering Modeling Applications Committee which developed the second edition of AWWA M32 (Computer Modeling of Water Distribution Systems). He is also a Fellow Member of ASCE and has also authored and presented numerous technical papers related to system modeling and planning, and hydraulic transient analysis for AWWA and ASCE conferences and publications.

VALUE ADDED

- Knowledge of MWDOC system and issues associated with integrating new supplies into the Orange County water system through his work on the Phase 1 and Phase 2 studies.
- Technical expertise in water system hydraulics and modeling including hydraulic transient analysis, as well as water system capital and operational planning.
- Requested by clients for his dedication and extensive experience with water system hydraulics, water quality, and operational issues.

OFFICE LOCATION
Charlotte, NC

EDUCATION
MS, Civil Engineering, Virginia Tech, 1990

BS, Civil Engineering, Virginia Tech, 1988

PROFESSIONAL REGISTRATION
PE – 2019, FL, 87966
PE – 2009, NC, 035367
PE – 1994, PA, 045490E

YEAR CAREER STARTED
1990

YEAR STARTED WITH B&V
2007

PROJECT EXPERIENCE

Municipal Water District of Orange County | OC Distribution System Hydraulic Model - Phase 1 Evaluation; Orange County, CA

Technical Advisor. Responsible for technical oversight and QA/QC of model investigation study. Project included data collection, stakeholder outreach, software selection evaluation, and preparation of a model development work plan.

Municipal Water District of Orange County, OC Distribution System Hydraulic Model - Phase 2 Model Development; Orange County, CA

Technical Advisor. Responsible for technical oversight of hydraulic model build from various system data sources and model calibration approach.

Eastern Municipal Water District | Perris Desalter WTP Pump Station 2; Perris, CA

Technical Advisor. Responsible for technical quality of surge analyses. As part of the design of the Perris Desalter WTP Pump Station 2 design, a surge analysis was performed to identify possible pressure surges that may occur in the system. The analysis included a baseline surge analysis of the transient hydraulic conditions in the system during a power failure when pumping from the existing Perris Desalter WTP Pump Station 1. The transient analysis also evaluated the potential surge conditions during a power failure when pumping from both stations under average day and maximum day demand conditions. The analysis focused on identifying any surge mitigation devices (air vacuum valve locations) to maintain system pressures within acceptable high and low pressure limits.

Southern Nevada Water Authority| Horizon Lateral Feasibility Study; Las Vegas, NV

Hydraulics Technical Lead. Responsible for hydraulic analyses of transmission system improvement alternatives. Hydraulics work included development of hydraulic model and analysis of various pipeline route alternatives using Innovyze InfoWater software and pipeline route, sizing, and pressure class optimization using Optimatics Optimizer software.

Meghan Merlihan, E.I.T.

Hydraulic Modeling

Meghan is a Civil Engineer working with Black & Veatch in the Water group and is based out of Irvine, California. She has experience in a range of water resource related projects. She has assisted with detailed design, planning, and engineering services during construction.

VALUE ADDED

- Experience for MWDOC on the Hydraulic Model Phase 1 and Phase 2 projects that will position her for the next phase of the work.
- Has interacted with MWDOC member agencies and understands their issues and concerns. .
- Project experience with the Metropolitan Water District of Southern California.

OFFICE LOCATION
Irvine, CA

EDUCATION
BS, Environmental Engineering, Cal Poly San Luis Obispo, 2019

PROFESSIONAL REGISTRATION
EIT

YEAR CAREER STARTED
2019
(Intern 2018)

PROJECT EXPERIENCE

Municipal Water District of Orange County, OC Distribution System Hydraulic Model - Phase 2 Model Development; Orange County, CA

Hydraulic Model Support. Responsible for data import of the entire system being modeled, for calibration/validation of the Allen-McColloch Pipeline, and for other data analyzation tasks in the model building process. Activities included interaction with MWDOC , MWDOC Member Agencies, and Metropolitan. Topics included discussions with Metropolitan Operations Staff on pressure control structures, high flow/low flow variances, etc. The ultimate result will be a hydraulic model that accurately represents the MWDOC water transmission system and is readily expandable to connect Member Agency systems if or when needed. This user-friendly model will support MWDOC's current and future needs, including studies needed to support new water supply integration projects.

Municipal Water District of Orange County | OC Distribution System Hydraulic Model - Phase 1 Evaluation; Orange County, CA

Staff Engineer. Responsible for evaluating various software alternatives and recommending InfoWater as the preferred software application for the future Hydraulic Model. This software was selected based on the needs of MWDOC and on criteria established from previous White Papers, data collection of the Orange County conveyance network, and member agency questionnaire responses.

City of Santa Rosa | Emergency Well Treatment Evaluation, Santa Rosa, CA

Staff Engineer. Responsible for modeling support in the city's plan to pursue an emergency groundwater supply program. The goal of this program is to install emergency wells in each of the major pressure zones that would provide up to 1 mgd of flow per well in case of an emergency that would reduce or eliminate deliveries of surface water from Sonoma County Water Agency.

Metropolitan Water District | Second Lower Feeder; Los Angeles, CA

Staff Engineer. Responsible for submittal review and backchecking design drawings for Reaches 2, 3, and 8. Submittal review included reviews of civil and mechanical shop drawings, such as steel pipe and fittings and air release enclosures. The purpose of the project is to reline 78 – 84-inch diameter PCCP pipe with new steel liner and update existing piping and pipeline appurtenances. Additional project design elements include excavation site selection, appurtenant rehabilitation, and outreach to jurisdictions in Los Angeles and Orange County

Moulton Niguel Water District | Valve Assessment, CA

Staff Engineer. Responsible for review of MNWD existing plug and check valve standards, research of technical valve equipment options and components, and obtaining preliminary cost estimates from various valve manufacturers.

James Maher, P.E.

Hydraulic Modeling

James has more than 15 years of experience with hydraulic evaluation and water quality evaluation of water distribution systems and wastewater collection systems. He has experience with developing, calibrating, and updating computer models of these systems and using them as a tool in master planning efforts and system analysis. James has experience with the integration of GIS (Geographical Information Systems) technologies in computer-aided modeling efforts and is proficient with ArcGIS software. He is proficient in all major industry water system modeling software packages.

VALUE ADDED

- Ability to leverage information gained through his experience as Lead Hydraulic Model on MWDOC's Phase 2 Model Build Project.
- "Hands on" knowledge of how systems operate and how to develop ways to communicate with stakeholders through dashboards and other methods.

PROJECT EXPERIENCE

Municipal Water District of Orange County, OC Distribution System Hydraulic Model - Phase 2 Model Development; Orange County, CA

Senior Planning Engineer. A system model of the conveyance network was constructed from GIS data, as-built drawings, and Google Earth KMZ files from the various agencies that receive water at the Southern portion of orange county. The model was calibrated to a summer condition, and subsequently validated using a winter day condition. Power BI Dashboard tools were used to provide a side-by-side comparison of the observed (SCADA, AMR, etc..) system operations during the calibration and validation time-periods against the model results.

City of Santa Rosa, CA | Water System Reliability Study; Santa Rosa, CO

Senior Planning Engineer. Coming out of the water system response project, several key opportunities were identified for improvement to system communications, operations, and infrastructure improvements. Modeling was performed to determine the impact of reliability improvements and to update the fire flow infrastructure improvements. Water age modeling evaluations were also performed to understand the extent to which changing system operations or adding infrastructure would have on water quality challenges. A revised CIP was provided based on the infrastructure evaluations which also included assessments on the SCADA system reliability, recommendations for equipment, technology and software as well as back-up power generation.

City of Santa Rosa, CA | Water System Response to Tubbs Fire; Santa Rosa, CO

Senior Planning Engineer. The City having recently gone through a wildfire which extended through their Hillside Pressure Zones, desired to perform a comprehensive evaluation of the system response to the wildfires. SCADA data for system operations prior to and during the Tubbs Fire was evaluated to understand the impact of the fire in terms of operations and to develop recommendations for system improvements to increase system reliability. System response workshops were held and interviews with Water Supply, City Staff and the Fire Department were held to gather information on what worked well and what could be improved in terms of the water system response. Several options for improvements to increase reliability were offered and the City took these options into a more detailed study focused on design and implementation.

City of Venice | Water System Master Plan Update; City of Venice, FL

Senior Modeling Engineering. Updated the hydraulic model and calibrated to high demand conditions using hydrant flow test data from 10 hydrant flow tests for the calibration period. Developed a water quality model and assessed the impact and operation of auto-flushing within the system. Developed a water quality monitoring plan and assisted the City with sampling at additional locations to further verify the model correlation with distribution system water quality. Developed a water age to chlorine residual correlation to identify areas of the system that would benefit from additional flushing.

OFFICE LOCATION

Kansas City, MO

EDUCATION

MS, Civil Engineering, Water, Univ Missouri Kansas City, 2009

BS, Civil Engineering, Univ Missouri Kansas City, 2006

PROFESSIONAL REGISTRATION

PE – 2011, MO, 2011000917

YEAR CAREER STARTED

2005

YEAR STARTED WITH B&V

2005

Kristi Kuhlmann, P.E., LEED AP

Pipeline Design

Kristi is experienced in the design of a wide variety of municipal public works facilities for Southern California water systems. Her experience includes preliminary and final design of pipelines, reservoirs, and water treatment and water recycling projects. She also has been responsible for coordinating conceptual-level planning and managing construction phase services. A particular area of expertise is managing large complex water pipeline rehabilitation projects, such as Metropolitan Water District's Second Lower Feeder, where she was a Team Leader for Preliminary Design and Engineering Manager for Final Design. She also understands Orange County Water District requirements from her work on the GWRS Initial and Final Expansions and Burris Pump Station and Fletcher Projects.

VALUE ADDED

- Combine strong technical pipeline design skills with ability to coordinate workshops for project consensus, identify schedule constraints, and provide field coordination for segments under construction.
- Excels in document management and organization and coordination of project documentation on various digital platforms.
- Has exceptional expertise in jurisdictional coordination and permitting, particularly in Southern California.

PROJECT EXPERIENCE

Metropolitan Water District of Southern California | Second Lower Feeder Final Design; Los Angeles, CA

Engineering Manager. Managing multiple simultaneous design contracts for 3 to 5 miles segments of relining 28 miles of 78-in to 84-in PCCP with a new steel liner.

Metropolitan Water District of Southern California | Second Lower Feeder Preliminary Design; Los Angeles, CA

Design Team Leader. Coordinated design of rehabilitation of a segment of the existing PCCP within 15 jurisdictions in Los Angeles and Orange Counties. Led development of Preliminary Design Report (PDR).

Orange County Water District | Groundwater Replenishment System (GWRS) Final Expansion Project, Fountain Valley, CA

Engineering Manager. Coordinated design components for AWTF expansion from 100 to 130 mgd, including 66-inch pipeline rehabilitation, process facility upgrades and off-site secondary effluent storage and pumping.

Orange County Water District | Fletcher Basin Project; Fountain Valley, CA

Engineering Manager. Managed the design for a 5-acre recharge basin to provide additional percolation capacity for Santa Ana River Water. Project included coordination with local agencies and the City of Orange. Project components included new flow metering facilities, pipeline, and excavation of the existing Fletcher Basin site to optimize recharge capability.

Cucamonga Valley Water District | Lloyd W. Michael WTP Upgrade Project; Rancho Cucamonga, CA

Project Manager/Engineering Manager. Preliminary and final design of UV and GAC additions to a 60 mgd WTP. Subsequent design of the hydraulic control structure for UV operational conditions.

Castaic Lake Water Agency | Sand Canyon Reservoir, Santa Clarita, CA

Engineering Manager. Managed construction phase services for a new 7 MG cast-in-place reservoir designed to accommodate an ultimate storage volume of approximately 21 MG.

OFFICE LOCATION
Irvine, CA

EDUCATION
MS, Engineering Management, Missouri University of Science & Technology, 2017

BS, Civil Engineering University Missouri-Rolla, 2001

PROFESSIONAL REGISTRATION
PE – 2005, CA, C68799

YEAR CAREER STARTED
2002

YEAR STARTED WITH B&V
2002

Rob Kaessner, P.E.

Pipeline Design

Rob is a Southern California native whose entire career focus has been planning, design, and construction support for Southern California water resources infrastructure projects. Facilities have included reservoirs, pump stations, and pipelines. He has worked on buried and above ground tanks of a wide variety of materials and capacities and has helped clients optimize approaches to reservoir planning and management.

VALUE ADDED

- Lead Technical Engineer for Black & Veatch's assistance to MWDOC in developing initial concepts for integration of new local water supply projects into the East Orange County Feeder #2.
- Authored the White Paper sections on hydraulics and physical facility integration issues.
- Extensive knowledge of Orange County water systems and expertise in maintenance issues, hydraulic control, and hydraulic transient control from work with MWDOC, the Metropolitan Water District of Southern California, , Irvine Ranch Water District, and the City of Tustin (OC-43 Valve Replacement Project).
- Hands-on Coordination with regulatory agencies and jurisdiction throughout Southern California, particularly in Los Angeles and Orange Counties.
- Extensive experience with development of hydraulic profiles and development of innovative design strategies.

OFFICE LOCATION
Irvine, CA

EDUCATION
B.S., Environmental Engineering, Cal Poly, 2002

PROFESSIONAL REGISTRATION
PE – 2002, CA, C68418

YEAR CAREER STARTED
2002

YEAR STARTED WITH B&V
2002

PROJECT EXPERIENCE

Municipal Water District of Orange County | Conceptual Evaluation for Integration of Huntington Beach Desalination Plant Supply into East Orange County Feeder No. 2; Fountain Valley, CA

Engineering Manager. Provided engineering services including the planning level study for three Orange County conceptual projects that would allow alternative sources of water to be conveyed in the East Orange County Feeder No. 2. Study included assessment of impacts to existing infrastructure and rough order of magnitude construction costs estimates for proposed water conveyance and blending tanks facilities.

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA

Engineering Manager. Developed a report to describe concepts of projects could be connected to the Metropolitan system in a way that new water supply could feasibly be used within Orange County. Identified key issues associated with those concepts that will need to be addressed in order to gain stakeholder support for the projects. The study focused on ocean desalination proposed conveyance into the EOCWD No. 2 and other existing water conveyance infrastructure within south Orange County.

Metropolitan Water District of Southern California | Second Lower Feeder PCCP Rehabilitation Project | Los Angeles, CA

Civil Engineer. Participated in preliminary and final design including assessment of isolation valves, coordination with environmental and geotechnical specialty subconsultants and coordination with Long Beach Airport on Reach 2 issues.

Private Client | Huntington Beach Project Due Diligence; Huntington Beach, CA

Project Engineer. Provided a fatal flaw analysis memo for the conveyance facilities to distribute 50 MGD product water from the Huntington Beach Ocean Desalination Facility to participating agencies. Memo was focused on evaluating the existing regional delivery systems in Orange County and new required water supply pipelines and appurtenances based upon baseload delivery scenario. Analysis of economic capital costs estimates prepared by other for complete conveyance option was also including to support projected water rates and provide information related to Project financing risk.

Jeremy Clemmons, P.E.

Pipeline Design

Jeremy is an engineering manager who has managed and served as a key team member on a variety of planning, design, and construction conveyance projects throughout the southwestern United States, including multiple pipelines, conveyance facilities and treatment plants. His experience in pipeline design ranges up to 144-inch in diameter, covering the majority of pipeline materials including CML&C steel, steel liners for PCCP rehabilitation, DIP, HDPE (solid and profile walls), PVC, CCFRPM, RCP and CIPP liners. A native of Southern California, he is familiar with regional pipeline design requirements and has an extensive history of working on projects across the west.

VALUE ADDED

- Experience with Managing design and quality control teams, coordinating with client and other approval agencies, completing technical pipeline design, coordinating with subconsultants, and providing budget and schedule control.
- Excellent communication and interpersonal skills and ability to foster quality relationships with all colleagues.

OFFICE LOCATION
San Marcos, CA

EDUCATION
MS, Civil Engineering, San Diego State University, 1999

BS, Engineering, University of Redlands, 1994

PROFESSIONAL REGISTRATION
PE – 2004 CA, C67140

YEAR CAREER STARTED
1994

YEAR STARTED WITH B&V
2012

PROJECT EXPERIENCE

Metropolitan Water District of Southern California | Second Lower Feeder Rehabilitation – Final Design (Reach 1, 2, 3, 4, and 8); Los Angeles, CA

Engineering Manager. Detailed design of steel liner rehabilitation for precast concrete cylinder pipe (PCCP) material, pipeline appurtenance replacement, valve vault rehabilitations, and interconnection / service connection turnout facility enhancements for 20-miles of large diameter (84- and 78-inch) potable water transmission main across Los Angeles and Orange counties estimated at $170M in construction.

Eastern Municipal Water District | Cactus II Feeder Transmission Main and Turnout Facilities; Moreno Valley, CA

Engineering Manager. Design of a $40M, 6-mile, 48- to 30-inch diameter CML&C steel potable water transmission main traversing congested roadways in the City of Moreno Valley. The project includes four turnout facilities to the local distribution systems, smaller diameter PVC distribution pipelines, and multiple pipeline appurtenances.

Eastern Municipal Water District | Perris and Elder Pipelines and Booster Pumping Station Replacement; Moreno Valley, CA

Engineering Manager. Design of a 1-mile 30-inch potable water transmission main and 17 MGD booster station, with five 200-HP vertical turbine pumps. Challenges of the project include crossing and avoidance of a large number of utilities, significant traffic and safety considerations, development on a very small pump station sight adjacent to residential homes and hotels, proper noise and aesthetical mitigation, and multiple agency coordination.

Rancho California Water District | Los Caballos Pump Station No. 2 and Pipelines Preliminary Design; Temecula, CA

Engineering Manager/Project Engineer. Preliminary design of two potable water booster pump stations (27 MGD and 20 MGD) and 1.5 miles of 36-inch steel transmission mains.

Clean Water Coalition | Systems Conveyance and Operations Program (SCOP) Reach/Pipeline Design; Clark County, NV

Project Manager. Design of 8,000 LF 96-in to 120-in diameter HDPE low pressure pipeline to convey treated effluent from City of Las Vegas WWTP to Clark County WRF. Design also included a large reinforced concrete diversion structure to modulate flows between the pipeline and local streambed.

Jennifer Thompson, P.E.

Pipeline Design

Jennifer is a registered civil engineer based in the Los Angeles office. She has been involved in a wide range of projects including general civil, mechanical, pipeline, water resource related projects and site development related projects. Responsibilities include engineering design calculations, underground utility investigation/coordination for relocation of existing utilities, traffic control coordination, permitting coordination/support, jurisdictional coordination, interdisciplinary design coordination, and project siting. She has extensive experience in developing both preliminary and final design drawings and specifications, developing technical memoranda, performing QA/QC, and providing construction phase services.

VALUE ADDED

- Experience with large diameter pipelines within Metropolitan Water District's system.
- Experience with coordinating with client and other approval agencies and coordinating with subconsultants for pipeline projects in Los Angeles and Orange Counties.
- Experience with traffic control and detour plans for pipeline projects routed through multiple jurisdictions.

OFFICE LOCATION
Los Angeles, CA

EDUCATION
BS Environmental Engineering, California Polytechnic State University, San Luis Obispo, 2013

PROFESSIONAL REGISTRATION
PE – CA, #86547, 2017

YEAR CAREER STARTED
2013

PROJECT EXPERIENCE

Metropolitan Water District of Southern California | Final Design Second Lower Feeder PCCP Rehabilitation Project; Los Angeles, CA

Lead Project Engineer. Final design for rehabilitation of existing 78 – 84-inch pre-stressed concrete cylinder pipe (PCCP). Serving as lead engineer for three different relining contracts (approximately 24,000 LF/contract) within the following jurisdictions: City of Placentia, City of Yorba Linda, City of Carson, City and County of LA, Caltrans, City of Lomita, City of Torrance and City of Rolling Hills Estates.

Pure Water Soquel Program – Treatment Facilities | Soquel Creek Water District; Santa Cruz, CA

Project Engineer. Final design of a new Tertiary Treatment Facility and a new Advanced Water Treatment Facility to help address critical overdraft in the Santa Cruz Mid-County Groundwater Basin and increase the sustainability of groundwater supply. The Program will replenish the groundwater basin with approximately 1,500 acre-feet per year of purified water.

WRP-4 Non-Potable Water Improvements| Coachella Valley Water District; Coachella Valley, CA

Project Engineer. Converting WRP 4 to meet Title 22 requirements with the design of those facilities and infrastructure necessary to process and distribute 2.5 MGD to nearby agriculture customers with planning considerations given for future expansion to 10 MGD.

IRWD MWRP Sludge Receiving Study | Irvine Ranch Water District; Irvine, CA

Project Engineer. Developed a technical memorandum to determine MWRP's ability to receive thickened sludge following completion of the upcoming Los Alisos Water Recycling Plant (LAWRP) modernization. The study includes recommendations for improvements at both MWRP and LAWRP to facilitate the sludge handling process.

Bob Hulsey, P.E.

Desalination Experts/Water Quality

Mr. Hulsey is a Global Practice and Technology Leader in Black & Veatch's Water Technology Group. In the technology portion of that role, he leads a group of PhD and Masters level process engineers dealing with advanced treatment technologies such as oxidation and removal of micro-contaminant s (EDCs, PPCPs, algal toxins, trace inorganics), taste and odor control, high rate sedimentation and flotation, membrane and biological filtration, ozone/UV/ClO2 disinfection, distribution system water quality, and desalination. He has been involved in the process design, equipment specification, start-up, training, and troubleshooting for many of Black & Veatch's premier projects.

VALUE ADDED

- Experience evaluating complex treatment issues to arrive at workable solutions.
- Previous experience with Charnock, Arcadia, and Olympic WTP (Santa Monica), Long Beach Desal Studies, Poseidon work in Carlsbad and proposed Huntington Beach along with broader knowledge of approaches taken around the world brings knowledge of integrating new sources into existing systems.
- Excellent relationships with regulators in California and across the US.

PROJECT EXPERIENCE

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA

Initial Workshop/QC Review. Present at initial workshop leading to study and provide input on water quality model/results.

Barkleys Bank/ J.P. Morgan/Poseidon | Desalination Plant; Carlsbad, CA| Desalination Plant; Huntington Beach, CA

Lead Process Engineer. Provide technical review of new 50 mgd (107 mgd pretreatment) seawater desalination facility to provide water to San Diego County Water Authority on Public Private Partnership basis. Served as technical lead for Independent Engineer (IE) during bond issue phase; review of design, construction, and start-up/performance testing of full-scale facility. As part of IE role, develop concept, approve design, and monitor results of proof pilot of RO pretreatment system to demonstrate capabilities during algal blooms. Pilot plant outcome determined $30M bond posting which would lead to retrofit of direct filtration with dissolved air flotation (DAF). Currently, lead technical reviewer of on-going operations for bond holders. For a Confidential Client, evaluate technical and financial feasibility of HB desalination plant.

Long Beach (LBWD) | Proposition 50 Grant-Pipe Loop Design-Mitigating Water Quality Effects of Desalinated Seawater; CA

Lead Process Engineer. Lead the development of bench-scale, pilot-scale pipe loop, and disinfection studies for integration of desalinated seawater into the existing distribution system. Successfully obtained Proposition 50 research grant for LBWD to examine this issue on bench and pilot scale and leading the design of pipe loops. The project addresses corrosion, DBP formation, and disinfection stability issues associated with seawater desalination introduced to an existing dist. system.

BHP Billiton | New Desalination Plant; Chile

Process Consultant. Provide technical expertise and organization for process engineering on new, 3200 L/s (~75 mgd) desalination facility for mining operations. Process includes pre-treatment (~150 mgd) through in-filter dissolved air flotation, secondary filtration, and pH adjustment. Post-desalination stabilization with soda ash and pH adjustment.

West Basin MWD| EC Little WRF Ozone Addition, Carson, CA

Process Consultant. With Butier, review ozone system design/operations, work with Design-Build team on modifications to scum removal in a novel ozone contactor design (pseudo-DAF removal step for organic foulants, first of a kind, arrived at float withdraw system from within the ozone contactor) as pretreatment to membrane filtration of reclaimed wastewater.

OFFICE LOCATION
Kansas City, MO

EDUCATION
MS, Environmental Health, Univ Kansas, 1994

BS, Chemical, Univ Colorado Boulder, 1988

PROFESSIONAL REGISTRATION
PE – 1993, MO, #25683

YEAR CAREER STARTED
1988

YEAR STARTED WITH B&V
1988

Srinivas Veerapaneni, P.E., Ph.D.

Desalination Experts/Water Quality

Dr. Srinivas (Vasu) Veerapaneni is a water treatment expert with focus on advanced treatment processes, including membrane filtration and desalination. He is also involved in evaluation of emerging technologies for treatment of various sources of water, including high saline water and RO concentrate and provide guidance to various startup companies. He has worked on every aspect of the treatment processes including feasibility studies, process evaluation and selection, pilot testing, development of procurement documents, start-up and operational assistance, lender Engineer, and financial viability evaluations. He has also worked on development of DBO projects for desalination and reuse.

VALUE ADDED

- Pioneering work in desalination projects throughout the world (Singapore, Middle East, Hong Kong, Chile, North America and Australia)
- Process consultant for major Southern California projects for Orange County Water District (GWRS Initial and Final Expansion), Eastern Municipal Water District, City of Santa Clara, Carlsbad desalination plant (lender's engineer), Perris II, Morro Bay, Soquel Creek, and the City of Long Beach.

OFFICE LOCATION

Kansas City, MO

EDUCATION

PhD, Environmental Engineering, Rice University, 1996

MS, Environmental Engineering, Rice University, 1992

MS, 8 graduate courses in Structural Engineering, Kakatiya University, 1988

BS, Civil Engineering, Kakatiya University, India, 1987

PROFESSIONAL REGISTRATION

PE – 2002, KS, #17283

YEAR CAREER STARTED

1987

YEAR STARTED WITH B&V

2000

PROJECT EXPERIENCE

Public Utilities Board, Singapore | **Four (4)** seawater desalination plants

Technical Lead. (1) Tuas I seawater RO (SWRO) desalination plant – Design Build contractor's engineer for 36 MGD plant. Processes include Infilter DAF, two pass RO, and posttreatment with CO2 and lime. **(2)** Tuas II SWRO plant: PUB's engineer for 72 MGD plant delivered under DBO contract. Processes include MF/UF, two pass RO, post-treatment using lime and CO_2 **(3)** Marina East SWRO Plant: PUB's engineer for 36 MGD plant delivered under DBO contract. Processes include MF/UF, two pass RO, post-treatment using lime and CO_2. Plant can treat both seawater and reservoir water when available. **(4)** Jurong Island SWRO: Design engineer for 36 MGD plant to be delivered under DBO contract. Processes include DAF, MF/UF, two pass RO, post-treatment using lime and CO_2

BHP Billiton | Initial and 1st Expansion of Escondida Water Supply Project; Antofagasta, Atacama, Chile

Lead Process Engineer. Designed the initial Escondida Water supply project with 57 MGD seawater desalination plant. The plant was expanded to 76 MGD. Processes use two stage pressure media filters, single pass RO and post treatment using corrosion inhibitor. The project also involved a long conveyance pipeline that is 112 miles long and conveys water to an elevation of 2 miles.

Water Services Department | Hong Kong

Lead Desalination Engineer. Procurement of a 36 MGD, expandable to 72 MGD seawater desalination plant. Development of reference design, permitting, public outreach, economical viability evaluation, procurement under DB, construction management services. Processes include Infilter DAF (dissolved air flotation on top of media filters), two pass RO, and post-treatment using lime and CO_2

Confidential Client, Middle East | 400 MLD Seawater Reverse Osmosis (SWRO); Global

Desalination Engineer. Procurement of a 400 MLD SWRO plant for drinking water purposes through design build contract. Process train involves coagulation, media filtration, two pass RO and post-treatment.

Jeff Neemann, P.E., D.Eng

Water Quality

Jeff specializes in the development and application of water quality and treatment evaluations, pilot and demonstration testing, design, and operations. He had a major role in the development of MWDOC's Water Supply Integration White Paper. Other recent relevant experience includes the GWRS Initial and Final Expansions, the EMWD P2D Desalter, and the IWRD well treatment alternatives study. He is a recognized nation expert in water quality and treatment issues that has developed internal water quality modeling software, designed over 40 WTPs, and has 2 patents for water treatment.

VALUE ADDED

- Ability to leverage experience of MWDOC system integration issues based on his work on the White Paper.
- Strong technical depth, including work on leading-edge research investigations and contributing to technical, cost, and institutional understanding of water treatment challenges and solutions.
- Demonstrated ability to combine technical understanding with practical approaches to issues resolution. Focus on clients and goals to help determine most appropriate solutions.
- Developer of Smart Analytics Applications that assist with remote monitoring of treatment systems that incorporate event–based calculations to identify and trace events to enable operators to view and assess performance.

OFFICE LOCATION
Irvine, CA

EDUCATION
Doctorate, Civil Engineering, University of Kansas, 2016

M.S., Environmental Engineering, University of Missouri-Rolla, 1998

B.S., Civil Engineering, University of Missouri-Rolla, 1996

PROFESSIONAL REGISTRATION
PE – 2002, Kansas, 17008

YEAR CAREER STARTED
1998

YEAR STARTED WITH B&V
1998

PROJECT EXPERIENCE

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA

Technical Director. Jeff interacted with stakeholders to help define direction for the research and participated in a series of project workshops with MWDOC, MWDOC Member Agencies, the Metropolitan Water District of Southern California, and third party consultants.

Orange County Water District | Groundwater Replenishment System (GWRS) Initial and Final Expansion| Fountain Valley, CA

Deputy Project Manager/ Process Task Lead. Groundbreaking groundwater augmentation and treatment project consisting of MF, RO and ADP, and finished water stabilization. Process design for initial (Initial Expansion from 70 to 100 mgd) and overall management for final (Final Expansion from 100 to 130 mgd).

Eastern Municipal District | Perris II Desalter Facility | Perris, CA

Technical Director. Design and construction support for new RO facility to expand an existing groundwater desalination program project including full-scale demonstration testing of closed-circuit RO technology.

Irvine Ranch Water District | Groundwater Treatment Evaluation; Irvine, CA

Project Director. Provided general oversight for evaluation and study of groundwater treatment and distribution improvements needed to treat four new wells. Study included assessment of previous groundwater study, developing treatment alternatives, distribution alternatives, decision making process, and planning level cost estimates. He participated in client meetings and workshops to establish the technical direction for the project.

Gil Hurwitz, Ph.D, P.E.

Water Quality

Gil is a Process Specialist in the Water Technologies Group within Black & Veatch and specializes in membrane filtration, desalination, and trace pollutant remediation. He has experience in the research, design, and optimization of water treatment technologies in both the municipal and industrial sectors.

VALUE ADDED

- Assisted with the White Paper prepared for MWDOC on the water quality issues related to integration of new water supplies into the EOCF#2/OC Distribution System.
- Extensive experience in advanced statistical and predictive modeling for water treatment and distribution system optimization, especially within the Southern California utility landscape
- Global experience in the design, modeling, optimization, and process evaluation of reverse osmosis desalination systems, including process consultation on major seawater desalination plants such as the Claude "Bud" Lewis Carlsbad Desalination Plant and Tampa Bay Seawater Desalination Plant.

OFFICE LOCATION

Los Angeles, CA

EDUCATION

Ph.D., Environmental Engineering, UCLA, 2012

M.S., Environmental Engineering, UCLA, 2008

B.S., Chemical Engineering, UCLA, 2006

PROFESSIONAL REGISTRATION

PE – 2021, CA, #6995

YEAR CAREER STARTED

2012

YEAR STARTED WITH B&V

2018

PROJECT EXPERIENCE

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA

Process Engineer. Major contributing author to a research white paper for MWDOC highlighting the water quality and hydraulic concerns with integrating a 50 mgd desalinated water source into the Orange County drinking water system. Included an in-depth analysis of potential physical and water quality impacts to the existing Orange County drinking water system and wastewater/water recovery facilities in the region. The paper provided recommendations on next steps and proposal of modeling techniques required for integration.

Tampa Bay Water | Desalination Plant Energy Audit and Performance Optimization Study; Tampa Bay, FL

Process Engineer. Responsible for the modeling and evaluation of energy savings and improved productivity opportunities within Tampa Bay Water's seawater desalination facility. Projected optimized pressure and flow conditions for existing energy recovery devices, developed a new hybridized reverse osmosis membrane configuration to reduce annual energy consumption by 5-10%, and studied the impact of blending with alternative feed water supplies.

Irvine Ranch Water District | Groundwater Treatment Evaluation; Irvine, CA

Lead Process Engineer. Evaluation and study of groundwater treatment and distribution improvements needed to treat four new wells. Study included assessment of previous groundwater study, development of three treatment alternatives, distribution alternatives, decision making process, and planning level cost estimates. Developed client-specific probabilistic water quality blending model and distribution system water quality model.

Confidential Client | Buy-Side Technical Advisory Services for the Carlsbad Desalination Project; Carlsbad, CA

Process Engineer. Responsible for the red flag review and technical due diligence evaluation for a client interested in an equity purchase of the 50 MGD seawater desalination plant in Carlsbad, California. Provided a desktop- and field-based evaluation of historical and current equipment performance and maintenance practices as they impacted plant valuation and purchaser liability.

Austin Cunniff, P.E.

Water Quality

Austin is a Design Engineer working in the Black & Veatch Engineering Services Group in Irvine, CA. Since starting with Black & Veatch, Austin has exceled in his work on a variety of projects including design of water, wastewater, and recycled water systems. His experience performing pipeline hydraulic and water quality analysis as well as process mechanical and civil site design has resulted in optimized performance of systems both inside and outside treatment plants. Austin obtained early career experience in water treatment and desalination process optimization and construction while working at the Carlsbad Desalination Plant. Here, Austin provided construction support services and executed membrane performance and water quality analyses.

VALUE ADDED

- Leverage knowledge of MWDOC system issues and MWDOC Member Agency concerns based on work done when preparing the Water Supply Integration White Paper.
- Additional understanding of local water quality issues based projects for Orange County Water District and the Metropolitan Water District of Southern California.

OFFICE LOCATION

Irvine, CA

EDUCATION

B.S., Civil Engineering, California Polytechnic State University, 2017

M.S., Civil & Environmental Engineering, California Polytechnic State University, 2018

PROFESSIONAL REGISTRATION

PE – 2020, CA C91574

YEAR CAREER STARTED

PROJECT EXPERIENCE

Municipal Water District of Orange County | New Local Water Supply Integration White Paper; Fountain Valley, CA

Staff Engineer. Austin prepared a research white paper for MWDOC highlighting the water quality and hydraulic concerns with integrating a 50 mgd desalinated water source into the Orange County drinking water system. Included an in-depth analysis of potential physical and water quality impacts to the existing Orange County drinking water system and wastewater/water recovery facilities in the region. Performed research discussing examples of projects currently integrating desalinated water into potable water systems. Assessed the potential impacts on local agriculture, industry, drinking water systems, pipe lining materials, and disinfection. The White Paper documented the research and provided recommendations on next steps and presented a proposal for modeling techniques required for integration, leading to the development of the Phase 1 and Phase 2 work.

Orange County Water District | Groundwater Replenishment System (GWRS) Final Expansion Contract 1; Fountain Valley, CA

Staff Engineer. OCWD is implementing the Final Expansion to GWRS, which will increase the capacity of the Advanced Water Purification Facility (AWPF) by 30 mgd to a total of 130 mgd. Austin provided hydraulic calculations and design services for the 2,250 hp secondary effluent wet well pump station and provided hydrologic runoff calculations for the site.

Orange County Water District | Groundwater Replenishment System (GWRS) Final Expansion Contract 2; Fountain Valley, CA

Staff Engineer. Contract 2 of the GWRS Final Expansion includes the relining of approximately 15,000 LF of an existing 66-inch RCP pipe to convey additional flow and providing permit coordination with Orange County Flood Control District. Austin assisted in utility investigations for the pipeline alignment as well as preliminary design report and drawing development for the project.

Pure Water Soquel | Treatment Facilities Project | Soquel Creek Water District; Santa Cruz, CA

Project Engineer. The project includes final design of a new Tertiary Treatment Facility (TTF) and a new Advanced Water Treatment Facility (AWPF) to help address critical overdraft in the Santa Cruz Mid-County Groundwater Basin and increase the sustainability of groundwater supply. Austin is leading the AWPF portion of the project which includes microfiltration, reverse osmosis, and UV AOP treatment technologies. His responsibilities include hydraulic design and analysis, process mechanical design, civil site layout and stormwater design, and serving as lead discipline coordinator for the site.

Keene Matsuda, P.E.

Electrical

Keene has 40 years of extensive experience with electrical power distribution systems for a wide variety of utility, industrial, aviation, energy, institutional, and health care types of projects. His particular expertise includes medium and high voltage substations, low voltage distribution networks, engine/generator and cogeneration power plants, water and wastewater treatment plants, pump stations, desalination plants, instrumentation and control, SCADA, fire alarm, CCTV, security, telecommunications systems, and condition assessments. He uses sophisticated computer software to perform power systems analysis and calculations for voltage drop, equipment sizing, load flow, short circuit, motor starting, coordination studies for protective relay and circuit breaker settings, and arc flash calculations per IEEE 1584 and NFPA 70E. He also uses computer based software to prepare a photometric analysis for lighting design and layouts. In conjunction with design drawings, he prepares construction cost estimates, and electrical equipment and installation specifications. Keene is an IEEE Distinguished Lecturer for the Power and Energy Society, where he has delivered national and international lectures on specialty topics: High Reliability Power System Design, and Renewable Energy.

VALUE ADDED

- Ability to leverage electrical power system distribution knowledge for a wide variety of Southern California agencies including the Metropolitan Water District of Southern California, Orange County Water District, Irvine Ranch Water District, and Eastern Municipal Water District.

OFFICE LOCATION

Irvine, CA

EDUCATION

BS, Electrical Engineering Computer Science, University of California at Berkeley, 1981

PROFESSIONAL REGISTRATION

PE – 1984, CA, E011758
PE – 1995, OR, 17586PE
PE – 1995, WA, 31686
PE – 1995, HI, PE-8493
PE – 1995, NV, 011622
PE – 1996, AZ, 29965
PE – 2000, NY, 77571
PE – 2000, FL, 55874

YEAR CAREER STARTED

1981

PROJECT EXPERIENCE

Orange County Water District | Ground Water Replenishment System Upgrade, Phase I and Phase II; Fountain Valley, CA

Lead Electrical Engineer. Responsible for electrical system design for both the phase I and phase II expansion of the existing GWRS plant. Design elements include 12 kV and 480 V switchgear, 12-4 kV isolation transformers, 4 kV and 480 V variable frequency drives and motors, motor control centers, active harmonic filters, lighting, grounding, underground duct banks and raceway, for the reverse osmosis, microfiltration, ultraviolet, and product water pump process areas.

Eastern Municipal Water District | Perris Desalination Facility; Perris, CA

Lead Electrical Engineer. Responsible for the complete design of the electrical system for a new 5 MGD desalination facility. Design included main switchboards and motor control centers for the reverse osmosis process area, chemical storage area, truck loading area, and also a new administration building with conference rooms and laboratory. Conducted weekly visits to the project site and inspection of construction in progress.

Irvine Ranch Water District | Michelson Water Recycling Plant Biosolids and Energy Recovery Facilities Project; Irvine, CA

Lead Electrical Engineer. Responsible for the design of a power distribution system for a new biosolids facility at the existing water recycling plant. The power system design includes a new electric utility service from SCE and 4.16 kV switchgear for three separate 480 V switchgear units feeding MCCs, VFDs, thickening and dewatering centrifuges, blowers, and solids handling process equipment. Included in the design was 5-200 kW microturbines using methane gas as fuel, with gas pre-treatment and final treatment skids. Served as electrical inspector and engineer-of-record during construction.

Metropolitan Water District of Southern California | Hayfield Groundwater Storage Project; Hayfield, CA

Lead Electrical Engineer. Prepared conceptual design for a new 6.9 kV circuit from the Julian Hinds Pumping Plant to six new pump stations, each with a 1250 hp, 4 kV motor and reduced voltage motor starter and pump station auxiliary loads.

Andrew Franklin, P.E.

I&C

Andrew is an instrumentation and control systems engineer with twenty years of increasing responsibility for designing and implementing control systems. Experienced with all phases of control systems projects including master planning, design, programming, scheduling, vendor selection, acquisition, installation, technical writing and technical presentation. Specific expertise includes project design, implementation, commissioning and management regarding process control in the water, wastewater, and power generation industries. These industries employ various automation platforms such as distributed control systems (DCS), programmable logic controllers (PLC), and human machine interfaces (HMI) and their monitoring and control of various process instrumentation devices. He also has similar experience with process control networks utilizing fiber and copper media in a LAN and WAN topology. Additional expertise includes field commissioning of HVAC, boiler and chiller systems.

VALUE ADDED

- Ability to view the design from the programmer's point of view with 10 years of aggregated experience in PLC and SCADA HMI programming on various platforms such as Concept, Unity, RSLogix 500, RSLogix 5000, iFix, Wonderware InTouch and Wonderware System Platform.

OFFICE LOCATION
Irvine, CA

EDUCATION
BS, Mechanical Engineering, University of California at Berkeley, 2000

PROFESSIONAL REGISTRATION
PE – 2007, CA, M33973

PROFESSIONAL ASSOCIATIONS
American Indian Science and Engineering Society

YEAR CAREER STARTED
2000

YEAR STARTED WITH B&V
2020

PROJECT EXPERIENCE

Orange County Water District| Groundwater Replenishment System (GWRS) Final Expansion; Fountain Valley, CA

I&C Engineer. I&C Engineer for the Groundwater Replenishment System Final Expansion project. This assignment included the design review and compliance of the instrumentation for the chemical feed, UV disinfection, MF, RO and miscellaneous systems.

Eastern Municipal Water District | Perris II Desalination Facility Project; Menifee, CA

I&C Engineer. The P2D project included the development of a groundwater Reverse Osmosis potable water treatment facility. Responsible for leading the SCADA network implementation and design compliance; commissioning plan review and design review of plant systems.

Orange County Sanitation District | TPAD Digester Facility at Plant No. 2, P2-128; Huntington Beach, CA

I&C Engineer. Replacing existing digestors with thermophilic anaerobic digestors. This includes sludge heating and cooling, new boilers, pumps, heat exchangers, batch tanks for transferring sludge to digesters, new power building, pumping systems. Currently developing design memos to plan for equipment controls, instrumentation, PLCs, fiber optics, tagging, and controls philosophy.

Orange County Sanitation District | A-Side Primary Clarifiers Replacement at Plant No. 2, P2-98; Huntington Beach, CA

I&C Engineer. Replacing side A clarifiers and rehabilitate the Side B and Side C clarifiers at Plant No. 2. Designed for power supply, instrumentation, and control system to be consolidated to a single central location dedicated to the primary clarifiers. Facility includes design of an electrical building, distribution structure, primary clarifiers, odor control, and associated chemical feed. Design includes the addition of a new control room, Schneider Electric M580 PLCs, and new fiber optic connections for several systems. Generated detailed design specifications for Division 17. Coordinated utility improvements and modifications with P&IDs.

Mark Lowe, P.E.

Structural

Mark is a registered Structural Engineer with 37 years of experience in structural design, project engineering and management. He has worked on preliminary and final design and construction support of new and upgraded water, wastewater, and other public works facilities throughout California. In addition to leading Black & Veatch structural engineering teams, Mark works with our clients' structural engineers and construction contractors to resolve issues in the field.

VALUE ADDED

- Lead Structural Engineer on the majority of Black & Veatch's Southern California water projects including assignments for the Metropolitan Water District of Southern California, Orange County Water District, Irvine Ranch Water District, and the Los Angeles Department of Water and Power.

PROJECT EXPERIENCE

Metropolitan Water District of Southern California, Second Lower Feeder Preliminary and Final Design, Los Angeles, CA

Lead Structural Engineer. Responsible for structural engineering associated with preliminary and final design of a project to rehabilitate an existing pipeline located within more than 15 cities in Los Angeles and Orange Counties. The rehabilitation will result in a transmission pipeline with a renewed service life in excess of 50 years. Because the SLF Pipeline is the first of five PCCP pipelines that Metropolitan is rehabilitating, the project also will be used to establish overall PCCP rehabilitation program standards and common methodologies for design as well as communication with stakeholders. The project has been executed in close collaboration with Metropolitan staff and with the parallel CEQA Programmatic EIR and project-specific EIR efforts.

Metropolitan Water District of Southern California | Sectionalization of Rialto Pipeline; San Bernardino, CA

Structural Engineer. The project involved structural modifications and improvements to the existing 96" diameter Rialto Pipeline, located in the City of San Bernardino. The work included design and construction of three (3) sectionalizing structures, butterfly valve with bypass piping, and a pump back facility at Live Oak Reservoir. The purpose of the work is to provide structural design and analysis for the sectionalization of the existing steel and concrete-lined water supply pipeline to provide a means of water flow control between various sections of the pipeline. The surge and hydraulic pressures resulting from the modifications were analyzed and evaluated to ensure the safe operation when back pumping the system.

Metropolitan Water District of Southern California | Feasibility-Level Engineering Analysis of Regional Recycled Water Supply Program; Los Angeles, CA

Structural Engineer. Conceptual design for conveyance portion of regional recycled water project. Components include conveyance pipelines, pump stations, and groundwater injection facilities.

Eastern Municipal Water District | Perris II Desalination Facility; Perris, CA

Structural Engineer. Provide structural design, analyses and preparation of construction documents for new water reclamation plant with 3.5 mgd capacity and expandable to 5.0 mgd. New structures included Forebay/RO Transfer Pump Station, Chlorine Contact Tank/Finish Water Pump Station, RO Process/Research/Chemical building, Decarbonator Facility, Brine Receiving Station and site security fence.

Orange County Water District | Expansion of Groundwater Replenishment System, GWRS Project; Fountain Valley, CA

Structural Engineer. Design upgrade to existing facilities to provide improved capacity to existing water filtration and treatment facilities. Structures required or modified included RO Building, MicroFiltration Facility, Ultraviolet Facility, Lime Treatment and Saturator Equipment, RO Flush Tank Channel Improvements, 15 MG Equalization Flow Storage Tanks and Pump Station. Upgrade capacity of 30 MGD provides a total plant capacity of 100 MGD.

OFFICE LOCATION
Irvine, CA

EDUCATION
BS, Civil Engineering, Montana State University, 1983

PROFESSIONAL REGISTRATION
PE – 1988, CA, 43603
PE – 1997, OR, 19461
PE – 2003, NV, 16253
PE – 2003, NM, 16295
PE – 2004, CO, 38709
PE – 1998, MT, 8046
Structural
SE – 1992, CA, 3693
SE – 1997, WA, 35549
SE – 1997, HI, 9382
SE – 1997, AZ, 31942
SE – 2003, UT, 2203
Committee

YEAR CAREER STARTED
1984

YEAR STARTED WITH B&V
2005

Kirk Johnson

Estimating

Kirk Johnson has 30 years of field construction, project management and estimating experience. He has experience with energy, chemical, refining, water, wastewater and oil field projects working directly on the construction, from performing trade craft work to project management for projects up to one hundred million dollars. As an Estimator Mr. Johnson has a proven track record for producing reliable estimating services on projects well over a billion dollars. Kirk has extensive knowledge of design-build, bid-build, engineer procure construct, construction manager at risk, and many other delivery models for private, industrial, commercial and federal clients. Within the Water/Wastewater marketspace Kirk has performed estimating for hundreds of projects in the United States and abroad with some up to 1.5 billion in value.

VALUE ADDED

- Extensive experience with project planning and execution that bring the contractor's perspective to constructability and cost-effective design.
- In depth knowledge of probability modeling for assessment of project risks to identify and mitigate unforeseen conditions having potential adverse impact to projects.
- Proven track record for establishing accurate project costs at every phase of design.

OFFICE LOCATION

Los Angeles, CA

EDUCATION

YCA Solutions for Project Success, Registered PMI Provider - Project Management: The Project Success Method

Saddle Island Institute - Construction Schedule Analysis & Evaluation of Delay Damages

Idysys, Inc. - Timberline Estimating Extended, Timberline Estimating Workflow, Timberline Report Writer

DRMcNatty & Associates, Inc. - SureTrack Project Manager, Planning and Scheduling with Primavera Project Planner P3

YEAR CAREER STARTED

1984

YEAR STARTED WITH B&V

2018

PROJECT EXPERIENCE

Metropolitan Water District of Southern California | Second Lower Feeder PCCP Rehabilitation – Final Design (Contracts 1, 2, 3, 4 and 8); Greater Los Angeles, CA

Estimating Manager. Mr. Johnson is responsible for development of the engineer's estimates for this project that include rehabilitation of 17.5 miles (92,000 Linear Feet) of 78-inch and 84-inch precast concrete cylinder pipe (PCCP) through an urban environment in greater Los Angeles. Total project value has been estimated at $115 Million in construction. The work comprises rehabilitation using steel liner and pipeline appurtenance replacement and is being executed as a multi-year program of interrelated projects with five discrete construction contracts authorized to date. As of the end of 2019, 11 miles (57,100 linear feet) or 78-inch PCCP has been successfully rehabilitated. As a part of the project, the mainline isolation valves are being replaced with new 48-inchg and 54-inch conical plug valves located within valve vaults.

Orange County Water District (OCWD) |Groundwater Replenishment System (GWRS) Final Expansion; Fountain Valley, CA

Estimating Manager. Mr. Johnson was responsible for estimating services for the Groundwater Replenishment System (GWRS) Final Expansion. Responsibilities included managing all aspects of the cost estimating services as well as detailed estimating of the process equipment and mechanical piping. The GWRS is the largest Indirect Potable Reuse (IPR) system in the world and treats secondary effluent wastewater through MF, RO and UV AOP for groundwater injection for both recharge and seawater barrier. This project was to expand the system from 100 to 130 MGD. The final engineer's estimate was within 5% of the low bid for this 200 Million Dollar construction project.

Eastern Municipal Water District | Perris II Desalter; Perris, CA

Estimating Manager. Mr. Johnson was the Estimating Manager for this project that included design services for the construction of the Perris II Desalter facility. The facility will produce 3.5 MGD of potable water from local groundwater wells with treatment through new Reverse Osmosis units. The engineers estimate for the project was with 1% of the low bid with a total construction value of $50 Million.

Appendix B – Standard Billing Rates

Appendix B Standard Billing Rates

BLACK & VEATCH 2021 FEE/PAYMENT SCHEDULE

Black & Veatch's hourly billing rates for 2021 are indicated in the table below. These billing rates will be used to develop our team's labor and fee estimates for future MWDOC task orders.

BLACK & VEATCH CORPORATION
SCHEDULE OF HOURLY RATES BY CATEGORY

PERSONNEL CLASSIFICATIONS	2021 HOURLY BILLING RATES
Project Director/Vice President	$275 - $330
Project Manager 1-3	$190 - $280
Engineer 6-7	$195 - $260
Engineer 4-5	$145 - $210
Engineer 1-3	$105 - $150
O&M Specialist 5-7	$130 - $205
Construction Manager 6-7	$185 - $230
Construction Manager 4-5	$140 - $190
Engineering Technician 5-8	$115 - $180
Engineering Technician 2-4	$100 - $135
Word Processing Specialist	$90 - $120
Clerical and Finance	$90 - $120
Project Support Assistant	$90 - $120

Notes:
(1) Rates shown are inclusive of current overhead rates.
(2) Other Direct Charges will be billed at cost. Allowable Other Direct Charges include the following: Travel (transportation fares/tickets, vehicle rental & Fuel, lodging, meals, parking, tolls, IRS-approved mileage), Delivery (courier, FEDEX/UPS/Express mail, US mail) Major deliverable reproduction (photocopy, printing), Field equipment and miscellaneous supplies, Temporary labor

Appendix C – Contract Exceptions

Appendix C Contract Exceptions

During our 30 years in California, Black & Veatch has negotiated contracts with some of the State's most prestigious agencies. We anticipate no difficulties in the negotiation of the contract with MWDOC. If possible, we ask that the following revision to the Insurance requirements section of the Standard Consulting Agreement be considered:

- *Article VI.B requires that the Professional Liability policy includes a provision that requires the insurer to provide 30 days notice of cancellation to the District. Similarly Article VI.C states that CGL, auto, worker's compensation and employer's liability will contain similar clauses. Our insurance policies do not contain this provision. We request that this language be struck or modified to state that Black & Veatch will endeavor to provide thirty days notice of any cancellation.*

Qualifications for **Municipal Water District of Orange County (MWDOC)**

On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development – RFQ ENG. 2021

March 25, 2021

CDM Smith

46 Discovery, Suite 250, Irvine, CA 92618
tel: 949 752.5452

March 25, 2021

Charles Busslinger, District Engineer
Municipal Water District of Orange County
18700 Ward Avenue, Fountain Valley, CA 92728
Email: CBusslinger@MWDOC.com

Table of Contents

Subject: Statement of Qualifications in Response to RFQ ENG. 2021 for On-Call Technical Services

Dear Mr. Busslinger:

CDM Smith is pleased to present the Municipal Water District of Orange County (MWDOC) with our qualifications to provide Water Reliability Planning and Engineering as-need services. We offer the following advantages to achieve your goals:

Firsthand Knowledge of Your Organization and its Technical Needs. Having served as a trusted advisor to MWDOC and its member agencies since 2005, our planning and engineering professionals have worked with you before and delivered excellent client service time after time. We know your mission, critical issues, and contracting mechanisms.

Substantial Water Reliability Planning Experience. With a 25-year track record of providing a full suite of water supply planning services, we have prepared 20+ water resources plans or studies in Southern California alone. We also have an extensive history of working with the Metropolitan Water District of Southern California and we possess a deep understanding of its imported water sources and reliability.

Exceptional Engineering Experience. We offer a vast engineering project portfolio encompassing large diameter pipelines for water, wastewater and recycled water conveyance; hydraulic and water quality analyses; and designing advanced treatment systems for seawater desalination and potable reuse.

Ability to Perform Task Order Requests. CDM Smith has performed well with dozens of task order-based contracts with agencies such as Los Angeles Department of Water and Power, Santa Ana Watershed Project Agency, MWDOC and others. For MWDOC, we have consistently delivered services within specified scope, schedule and budget—many times delivering ahead of schedule and under budget.

We look forward to the opportunity to continue our long-term partnership and support to MWDOC with the successful delivery of services under this On-Call contract. If you have questions regarding our qualifications, please contact me at (949) 302-0419 or acevedoa@cdmsmith.com.

Sincerely,

Alberto Acevedo, PE, PMP, BCEE
Project Manager and Client Service Leader
CDM Smith Inc.

Section 1 – Firm Information

Understanding the importance of streamlined communication for your On-call Technical Services contract, we have appointed the following individual to serve as the primary point of contact to MWDOC for the duration of the contract.

Alberto Acevedo, PE, PMP, BCEE
Project Manager
46 Discovery, Suite 250
Irvine, CA 92618
Direct: (949) 930-7252
Mobile: (949) 302-0419
Email: acevedoa@cdmsmith.com

A Locally Based Team Capable of Immediately Responding to MWDOC's Needs

We will manage this contract from our Irvine office with support from our other Southern California offices in Los Angeles, Carlsbad and Rancho Cucamonga.

The proximity of our local team to MWDOC's office and service area will allow us to work closely with your team and other consultants in a collaborative manner, while sharing a common purpose of successfully and cost effectively executing your task orders.

Moreover, with **170+ professionals across our Southern California offices**, we have the full capability and flexibility to mobilize immediately to meet MWDOC's needs.

CDM Smith's Southern California footprint aligns well with MWDOC's service area, giving you the full advantage of our resources and professionals.

MWDOC On-Call Categories of Interest

CDM Smith is proposing on two of MWDOC's main categories specified in the RFQ:

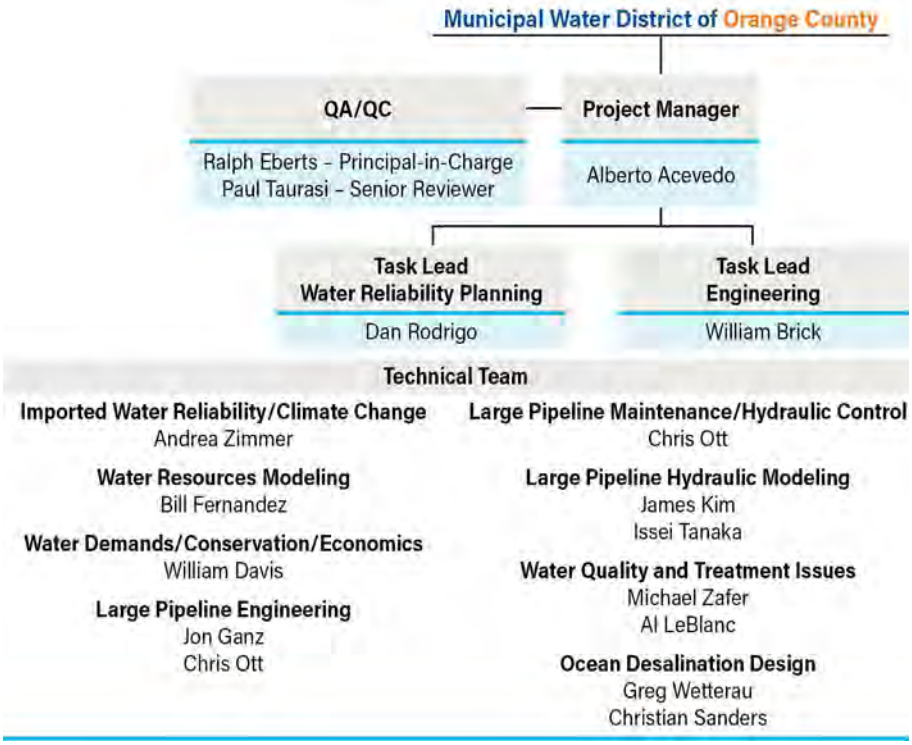
1) Water Reliability Planning Services

2) Engineering Services (for Large Pipeline Engineering, Hydraulic and Water Quality Modeling, and Ocean Desalination)

Section 2 – Organization and Key Personnel

Our core team includes **seasoned professionals with the expertise and experience that align with your project delivery needs**. Further, many of our proposed team members have previous experience working for MWDOC and its member agencies dating back to 2005. We also offer a deep bench of mid-level planning and engineering professionals to support the core team, providing cost-effectiveness in execution of our services.

While CDM Smith can execute fully on all task orders for this project, we can augment this team if required with trusted subconsultant partners.



Alberto Acevedo PE, PMP, BCEE

Project Manager

Alberto is a technical expert, strategic planner, and hands-on project manager with 46 years of experience on water and wastewater projects throughout Southern California, many of which have been task orders under on-call contracts. For the last 21 years, he has held leadership roles on Orange County projects, including his recent work for South Coast Water District, and many of these projects have been task orders under on-call contracts. Alberto's transparent and collaborative communication style enables him to work with clients, and diverse teams and stakeholder groups to resolve complex issues and find solutions. He excels at efficiently managing teams and driving project objectives for quality, safety and cost.

Dan Rodrigo

Task Lead – Water Reliability Planning

Dan is CDM Smith's national One Water Practice Leader and has 30 years of experience in water supply planning, integrated water resources management, water demand forecasting, scenario planning, climate resiliency, and resource economics. As an expert in Metropolitan Water District of Southern California's (MWD) imported water supplies and the evaluation of local water supply projects, Dan has provided leadership to MWDOC in characterizing supply risks and uncertainties, culminating in the preparation of the first-ever Orange County Water Reliability Study in 2014 and its update in 2018.

William Brick PE, PMP, BCEE

Task Lead – Engineering

With 24 years of experience, Bill has served as the civil design manager and/or lead design engineer on 20+ projects at water treatment plants and related distribution facilities in California. This includes leading the feasibility-level design of MWD's 84- to 150-in Sepulveda Feeder and preliminary design of the MWD Regional Recycled Water Supply Program. His extensive conveyance experience includes regional recycled water master planning, potable water pump stations, storage facilities ranging from 2 to 300 MG, distribution pipeline design and rehabilitation, and groundwater extraction and recharge facilities.

CDM Smith's project management team will be supported by a **highly specialized team of technical experts with experience in all aspects of work anticipated under this on-call services contract**. In the table below, we provide highlights of the qualifications and experience of our technical team members. In addition to these staff members, we also have the ability to draw on additional multidiscipline resources from across our Southern California offices should the need arise.

Technical Team Roles, Qualifications and Experience

Name | Role	Qualifications & Experience Highlights
Ralph Eberts, PE, PMP Principal-in-Charge and QA/QC	In his 35 years of experience, Ralph has held significant leadership and similar roles on dozens of complex, high-profile water projects for water utility clients, such as Orange County Water District and Orange County Sanitation District.
Paul Taurasi, PE, BCEE QA/QC Senior Reviewer	Paul has 28 years of technical, leadership and QA/QC experience for the design of water transmission mains, water treatment facilities, pump stations, including his current work for San Diego County Water Authority.
Andrea Zimmer, PhD, PE Imported Water Reliability/Climate Change	As an expert in MWD water supplies and climate change, Andrea has modeled supply reliability for agencies such as MWDOC, SCWD, Long Beach, San Diego, and Upper San Gabriel Valley Municipal Water District.
Bill Fernandez, PE Water Resources Modeling	With over 20 years of water resources engineering, Bill has led complex groundwater, surface water and integrated systems modeling projects and has overseen evaluations of alternatives.
William Davis Demand Forecasting and Conservation	A national expert with 35+ years of experience in water demand forecasting and conservation evaluations, Bill has led numerous demand studies for agencies such as MWD, San Diego, Los Angeles, and most recently MWDOC.
Jon Ganz, PE, BCEE Large Pipeline Engineering	John's 24-year career encompasses the design, construction and rehabilitation of water/wastewater treatment facilities and large diameter pipelines for Southern California clients, such as MWD, OCSD, EMWD, and LACSD.
Chris Ott, PE Large Pipeline Engineering and Hydraulic Control	Specializing in water and wastewater conveyance systems, pumping and pressure hydraulic systems, Chris has 17 years of experience and a substantial project portfolio spanning local agencies such as OCSD, MWD, EMWD.
James Kim, PE Large Pipeline Hydraulic Modeling	James is a water resources engineer with 17 years of experience in hydraulic modeling of water distribution and wastewater systems, including leading hydraulic analyses for regional clients, such as MWD, EMWD and IEUA.
Issei Tanaka Large Pipeline Hydraulic Modeling	A water resources engineer, Issei is experienced in performing hydrology and hydraulics analyses for large pipelines, construction oversight, and utility and site investigations. His experience includes project work for LABOE and LADWP.
Michael Zafer, PE Water Quality and Treatment Issues	An expert at navigating complex regulatory compliance and addressing water quality issues, Michael has 34-years of experience focused on planning, design, construction, and operations of water treatment facilities in California.
Al LeBlanc, PE, BCEE Water Quality and Treatment Issues	In his 26 years of experience, Al has worked on 11 PFAS removal projects ranging up to 200 mgd. His unmatched national experience includes ongoing PFAS work for East Orange County Water District and the City of Garden Grove.
Greg Wetterau PE, BCEE Ocean Desalination Design	An international expert in process and system design for membrane filtration, desalination, and advanced wastewater treatment facilities, Greg has 23 years of experience, including work on MWDOC's Coastal Desalination Pilot Project.
Christian Sanders Ocean Desalination Design	Christian has in-depth design expertise in seawater desalination, recycled water and conventional surface/groundwater treatment and 16 years of experience on projects, such as the Monterey Peninsula Water Supply Project.

Section 3 – Description of Firm and Capabilities

CDM Smith Overview

Founded in 1947, CDM Smith is a full-service consulting, engineering, construction, and operations firm delivering exceptional service and smart solutions to clients worldwide. As a global leader in the development, treatment, and delivery of safe and reliable drinking water, CDM Smith has **designed over 1,500 new or expanded water treatment plants** ranging from 1 million gallons per day (mgd) to 1,260 mgd. We are also a global leader in water treatment and potable reuse; water conveyance systems; brackish and seawater desalination; and groundwater modeling, treatment and remediation.

CDM Smith provides the complete spectrum of services, including planning, water quality studies, condition assessment, environmental documentation, digital solutions, permitting support, engineering design, construction, construction services, and operations and maintenance.

Proven Track Record on Task-Order Based Contracts

Our extensive depth of resources allows us to effectively manage resources and provide rapid responsive service for on-call contracts with a short duration with cost effective results. **Over the past 10 years, in California alone, we have maintained over 70 as-needed contracts and successfully executed over 350 discrete task orders**. These task orders range from $10,000 to over $100,000. Through the delivery of these task orders and projects, we have built a reputation for quality and responsiveness. We plan effectively, respond quickly, and know how to deliver on multiple projects concurrently.

While we have been serving MWDOC since 2005, we have recently been providing water supply reliability and water demand forecasting services under an as-needed services contract since 2019. Our team has demonstrated the ability to work closely with yours to successful complete task orders to an agreed upon schedule and budget.

Expertise in Water Reliability Planning

CDM Smith has been **providing water supply reliability planning services to clients in California for over 25 years**. We have an extensive understanding of all of California's major water supply systems, especially with MWD's imported water sources from the Colorado River and Sacramento-San Joaquin Delta via the State Water Project. We excel on providing the following services in this area:

- Water demand forecasting and conservation evaluations
- Water resources modeling and reliability assessments under multiple hydrologies, including surface water and groundwater
- Climate change impacts on water demands and supplies, and identifying adaptation measures
- Scenario planning and adaptive management to capture uncertainties
- Resource economics and benefit-cost analysis for conservation and water supply projects
- Preparation of water resources plans, integrated water resources plans, and urban water management plans

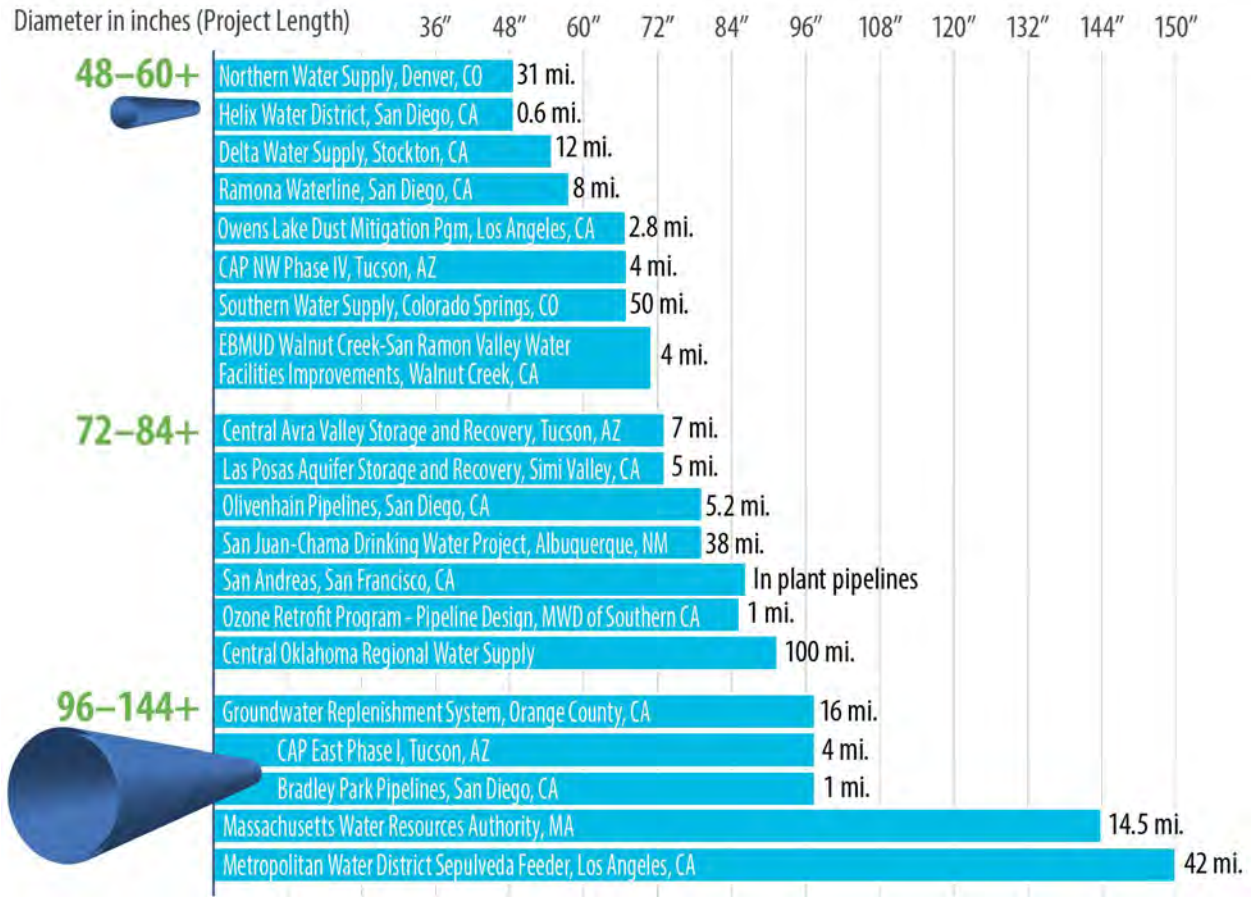
In Southern California alone, we have prepared **over 23 plans/studies for 12 clients** since 2000.

1. Thousand Oaks: Groundwater/Reclaimed Water Study (2016)
2. City of Pasadena: Integrated Water Resources Plan (2010)
3. Upper San Gabriel Valley MWD: Integrated Water Resources Plan (2017)
4. City of Los Angeles: UWMP (2015, 2020), Demand Forecasting (2010-2020), and Water Conservation Study (2017)
5. MWD: Integrated Area Study (2008), CII Conservation Study (2013), 2020 IRP Support (2021)
6. City of Long Beach: Water Resources Plan (2019)
7. MWDOC: Water Reliability Study (2014, 2018), Demand Forecasting (2021)
8. Moulton Niguel Water District: Long-Range Reliability Plan (2016)
9. South Coast Water District: Water Reliability Study (2018) and Integrated Water Resources Plan (2021)
10. Eastern MWD: Integrated Water Resources Plan (2011)
11. City of San Diego: Long Range Water Resources Plan (2013), UWMP (2015, 2020), and Demand Forecasting (2000-2021)
12. Otay WD: Integrated Water Resources Plan (2008)

MWDOC will benefit from our extensive understanding of imported water and local water supplies in Southern California, as well as our ability to estimate current and future supply reliability under uncertainties. In addition, our conceptualization and implementation of water conservation, seawater desalination, and groundwater conjunctive projects allows us to share lessons learned.

Nationally Known Leader in Large Pipeline Engineering

CDM Smith has designed and built hundreds of projects involving large diameter pipelines for potable water, raw water, wastewater, and recycled water conveyance. Our conveyance expertise includes planning, design, condition assessment, and rehabilitation of water transmission pipelines ranging from small distribution system mains up to tunnels as large as **17 feet in diameter, and large-diameter pipelines of up to 144 inches in diameter** using construction methods that encompass traditional and trenchless technologies. We have completed **50+ trenchless projects** utilizing various technologies, such as microtunneling, directional drilling, cured-in-place-pipe (CIPP), sliplining and pipe bursting. The figure below provides a snapshot of CDM Smith's vast experience working on pipeline design projects.



In Southern California alone, CDM Smith has designed nine large diameter pipelines bringing this expertise to MWDOC and its member agencies.

Many of our large-diameter pipeline designs involve **creative solutions for navigating a range of project constraints** that may arise during a pipeline project, such as difficult soil conditions, steep slopes, stream crossings, hard rock conditions, seismic fault crossings, construction near other active pipelines, drilling and tunneling in sensitive environmental habitats, construction in crowded rights-of-way, managing traffic near construction sites, maximizing capacity following rehabilitation, and building and maintaining positive public support and relations.

CDM Smith's Trenchless Roots

Our firm has completed thousands of trenchless technology projects utilizing various technologies such as CIPP, sliplining, pipe bursting, jack & bore, auger boring, horizontal directional drilling, micro-tunneling and utility tunneling. With 200+ trenchless technology experts on staff, CDM Smith's projects have been recognized as "Project of the Year" on several occasions and we have been consistently ranked in the **Top 10 of trenchless technology firms by Trenchless Technology Magazine**.

Hydraulic Modeling and Water Quality Analysis Experience

At CDM Smith, we have developed large city-wide distribution models from geographic information systems (GIS) layers and calibrated them to field and SCADA data and provided reliable and robust models. InfoWater is one of the main pressurized pipeline modeling software platforms as it is preferred by many clients across the nation and merges well with agency GIS network and mapping data systems. Our dedicated GIS specialists have condensed large amounts of information into concise map books and GIS layers intended for both internal and public access, experience that will prove valuable to MWDOC if we need to perform a hydraulic analysis of your system.

We are **highly proficient in using InfoWater and InfoSurge as tools to perform hydraulic, operational, water quality and surge evaluations for distribution and transmission systems**. We develop control logic statements within InfoWater that represent actual field operating strategies, whether they are automatic SCADA-based controls or manual methods based on staff strategies. Extended Period Simulation (EPS) controls are important in evaluating and finding solutions. We develop and use models for planning evaluations, operational analyses, optimizing operations, water age evaluations and mitigating potentially damaging surge events. CDM Smith's modeling team is well equipped to perform hydraulic evaluations that may be needed by MWDOC throughout the life of the contract.

Operational hydraulics are critical to the success of every water project. CDM Smith has extensive experience in every aspect of hydraulics and water quality modeling. We typically use modeling tools in the planning and design process to predict hydraulic conditions with a high level of accuracy. We utilize these tools to address water quality issues of concern, including water aging and disinfection residuals, such as chloramine.

Our team has integrated hydraulic modeling with our water quality and treatment expertise to solve complex issues related to protecting and enhancing water quality from the sources of supply to the customers' taps. Specific experience includes:

- Correlating water age with DBP production and disinfection;
- Development of nitrification prevention plans;
- Corrosion control and blending studies for groundwaters and treated surface waters- including desalination for brackish groundwaters, brackish surface waters, and seawater;
- Blending studies to meet aesthetic goals (e.g., hardness, chloride, total dissolved solids, etc.) and health-based regulations (e.g., nitrate, PFAS, arsenic, etc.).

CAD Systems Expertise

CDM Smith has full working knowledge of the Autodesk, Inc. product line, including AutoCAD Map 3D and AutoCAD P&ID. We have standardized on Bluebeam Revu, which is defined as the standard software used in the management of pdf files at MWDOC. CDM Smith is experienced in AutoCAD Civil 3D, AutoPlant 3D, and Revit as core modeling platforms. We have full capabilities in Building Information Modeling (BIM), through our 3D Intelligent Modeling technologies that address complex designs and structures beyond buildings. 3D Intelligent Models allows us to utilize data-centric 3D models through all stages of design.

Leading the Industry in Advanced Treatment and Desalination

CDM Smith team has designed some of the most visionary and technically sophisticated advanced water treatment facilities in existence today. We have completed **more than 270 reclaimed/reuse water projects** worldwide and we have partnered with the USEPA on every edition of the *Guidelines for Water Reuse* (1980, 1992, 2004, 2012, and 2017).

Our experience leading the design of advanced water treatment facilities is unmatched in California and includes the 8-mgd Leo J. Vander Lans Water Treatment Facility in Long Beach and the 70-mgd, multiple award-winning, world-class Groundwater Replenishment System for the Orange County Water District in Southern California—an innovative advanced water purification facility for indirect potable reuse that has changed the course of water recycling throughout the world.

We offer expertise in the **full array of technologies used in ocean desalination**, including membrane and media filtration, reverse osmosis, energy recovery and product water stabilization. Our experience includes support for some of the largest projects in the western Hemisphere, including program management for the 57 mgd Escondida Water Supply Project in Chile, long-term operational support for the 40 mgd Point Lisas Desalination Plant in Trinidad, and design-build for the 8-mgd Monterey Peninsula Water Supply Project.

From Orange County to Sand City, CDM Smith is at the forefront of making ocean desalination a viable and sustainable option for California communities.

Our team members' substantial desalination portfolio includes the design-build of the Sand City Desalination Plant – the first full-scale desalination facility in California to receive permitting approval under the current surface water treatment regulations.

CDM Smith also brings **firsthand experience supporting MWDOC's early work on the South Coast Ocean Desalination Feasibility Study** in 2012. For this project, we supported an 18-month operation of a pilot facility, treating a portion of the water from the 2,200-gallon-per-minute demonstration slant well and we led the evaluation of pretreatment approaches to address the unusually high concentrations of iron and manganese

Proven Delivery of As-Needed Services for MWDOC

CDM Smith has been **successfully delivering as-needed services to support water reliability planning for MWDOC since 2019**. Recently we accelerated a comprehensive water demand forecast for all of Orange County for a task order under this contract with both MWDOC and OCWD. This forecast was needed to support reliability planning work and preparation of 2020 Urban Water Management Plans which have a regulatory deadline of July 1, 2021. CDM Smith mobilized its forces to quickly develop an agency survey to collect needed water use data, developed a methodology, held several agency meetings to go over both methodology and draft forecast results, and finalized water demand forecasts for 30+ water agencies—all in three and a half months.

"As some of MWDOC's member agencies needed their demand forecasts early for their own 2020 UWMPs, CDM Smith was asked if we could accelerate those agency forecasts earlier than originally scheduled. Of course, CDM Smith delivered on that. Thank you very much Dan! We really appreciate the quick turn around on the projections. Thanks."

– Alex Heide, Water Resources Analyst, MWDOC

Section 4 – Firm Capacity

The success of any as-needed contract depends on the expertise, experience and availability of personnel assigned to the team. All our team members identified in Section 2 are available to respond to and execute the full array of potential services that MWDOC may need under this contract. CDM Smith is committed to continuing to provide MWDOC with high quality services within budget and schedule. Our two proposed categories of work for MWDOC will be coordinated by our **Project Manager Alberto Acevedo**, and overseen by our two Task Leads, **Dan Rodrigo (Water Reliability Planning)** and **Bill Brick (Engineering Services)**. Dan and Bill will engage our various technical staff as needed.

Key Staff Commitment

The table below lists the available time that each of our team members will dedicate to MWDOC during the duration of this contract.

Key Staff and % of Time Available to MWDOC

Team Member	% Time Available to MWDOC
Alberto Acevedo	15-25%
Dan Rodrigo	20-30%
Bill Brick	20-30%
Ralph Eberts	10-15%
Paul Taurasi	10-15%
Andrea Zimmer	25-45%
William Fernandez	25-45%
William Davis	25-45%
Jon Ganz	25-45%
Chris Ott	20-40%
James Kim	25-45%
Issei Tanaka	25-45%
Michael Zafer	10-30%
Al LeBlanc	10-30%
Greg Wetterau	10-30%
Christian Sanders	10-30%

CAPACITY, COMMITMENT AND FLEXIBILITY

Presenting the capacity for individual consultant staff for an on-call services contract can be tricky as there are no specified tasks or schedule at this time. However, CDM Smith is fully committed to providing excellence and cost-effective solutions to MWDOC for the duration of this contract. To achieve this commitment, we have assigned multiple core team members in each of the key categories of work MWDOC has expressed interest. This will ensure MWDOC will always have a seasoned expert at hand.

Supporting, and under the direction of, this core team is a cadre of mid-level planners and engineers that can be assigned to task orders at a moment's notice—providing MWDOC with both adequate response and cost-effectiveness in the delivery of services.

Resumes for all team members are included in Attachment C and are presented in the order they appear in the table above.

Section 5 – Technical Approach to Execute Work

Project Execution Approach

CDM Smith is committed to meeting MWDOC's high project delivery standards. We have engaged in the past with many agencies to deliver projects under on-call services agreements and we are well-versed in delivering projects defined by discrete task orders and scopes of work under similar master services agreements. The figure at right illustrates our approach to managing Contract Service Orders (CSOs) that will be issued under MWDOC's on-call services agreement. Following a request from MWDOC, Project Manager **Alberto Acevedo** will immediately review the CSO request and will work with Task Leads **Dan Rodrigo** (planning) and **Bill Brick** (engineering) to prepare a draft scope of work and budget, conferring with MWDOC. We will then identify the best technical resources on our team to complete the CSO.

The first task on every assignment will be the preparation of a project work plan to outline the MWDOC and CDM Smith responsibility and work protocols. Work plans will be similar for all on-call CSOs to provide consistency between task assignments, but they will be tailored for project-specific needs. Depending on the complexity of the task assignment, the technical work will start with gathering background information and facilitating a team meeting between CDM Smith and the appropriate MWDOC staff to set common goals and expectations. In order to complete the work with technical excellence and within the defined scope, schedule and budget during CSO execution, the CDM Smith team will:

- Conduct regularly scheduled progress meetings with MWDOC and hold internal meetings for all team members to keep MWDOC and team members apprised of technical project development.
- Maintain action item lists and decision logs from meetings to keep track of outstanding issues and major decisions.
- Prepare tech memos, emails, and conduct conference calls to keep all team members informed about project activities that affect their involvement.
- Throughout project execution, CDM Smith will maintain rigorous quality, schedule, and budget control procedures. After the final submittal, Alberto and the Task Lead will meet with MWDOC to confirm all CSO elements have been completed and officially close-out the project.

Project Management and Project Controls

CDM Smith has successfully implemented its project management approach for hundreds of task order assignments through project-specific and as-needed engineering services contracts. Our approach is based on the following fundamental principles:

Rapid Response: With our Irvine, California-based team, CDM Smith provides rapid response for MWDOC's requests.

Effective Team Building: CDM Smith will create project teams targeted to the needs of each CSO, and we will mobilize quickly and work in coordination with MWDOC staff to deliver the project.

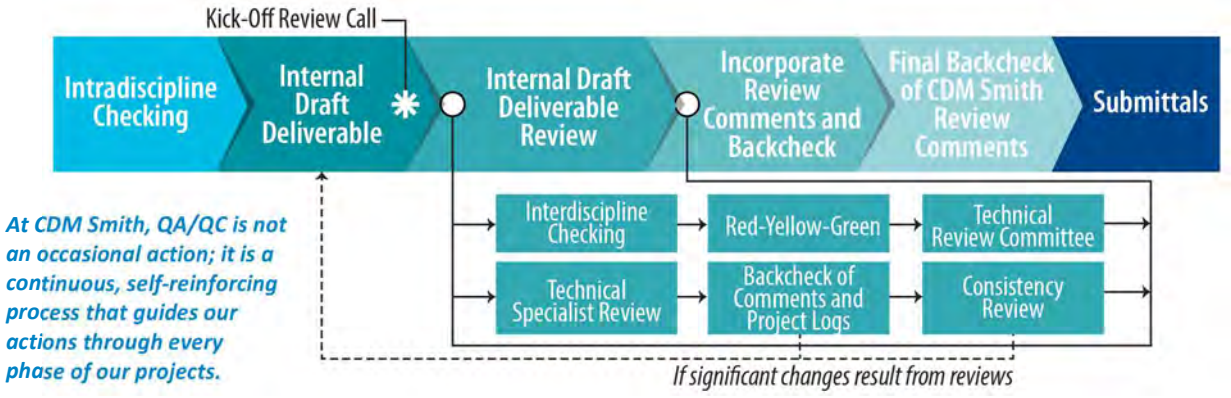
Technical Excellence: CDM Smith has the resources to provide the full range of engineering services and will align the needs of the project with the right technical expertise.

Effective Communication: CDM Smith will apply our proven communication methods to facilitate project delivery, track project progress and action items, and build consensus on technical issues.

Project Schedule and Budget Control: For each project, CDM Smith will work closely with MWDOC to identify all requirements, expectations, and specifics of each CSO. This will help develop a realistic schedule and budget to meet the project objectives. During project execution, CDM Smith's task order project manager will track the progress and budget using an earned value (EV) methodology.

Quality Control

To deliver all of our projects with the utmost attention to quality, we have fully integrated Quality Assurance/Quality Control (QA/QC) as a core process in our project delivery. We emphasize quality throughout our projects with implementation of both detailed guidance documents and a firm-wide cultural commitment to exceeding our clients' expectations for quality. The figure below shows the procedures that comprise our QA/QC process.



QA/QC Review Procedures

All deliverables will be reviewed following the applicable QA/QC procedures below:

Intrafunction Checking includes discipline internal checks where each discipline group (e.g., structural, electrical, cost estimating, etc.) performs detailed internal checking of all calculations, drawings, specifications, studies, reports, and cost estimates per the established schedule.

Interfunction Checking involves multidisciplinary cross-checking that is performed before each design submittal to correct discrepancies among the process and other engineering disciplines.

Red-Yellow-Green Checking team members will perform an independent multidiscipline review check to confirm discipline accuracy, provide coordination, and eliminate conflicts.

Technical Review Committee is an independent review by QA/QC reviewers Ralph Eberts and Paul Taurasi who are experienced and technically qualified to assess soundness, cost effectiveness and adequacy of the design.

Technical Specialist Review is an independent review of submittals for technical accuracy; completion of project objectives; presentation clarity; and evidence of independent checking of equations and calculations, reference citations, and tables or figures.

Backcheck of MWDOC Comments are incorporated and registered in project logs.

Consistency Review will be performed by Alberto to check for uniform use of terminology between report sections and contract documents.

Final Backcheck of CDM Smith review comments from all parties are addressed.

Constructability Reviews involves a team of senior professionals who spend their careers on the construction side of the industry will review design drawings. These in-house contractors will evaluate if the design can be built by standard construction methods, materials, and equipment. Constructability reviews can help mitigate claims and job safety issues that could occur during construction. The result can be significant savings and a successfully completed project

CDM Smith will assign experienced senior professionals who are not directly involved in the project to thoroughly review the assumptions, field work, calculations, models, and deliverables and every other key aspect of a project. CDM Smith review personnel will have specific experience related to water distribution system modeling, water quality, operations, system hydraulics, and pumping systems.

Cost Estimating & Scheduling

CDM Smith knows the importance of providing our clients with cost and schedule certainty. In addition, we recognize that project performance is enhanced by using scheduling and cost estimating tools that are uniform and integrated. Our cost estimates will be prepared by full-time cost estimators from our construction subsidiary. Construction estimates will include general conditions, overhead and profit, contingency, and percent of escalation with a detailed breakdown of materials, labor and equipment required.

COLLABORATIVELY WORKING WITH MWDOC AND ITS MEMBER AGENCIES

CDM Smith has demonstrated its collaborative approach working with MWDOC staff and its member agencies in our work developing the first-ever comprehensive ***Orange County Water Reliability Study***. To deliver on this project required a partnership between MWDOC staff, MWDOC's member agencies and CDM Smith. Dozens of meetings were held with MWDOC staff and member agency managers during the course of the 2014 Water Reliability Study and its 2018 update. Many times, CDM Smith was complemented by member agency managers on our objectiveness, collaboration and drive for this project. This would not have been successful without the unique partnership between consultant and MWDOC staff.

Section 6 – Insurance

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY)
12/31/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Aon Risk Services Northeast, Inc. Boston MA Office 53 State Street Suite 2201 Boston MA 02109 USA	PHONE (A/C. No. Ext): (866) 283-7122	FAX (A/C. No.): 800-363-0105
	E-MAIL ADDRESS:	

INSURED	INSURER(S) AFFORDING COVERAGE		NAIC #
CDM Smith Inc. 75 State Street Suite 701 Boston MA 02109 USA	INSURER A:	Commerce & Industry Ins Co	19410
	INSURER B:	Liberty Mutual Fire Ins Co	23035
	INSURER C:	Liberty Insurance Corporation	42404
	INSURER D:	LM Insurance Corporation	33600
	INSURER E:	ACE Property & Casualty Insurance Co.	20699
	INSURER F:	Lloyd's Syndicate No. 2623	AA1128623

COVERAGES **CERTIFICATE NUMBER:** 570085528327 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS. Limits shown are as requested

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
C	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT X LOC OTHER:			TB7611B8T8Z6041	01/01/2021	01/01/2022	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$2,000,000 $1,000,000 $10,000 $2,000,000 $4,000,000 $4,000,000
B	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY HIRED AUTOS ONLY SCHEDULED AUTOS NON-OWNED AUTOS ONLY			AS2-611-B8T8Z6-061	01/01/2021	01/01/2022	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$2,000,000
E	X UMBRELLA LIAB X OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION			XEUG28194687005	01/01/2021	01/01/2022	EACH OCCURRENCE AGGREGATE	$5,000,000 $5,000,000
D D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		WA561D88T8Z6011 AOS WC5611B8T8Z6021 WI	01/01/2021 01/01/2021	01/01/2022 01/01/2022	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE-EA EMPLOYEE E.L. DISEASE-POLICY LIMIT	$1,000,000 $1,000,000 $1,000,000
F	Archit&Eng Prof			PSDEF2100033 Professional/Claims Made	01/01/2021	01/01/2022	Each Claim Aggregate	$3,000,000 $3,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Re: Proposal Use Only.

CERTIFICATE HOLDER	CANCELLATION
CDM Smith Inc. 75 State Street, Suite 701 Boston MA 02109 USA	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE *Aon Risk Services Northeast, Inc.*

Holder Identifier :

Certificate No : 570085528327

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Section 7 – Firm Qualifications

In Section 3, we presented a summary of CDM Smith and why we believe that we are uniquely qualified to provide MWDOC with services in the **Water Reliability** and **Engineering** categories of this On-Call contract. To further demonstrate why we believe this to be the case, we are showcasing our most relevant examples of our work with MWDOC and other California agencies.

Water Reliability Planning Category – Relevant Experience

Orange County Water Reliability Study

Municipal Water District of Orange County | Fountain Valley, California

In 2014, CDM Smith, working with MWDOC staff, OCWD and MWDOC's other member agencies, completed the first-ever comprehensive assessment of water reliability for the entire Orange County. In 2018, an update to this study was prepared by CDM Smith reflecting important changed conditions. This effort involved developing and using planning scenarios to account uncertainties, water supply reliability modeling of imported water from MWD and local groundwater, evaluation of climate change impacts on water demands and supplies, and benefit-cost analysis of various water supply projects sponsored by Orange County water agencies.

CDM Smith is continuing to support this ongoing effort with task orders to evaluate projects, such as participation in Irvine Ranch Water District's (IRWD) Strand Ranch Water Banking, and evaluation of a conceptualized new large regional surface reservoir.

RELEVANCE TO MWDOC

- ✓ Scenario planning
- ✓ Water supply reliability modeling
- ✓ Working collaboratively with MWDOC member agencies
- ✓ Benefit-cost analysis of projects

Client Contact

Charles Busslinger
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Project Dates

2014-2021

Orange County Water Demand Forecast

Municipal Water District of Orange County | Fountain Valley, California

To support water reliability planning for both MWDOC and OCWD, as well as the preparation of 2020 UWMPs, CDM Smith developed a common methodology to forecast water demands for every water agency in Orange County. CDM Smith presented this methodology to MWDOC/OCWD agencies and MWDOC's board of directors for input. CDM Smith then executed this methodology and prepared draft forecasts for agency reviews.

CDM Smith had several one-on-one meetings with agencies and finalized the demand forecast which accounted for increased water conservation efficiencies for indoor and outdoor residential water demands. Weather and climate factors were also provided. While not all agencies opted to use CDM Smith's forecast approach, all were complimentary of our work.

RELEVANCE TO MWDOC

- ✓ Water demand forecasting
- ✓ Water conservation analysis
- ✓ Working collaboratively with MWDOC/OCWD agencies

Client Contact

Alex Heide
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Project Dates

2020-2021

Water Reliability Study and Integrated Water Resources Plan

South Coast Water District | Laguna Beach, California

In 2017, CDM Smith launched a water reliability study for South Coast Water District (SCWD) using the OC Reliability Study framework, but with a deeper dive into local supply planning. Various supply projects were evaluated and compared under different seismic and drought conditions. This work was helpful for SCWD in advancing its Doheny Seawater Desalination project.

In 2020, CDM Smith began working with SCWD to develop its first-ever Integrated Water Resources Plan (IWRP). This effort involves projecting water demands, imported water supplies and local supplies under various planning scenarios. Several Board workshops have provided opportunities for feedback in the process. Local and outside of service area water supply and system emergency projects are being evaluated in terms of reliability, resiliency, cost and implementation. The IWRP is expected to be completed by the summer of 2021.

RELEVANCE TO MWDOC

- ✓ Water demand forecasting
- ✓ Scenario planning
- ✓ Climate and seismic risk
- ✓ Working collaboratively with SCWD engineering staff and board members
- ✓ Evaluation of projects

Client Contact

Taryn Kjolsing
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Project Dates

2017-2021

Water Resources Plan

Long Beach Water Department | Long Beach, California

CDM Smith was hired to prepare Long Beach Water Department's (LBWD) first-ever Water Resources Plan (WRP). Faced with greater uncertainties in both its local groundwater and imported water from Metropolitan, LBWD embarked in a 50-year plan for assessing water supply reliability and implementation of local and regional projects.

CDM Smith prepared a detailed econometric demand forecast and developed planning scenarios to capture uncertainty of imported water, climate change and success of regional water supply projects, such as MWD's Regional Recycled Water Program and Delta Conveyance. Then various local water supply projects such as indirect potable reuse, stormwater capture, expansion of non-potable reuse, and ocean desalination were evaluated against multiple criteria. Base on the ranking of these projects, a recommended strategy was developed using adaptive management where project implementation would be triggered based on outcomes of future conditions such as MWD reliability, climate change, and growth in water demands.

RELEVANCE TO MWDOC

- ✓ Scenario planning
- ✓ Water demand forecasting
- ✓ Modeling imported and GW reliability
- ✓ Evaluation of projects
- ✓ Adaptive management

Client Contact

Dean Wang
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Project Dates

2018-2019

Southern California Integrated Resources Plan Support

Metropolitan Water District of Southern California | Los Angeles, California

CDM Smith's Dan Rodrigo is currently an expert panel member for MWD's 2020 Integrated Resources Plan (IRP), focusing on water demand forecasting using scenario planning. Through this support, Dan is providing insights on key variables to include in scenarios and how these variables can be forecasted to account for uncertainties.

CDM Smith is also engaged by MWD to help understand the long-term sustainability of local groundwater, incorporating variability due to hydrologic conditions, recharge operations and new groundwater augmentation projects, and impacts from climate change.

RELEVANCE TO MWDOC

- ✓ Water demand forecasting
- ✓ Scenario planning
- ✓ Groundwater reliability

Client Contact
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Project Dates
2021

Integrated Water Resources Plan

Upper San Gabriel Valley MWD | Monrovia, California

CDM Smith developed Upper District's first Integrated Resources Plan (IRP) in order to provide a road map for future water supply investments. Groundwater levels in the Main San Gabriel Basin (Main Basin) have been on a long-term downward trend due to changing climate, periodic droughts affecting availability of imported water for groundwater recharge, and rising cost of imported water. As such, Upper District has been exploring a number of local water supply options such as increased water conservation, additional stormwater capture, recycled water (both indirect potable reuse and non-potable reuse), and water transfers.

A sophisticated integrated surface and groundwater decision support tool was developed by CDM Smith to simulate groundwater elevation levels based on water demands, historical and climate changed hydrology, and availability of imported water. This tool was also used to evaluate the supply benefits of different water supply projects. Grounded on the modeling and technical evaluations, an adaptive implementation strategy was developed based on triggers such as water demand growth, climate change and hydrology, and the success of the Delta Conveyance Project and others.

RELEVANCE TO MWDOC

- ✓ Reliability of imported water
- ✓ Groundwater analyses
- ✓ Climate change modeling
- ✓ Evaluation of supply projects
- ✓ Groundwater recharge

Client Contact
Shane Chapman (former Upper District GM, now MWD CAO)
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Project Dates
2015-2018

Preliminary Design of Prestressed Concrete Cylinder Pipe (PCCP) Rehabilitation Projects

Metropolitan Water District of Southern California | Los Angeles, California

Under Metropolitan's $2B PCCP Rehabilitation Program, CDM Smith implemented preliminary design of structural rehabilitation of the Sepulveda Feeder, the largest feeder within Metropolitan's system. The feeder is 42 miles long and approximately 35 miles of the feeder comprises PCCP with diameters ranging from 150-in to 84-in. The primary goal of this project is to reline and rehabilitate the deteriorating sections of PCCP before they cause major disruptions to service or fail catastrophically.

The work includes replacing existing valves, flow meters, and appurtenant structures, while allowing Metropolitan to continue to provide a reliable water supply to its member agencies and stakeholders. The preliminary design phase involved an alternatives analysis, a series of collaborative workshops, a preliminary design report, and nearly 200 drawings. Key challenges included maintaining service, maximizing future, permitting/agency coordination, construction schedule development, optimizing design elements, and minimizing impacts to traffic, neighborhoods, and businesses.

RELEVANCE TO MWDOC

- ✓ Hydraulic modeling and capacity analysis
- ✓ Construction planning and package development
- ✓ Understanding and mitigating seismic risks
- ✓ Construction cost estimating
- ✓ Large diameter pipeline design
- ✓ Water distribution design and operations
- ✓ Water metering

Client Contact
Chao Wong
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Project Dates
2018-Ongoing

Regional Recycled Water Program (RRWP)

Metropolitan Water District of Southern California | Los Angeles, California

With a goal of improving water supply reliability in Southern California, Metropolitan is studying the feasibility of developing an RRWP which would utilize advanced water treatment processes to purify secondary treated effluent from the Sanitation District's Joint Water Pollution Control Plant in Carson, California. The advanced treated water would then be pumped to select locations to recharge the groundwater basins in Los Angeles and Orange Counties.

CDM Smith prepared a conceptual design report for the RRWP conveyance system facilities to deliver up to 150 mgd of treated water as far east as the Orange County Spreading Grounds in Anaheim and as far north as the Santa Fe Spreading Grounds in Irwindale. Approximately 50- to 60-miles of new piping, ranging in diameter ranging from 54- to 84-in, will be installed. Discharge locations along the alignment are anticipated to consist of groundwater spreading basins and injection wells.

RELEVANCE TO MWDOC

- ✓ Water reliability planning
- ✓ Hydraulic modeling
- ✓ Groundwater replenishment
- ✓ Distribution system planning
- ✓ Construction cost estimating
- ✓ Large diameter pipeline design
- ✓ MWD engineering, operations and water quality protocols and procedures

Client Contact
Brue Chalmers
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Project Dates
2016-2020

On-Call Engineering Services

Metropolitan Water District of Southern California | Los Angeles, California

CDM Smith has managed dozens of diverse task orders for Metropolitan over the past decade, including providing engineering studies, new designs, facility retrofits, construction support, and rehabilitation services. CDM Smith staff interacted with Metropolitan staff members on a regular basis at the Jensen, Mills, Skinner, Diemer and Weymouth facilities.

We have also worked in Metropolitan's office and on-site nearly full-time during construction of both the Skinner and Diemer Oxidation Retrofit Program improvements. We completed the fast-track design of the new liner, floating cover, and ancillary systems for the rehabilitation of the Palos Verdes Reservoir and we are now completing engineering services during construction for this important component of Metropolitan's system. Most recently, we have been engaged on task orders ranging from a sewer condition assessment at employee housing villages to design of electrical upgrades at Iron Mountain Pumping Plant.

RELEVANCE TO MWDOC

- ✓ As-needed contract
- ✓ Task order delivery ahead of schedule
- ✓ Large diameter pipeline design
- ✓ Metropolitan engineering, operations and water quality protocols and procedures

Client Contact
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Project Dates
2008-Ongoing

Brine Line Study

Eastern Municipal Water District | Perris, California

Eastern Municipal Water District (EMWD) operates a brackish water conveyance and treatment system that consists of groundwater wells, pipelines up to 24-inch in diameter, and desalter facilities. The system originally operated with a feed flow rate of approximately 7.5 mgd. CDM Smith performed steady state and surge (transient) modeling to identify conveyance upgrades to increase the system to approximately 17.7 mgd.

CDM Smith first updated EMWD's GIS-based Infowater hydraulic model. New pipelines, wells, and ground water levels were incorporated into the model. Calibration was then performed by comparing model predicted flows and pressures against field recorded data. A surge model was also constructed by adding characteristics, such as pipeline wave speeds, pump trip, and air valve characteristics. Several different flow scenarios were analyzed for both steady state and surge conditions. Ultimately, the modeling identified the need for two parallel pipelines, up to 36-inches in diameter, to be added to the system. Recommended surge improvements included specifically sized and located air valves.

RELEVANCE TO MWDOC

- ✓ Piping hydraulics
- ✓ Hydraulic modeling and transient control
- ✓ Well operating strategies
- ✓ Surge analysis
- ✓ Working closely with operations & maintenance staff

Client Contact
Greg Kowalski
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Project Dates
2017-2018

Design-Build of Sand City Desalination Facility

City of Sand City | Sand City, California

CDM Smith delivered a 0.3-mgd design-build project for the City of Sand City to facilitate the treatment of seawater to domestic drinking water standards. This is the first full-scale desalination plant in California to receive permitting approval under new regulations—and the only municipal seawater desalination project that operates continuously.

The project included a fully operational water treatment facility which uses RO and UV light to treat a highly brackish seawater blend drawn from four vertical beach wells. CDM Smith proposed a unique solution that facilitated obtaining the required permits from 20 different agencies and completing the project for almost half the price of the original design proposal. The CDM Smith project team provided further value by proposing to double plant capacity to 0.6 mgd, allowing for off-peak operation, thus resulting in a significant energy savings.

RELEVANCE TO MWDOC

- ✓ Subsurface intake coastal desalination facility
- ✓ First use of PX energy recovery in California
- ✓ Set precedent for RO integrity monitoring
- ✓ Permitting of innovative brine disposal

Client Contact

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Project Dates

2007-2010

PFAS Treatment System Design

East Orange County Water District | Orange, California

CDM Smith assisted East Orange County Water District (EOCWD) in the evaluation and piloting of a temporary PFAS treatment system. EOCWD, along with many other water agencies in Orange County, intends to install pressurized ion exchange (IX) wellhead treatment facilities to remove the PFAS contaminants at their wellheads before furnishing the water to their customers. However, EOCWD's well water shows presence of entrained air which can reduce the resin's bed life. CDM Smith designed a pilot using technologies that are commercially available in the market. EOCWD has pilot tested 3M Liqui-Cel membrane contactors and Mazzei Degas Separator to remove the entrained air that could disrupt the IX resin beds.

Due to increasing cost of O&M due to entrained air, we were also tasked with evaluating nano-filtration as an alternative to IX which concluded that nanofiltration's life cycle cost would be more than IX. The team's review included: the water quality data, downstream chloramination, electrical and hydraulic requirements, cost terms and conditions, and the vendor's proposed system to ensure soundness of design. We also assisted in DDW permitting and determined alternatives for the removal of entrained air. Moreover, CDM Smith is currently designing a 2,000 gpm lead/lag IX system with design to be completed in mid-2021. We are also slated to provide construction management services for this project.

RELEVANCE TO MWDOC

- ✓ Groundwater water quality issues
- ✓ Water quality treatment
- ✓ Associated piping for conveyance
- ✓ Permitting assistance

Client Contact

Jeff Smyth
T: (714) 538-5815
E: jsmith@eocwd.com

Project Dates

March 2020-Ongoing

Attachment A

Billing Rates

The following table presents CDM Smith's billing rates for 2021 to execute on-call services for MWDOC.

Engineers/Scientists/Planners	Hourly Rate 2021 (*)
Engineer/Planner 9 and 10	$305
Engineer/Planner 7 and 8	$210
Engineer/Planner 5 and 6	$185
Engineer/Planner 3 and 4	$165
GIS Specialist	$165
Engineer/Planner 1 and 2	$135
Senior Engineer/Planner	$270
Project Engineer/Planner	$195
Contract Administrator	$150
Administrative Assistant/Word Processing	$115

(*) Rates will be increased by 3.0% per year for the following years.

We have not included subconsultants at this time. If we are presented a CSO that requires specialty subconsultant services, we will identify appropriate subconsultants and present MWDOC with their scope of services and billing rates to execute the work.

Attachment B

Exceptions to the Standard Consulting Agreement

CDM Smith has reviewed the Professional Services Agreement and respectfully proposes the following modifications for MWDOC's consideration. All proposed modifications are indicated in *red italics* or ~~*red italic striketext.*~~

Deviations/Exceptions to the Standard Terms and Conditions of the Professional Services Agreement

Article I - PURPOSE AND SCOPE OF WORK B. Independent Contractor

Delete: ~~*CONSULTANT represents and warrants that in the process of hiring CONSULTANT's employees who participate in the performance of SERVICES, CONSULTANT conducts such lawful screening of those employees (including, but not limited to, background checks and Megan's Law reviews) as are appropriate and standard for employees who provide SERVICES of the type contemplated by this Agreement.*~~

Add: ***Section D. Standard of Care:*** *"CONSULTANT shall perform the services required hereunder in accordance with the prevailing engineering standard of care by exercising the skill and ability ordinarily required of engineers performing the same or similar services, under the same or similar circumstances, in the State of California."*

Add: ***Section E. DISTRICT:*** *Provided Information and Services: "The DISTRICT shall furnish CONSULTANT available studies, reports and other data pertinent to CONSULTANT's services; obtain or authorize CONSULTANT to obtain or provide additional reports and data as required; furnish to CONSULTANT services of others required for the performance of CONSULTANT's services hereunder, and CONSULTANT shall be entitled to use and rely upon all such information and services provided by the DISTRICT or others in performing CONSULTANT's services under this AGREEMENT."*

Add: ***Section F. Estimates and Projections:*** *"CONSULTANT has no control over the cost of labor, materials, equipment or services furnished by others, over the incoming water quality and/or quantity, or over the way the DISTRICT's plant and/or associated processes are operated and/or maintained. Data projections and estimates are based on CONSULTANT's opinion based on experience and judgment. CONSULTANT cannot and does not guarantee that actual costs and/or quantities realized will not vary from the data projections and estimates prepared by CONSULTANT and CONSULTANT will not be liable to and/or indemnify the DISTRICT and/or any third party related to any inconsistencies between CONSULTANT's data projections and estimates and actual costs and/or quantities realized by the DISTRICT and/or any third party in the future."*

Article V - TERMINATION

CDM Smith kindly requests to reduce the 125 percent withhold to 100% of any disputed amounts as noted below.

(5) DISTRICT may withhold ~~125~~ *100* percent of the estimated value of any disputed amount pending resolution of the dispute, consistent with the provisions of section III D above, and;

Article VII - INDEMNIFICATION (Revised as of June 2020)

a. When the law establishes a professional standard of care for the CONSULTANT's services, all claims and demands of all persons that arise out of, pertain to, or relate to the CONSULTANT's negligence, recklessness or willful misconduct in the performance (or actual or alleged non-performance) of the work under this agreement. CONSULTANT shall defend itself against any and all liabilities, claims, losses, damages, and costs arising out of or alleged to arise out of CONSULTANT's *negligent, reckless or willful misconduct in the* performance or non-performance of the SERVICES hereunder, and shall not tender such claims to DISTRICT nor its directors, officers, employees, or authorized volunteers, for defense or indemnity.

Attachment C

Resumes

Alberto Acevedo, PE, PMP, BCEE

Project Manager

Mr. Acevedo is a civil and chemical engineer with over 46 years of experience overseeing multidisciplinary teams to deliver infrastructure projects in California, Nevada, Texas, and Puerto Rico. His experience includes design and construction of infrastructure projects with extensive experience in water and wastewater engineering and reclaimed water systems in Southern California and Central America. Mr. Acevedo has been involved in the preparation of planning studies for water and wastewater facilities; sewer design and rehabilitation of pipelines ranging from 6-inch to 120-inch in diameter; and design and operation of pump stations, chemical feeding systems, and water and wastewater treatment plants as well as managing large budgets and diverse teams, including managing teams under on-call services contracts.

Mr. Acevedo's most relevant experience includes:

Project Manager, Headworks Modifications at Plant 2 for GWRS Final Expansion Project P2-122, Orange County Sanitation District (OCSD), Fountain Valley, California. Mr. Acevedo was responsible for the preparation of the construction documents for the headworks modifications at Plant 2 to separate the non-reclaimable flow stream from the incoming wastewater in order to supply the recyclable flow to the Orange County Water District (OCWD) Groundwater Replenishment System (GWRS), the world's largest water purification system for indirect potable reuse, to provide a drought-proof water supply for Orange County.

Mr. Acevedo continues to work with OCSD on this project and is responsible for providing engineering services during construction of the final design recommended facilities.

Project Manager, Gisler-Redhill Interceptor and Baker Force Mains Rehabilitation (7-65), OCSD, Fountain Valley, California. Mr. Acevedo is responsible for the design and preparation of construction documents to rehabilitate approximately 6,500 linear feet of 30-inch gravity VCP sewer, and a one-mile-long double DIP 42-inch barrel force main system.

Project Manager, Integrated Water Resources Plan, South Coast Water District, Laguna Beach, California. Mr. Acevedo is responsible for the completion of the Integrated Resources Plan (IWRP) for South Coast Water District, the study will include the development of the plan objectives to ensure water supply and system reliability for SCWD's customers during droughts and system outages, reduce reliance on imported water, develop strategies and projects that are cost-effective, considering the economic cost of water shortages. The study will prepare an annual water demand forecast for the purpose of assessing water supply reliability and needs for future projects, and peak month and peak day demands will be generated for assessing system reliability and needs for future projects. CDM Smith will prepare an executive-style report that documents the objectives for the plan, summarizes future water demands and existing water supplies, development of plan targets, and assessing benefits and costs of achieving the targets.

Education

MS – Environmental Engineering, University of California, Irvine, 1980

BS – Chemical Engineering, University of Guadalajara, Mexico, 1972

Registration

Professional Civil Engineer: California, Nevada, Texas, Arizona

Registered Chemical Engineer: Mexico

Certifications

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Certified Project Management Professional (PMP), Project Management Institute (PMI)

Dan Rodrigo

Task Lead – Water Reliability Planning

Mr. Rodrigo is CDM Smith's Global One Water Practice Leader. He has over 30 years of experience in water supply reliability planning, water demand forecasting, climate resiliency, scenario planning, and resource economics. Mr. Rodrigo has successfully used a variety of tools such as system integration models, multi-criteria decision analysis software, and benefit-cost calculations to garner stakeholder consensus and to develop adaptive management plans that phase in water resources investments over time.

Project Manager, Orange County Water Reliability Planning, Municipal Water District of Orange County, Fountain Valley, California. Mr. Rodrigo has been leading water reliability planning work for MWDOC since 2014. He oversaw the first-ever Orange County Water Reliability Study in 2014 and updated it in 2018. He has been providing on-call services since, including evaluation of various water supply projects and development of comprehensive water demand forecasts for every water agency in the county.

Project Director, Water Resources Plan, 2019, Long Beach Water Department, Long Beach, California. This 50-year water resources plan used comprehensive planning scenarios to identify a range of future water needs. Services included: demand forecasting, assessing MWD and local groundwater water supply reliability, conceptualization and evaluation of new supply alternatives, and development of an adaptive management strategy for recommended projects.

Project Manager, Water Conservation Potential Study, 2017, Los Angeles Department of Water and Power, Los Angeles, California. The goal of this study was to assess the remaining potential for water conservation for Los Angeles given its 20-year efforts to conserve water. The study involved detailed baseline water surveys of single-family and multifamily customers, and on-site audits of city-owned facilities (airports, seaports, administrative offices, maintenance yards, and parks) along with a meta-analysis of CII water use. A detailed water conservation savings and economics model was developed to forecast current and future efficiency levels by end water use.

Project Manager, Integrated Water Resources Plan, 2016, Upper San Gabriel Valley Municipal Water District, Monrovia, California. To diversify its current water supplies, this plan was developed to analyze risk of climate change and more variable imported water supply availability. CDM Smith's Water Integration Tool was used to simulate groundwater, surface water and imported water; and used to assess risk and evaluate conceptual alternatives (potable reuse, capturing additional stormwater for groundwater replenishment, additional conservation). A long-term, adaptive management strategy was developed and approved by the water district board of directors.

Project Manager and Facilitator, Long-Range Water Resources Plan, 2013, San Diego Public Utilities Department, San Diego, California. This long-term plan examined all the City's water resources in a holistic, interconnected manner, examining water supply, wastewater, and stormwater. Indirect potable reuse using purified recycled water, various groundwater projects, stormwater capture and water conservation were evaluated from a triple-bottom-line perspective. The plan also evaluated climate change impacts and adaptation, as well as greenhouse gas emissions from water operations.

Education

MS – Environmental Planning, Southern Illinois University, 1988

BS – Geography/ Economics, Southern Illinois University, 1986

CDM Smith

William D. Brick, PE, PMP, BCEE

Task Lead – Engineering

Mr. Brick has 24 years of experience in civil engineering design and studies. He has served as the civil design manager and/or lead design engineer on over 20 projects at water treatment plants and related distribution facilities in California, ranging from small satellite installations to complex $180 million treatment plant upgrades. Mr. Brick's conveyance project work has included regional recycled water master planning; potable water pump stations; storage facilities ranging from 2 MG to 300 MG; distribution pipeline design and rehabilitation; and groundwater extraction and recharge facilities.

Project Manager, Moosa Canyon Imported Pipeline Study, San Diego County Water Authority, San Diego, California. Mr. Brick is managing a study to evaluate alternatives in hardening or relocation of critical imported water pipelines (treated and untreated) for San Diego County that cross into Moosa Canyon. These pipeline segments are vulnerable to seismic, river crossings, and flooding.

Engineering Team Leader, Feasibility-Level Design of Conveyance/Distribution System for Potential Regional Recycled Water Supply Program, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Brick is project manager for engineering tasks associated with the feasibility-level design of pump stations up to 150 mgd for Metropolitan's Regional Recycled Water Program. Engineering tasks consisted of: assessment of existing site conditions in potential pump station locations; sizing of local reservoirs for distribution system operational storage; development of general pump station site layout, space requirements, and site plans; and, evaluation of available electrical power sources, capacity, and anticipated pump station power demands.

Project Manager, Sepulveda Feeder PCCP Rehabilitation Preliminary Design, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Brick is serving as project manager for engineering tasks associated with the preliminary design for the rehabilitation of 35 miles of prestressed concrete cylinder distribution piping ranging in diameter from 84-in to 150-in. Engineering activities performed during preliminary design included: identification and analysis of pipe rehabilitation alternatives; evaluation of alternatives for recovering lost capacity; risk analysis and mitigation; operational considerations; identification of construction packaging; Enhanced Preliminary Design; development of a Project Description to supplement the Programmatic EIR; and evaluation of project costs.

Project Manager, Palos Verdes Reservoir Cover and Liner Replacement, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Brick managed the design of a chlorosulfonated polyethylene (CSPE) (a.k.a. Hypalon) cover and liner for a 1,000 acre-ft potable water storage reservoir. This included: regrading the existing reservoir bottom to improve reservoir hydraulics and useful volume; reconstruction of the on-site sodium hypochlorite feed and distribution systems; improvements to inlet and outlet piping to improve reservoir mixing; improvements to mitigate high groundwater beneath the reservoir; improvements to the existing overflow spillway structure to comply with Division of Safety of Dams (DSOD) requirements; planning for the mitigation of historic sealants during demolition; and site wide electrical system upgrades.

Education

BS – Civil Engineering, California Polytechnic, San Luis Obispo, 1995

Registration

Professional Civil Engineer: California, Hawaii, Washington

Honors/Awards

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Professional Activities

Member, American Society of Civil Engineers

Member, Pipeline Users Group

Ralph Eberts, PE, PMP

Principal-in-Charge and QA/QC

Mr. Eberts brings 35 years of planning, engineering, construction and managerial experience delivering complex, high-profile water and wastewater projects for water utility clients. He listens to clients' challenges and offers solutions and resources to successfully meet their needs. He works with the client and multidisciplinary consultant teams to deliver high-quality design and construction programs and projects. Prior to joining CDM Smith, Mr. Eberts served in similar roles at another global engineering and construction firm where he worked closely with water and wastewater utilities to deliver dozens of large and complex projects and programs around the world to achieve best practice and award-winning standards.

Project Director, PFAS Treatment System On-Call Design and Construction Management Services, Orange County Water District, Fountain Valley, California. Mr. Eberts is overseeing the design and construction management of multiple water treatment facilities and supporting pipelines to meet new Response Levels (RLs) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) for member-agency producers. CDM Smith will produce construction documents and manage construction of these fast-tracked projects which include dual media pressure vessel systems.

Principal-in-Charge, Water Reclamation Facility Upgrade Construction Manager at Risk (CMAR), City of Avondale, Arizona. Mr. Eberts oversaw the $10.5M CMAR project that aimed to ensure facility operation at the rated capacity and maintain operational reliability. Facility improvements included: addition of a 100-ft dia. primary and a 90-ft dia. secondary clarifier, new aeration basins and process air improvements, primary scum pump replacement, primary sludge pumping system to secondary treatment basins, and return-activated sludge pumps replacement. Mr. Eberts monitored the project's progress and delivery, and proactively communicated with the city on any opportunities or issues.

Principal-in-Charge, Oroville Dam Inspection Services, California Department of Water Resources, Butte County, California. Mr. Eberts is overseeing CDM Smith's inspection services on the Oroville Dam reconstruction project. Services include reviewing and evaluating naturally occurring asbestos (NOA) air sampling data and adjusting field sampling procedures based on the results. Site visits and logistical support of the field staff are also a part of these services. Mr. Eberts works with the project team to ensure appropriate staffing and high-quality services are delivered.

Principal-in-Charge, Klamath Dam Removal Project Owner's Representative, Klamath River Restoration Corporation (KRRC), California and Oregon. Mr. Eberts is overseeing CDM Smith's work to restore the imperiled fisheries on the Klamath River. Working in partnership with other consultant team members and the KRRC, CDM Smith is part of the program management team for this high-profile $400M project. CDM Smith's role includes providing biological resource surveys, ground water monitoring, mitigation planning and design, California Environmental Quality Act (CEQA) technical support, Federal Energy Regulatory Commission (FERC) decommissioning plans, design services, and alternative delivery evaluations. The project will remove four dams, replace the water supply line, restore recreational facilities, and restore the land beneath the reservoirs.

Education

BS – Civil Engineering, University of Missouri, Columbia, 1978

MS – Civil Engineering, University of Missouri, Columbia, 1984

Master of Real Estate Development – University of Southern California, 1993

Registration

Professional Civil Engineer: California

Professional Structural Engineer: California

Certifications

Project Management Professional, Project Management Institute

Paul M. Taurasi, PE, BCEE

QA/QC – Senior Reviewer

Mr. Taurasi brings 28 years of experience in design of water transmission mains, water treatment facilities, pump stations and yard piping design.

Technical Lead, Moosa Canyon Pipelines Repair and Replacement Planning Study, San Diego County Water Authority, San Diego, California. Mr. Taurasi is currently serving as a technical lead for a study to evaluate alternatives in hardening or relocation of critical imported water pipelines (treated and untreated) for San Diego County that cross into Moosa Canyon. These pipeline segments are vulnerable to seismic, river crossings, and flooding.

Design Lead, Southeast Oklahoma Water Supply Project, Oklahoma City Water Utilities Trust (OCWUT), Oklahoma City, Oklahoma. Mr. Taurasi served as design lead for the development of the design standards for the approximately 100 miles of 72-inch diameter steel transmission main that will transport raw water flow from the Atoka Reservoir to Oklahoma City. The design standards manual includes detailed pipe design methodology; pipe thickness throughout the transmission main; thrust restraint; all project standard details; pipeline hydraulics, surge and booster pump station modeling and design criteria; and detailed guidance on other aspects of the design including river and highway crossings. This design standards manual formed the basis of the detailed design documents developed by eight local design firms.

Project Delivery Lead, Willamette Water Supply Program Water Treatment Plant Design, Tualatin Valley Water District & City of Hillsboro, Sherwood, Oregon. For the Willamette Water Supply System (WWSS), Mr. Taurasi is leading the overall design production, process yard piping design, and quality control aspects for this multidiscipline effort for the design of a new, greenfield 70-mgd (initial capacity) water treatment facility. Mr. Taurasi is the design lead for the large diameter raw water, finished water, and facility site piping (84-, 66- and 48-inch) and provides oversight for the overall civil site design. Paul is also serving as quality control lead for the flash mix, ballasted flocculation, ozonation, biological filtration, UV disinfection, finished water booster pump station with surge mitigation; backwash water pumping, solids thickening and dewatering; hydraulic equalization and recycle pumping, process overflow storage and chemical systems.

Assistant Design Manager, Northeast Water Purification Plant Expansion Project, City of Houston, Houston, Texas. The Northeast Water Purification Plant Expansion Project will deliver 320 mgd of additional finished water production capacity. For this design-build project, Mr. Taurasi managed CDM Smith's Phoenix Global Resources Center engineers and modelers supporting the design and provided quality control oversight and review for this $1.7B project. Specific areas of quality review oversight by Mr. Taurasi included dual raw water transmission pipelines each of 96-inch, process yard piping and site utility piping.

Design Manager, Reverse Osmosis Water Treatment Plant, Gila River Indian Community, Sacaton, Arizona. Mr. Taurasi served as design manager during design and construction services for the 5-mgd reverse osmosis water treatment facility. The facility treats groundwater containing arsenic and high levels of suspended solids. Mr. Taurasi designed the associated five miles of transmission pipelines and permeate force main, and one million gallons of distribution storage.

Education

MS – Civil Engineering, Northeastern University, 2000

BS – Civil Engineering, University of Massachusetts, 1993

Registration

Professional Engineer: Arizona

Honors/Awards

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Andrea Zimmer, PhD, PE

Imported Water Reliability and Climate Change

Dr. Zimmer is a water resources engineer with experience in imported water supply reliability from Metropolitan Water District, climate change impacts on water supplies, Orange County groundwater, long-term water supply planning, and systems modeling.

Project Engineer, Orange County Water Reliability Study, Municipal Water District of Orange County, California. Dr. Zimmer simulated imported water supply reliability for Orange County. This included recent regulations and BOR Drought Contingency Plan. She also developed an empirical model of local groundwater. Climate change impacts were incorporated using CMIP5 climate models to estimate impacts on overall reliability of supplies. A systems model built in WEAP was used by Dr. Zimmer to tie in all of these reliability impacts, which resulted in probabilities and size of water shortages between now and 2050. Dr. Zimmer continues to analyze the reliability under different assumptions to support MWDOC.

Project Engineer, Water Resources Plan, Long Beach Water Department, California. Dr. Zimmer modeled imported and local groundwater supply reliability under different scenarios of demand growth, climate, and successful implementation of MWD projects for City of Long Beach. A simplified mass balance groundwater model was developed by Dr. Zimmer using empirical regressions of precipitation, spreading operations, and artificial replenishment. She also incorporated climate change impacts using CMIP5 global climate models. Probability and magnitude of water shortages were then derived.

Project Engineer, Water Sustainability Plan, San Diego Public Utilities, California. Dr. Zimmer modeled imported and local water supplies for San Diego county and City under different scenarios of demand growth, assumptions of regional and state projects, such as Delta Conveyance, and climate change. This included analyzing supply impacts from Imperial Irrigation District under the new US BOR Drought Contingency Plan. Seismic disruptions in imported water were also analyzed by Dr. Zimmer.

Project Engineer, Water Reliability Study, South Coast Water District, California. Dr. Zimmer adapted the Orange County Reliability WEAP model to evaluate imported and local water supply reliability for SCWD. She incorporated local San Juan Groundwater Basin supplies and simulated the impacts of CMIP5 global climate models on imported water and local groundwater.

Project Engineer, Upper San Gabriel Valley Municipal Water District Integrated Resources Plan, Monrovia, California. Dr. Zimmer ran a model of the San Gabriel groundwater basin to estimate future groundwater levels due to climate change, different management strategies, and new supplies. She identified the direct impacts of changes to deliveries from the MWD on basin recharge.

Project Engineer, 2015 Urban Water Management Plan, San Diego, California. Dr. Zimmer researched the City of San Diego water system and assembled historic data to create an updated urban water management plan. She also estimated climate change impacts on local surface reservoirs.

Education

PhD – Civil and Environmental Engineering, Hydrosystems, University of Illinois at Urbana-Champaign, 2014

Registration

Professional Engineer: California, 2019

William S. Fernandez, PE

Water Resources Modeling

Mr. Fernandez is a senior water resources engineer with 21 years of technical and management experience in water resources planning and modeling. He is an expert at reliability modeling of large water resources systems with multiple sources of water supplies. Mr. Fernandez also has significant experience in numerical and empirical groundwater modeling and conjunctive use storage evaluations. He uses these models and tools to help evaluate future water supply projects, formulate management strategies, conduct drought management plans, and evaluate climate resiliency.

Project Manager, 2020 Urban Water Management Plans, Los Angeles Department of Water and Power, and City of San Diego California. Mr. Fernandez is managing the development of the 2020 UWMPs for LADWP and San Diego, including an analysis of historical and future projections of water demand and supplies, assessment of water supply reliability, compliance with water conservation requirements, and development of DWR-compliant water shortage contingency plans.

Project Manager, Water Resources Plan, Long Beach Water Department, California. Mr. Fernandez worked with LBWD to create a water resources plan (WRP) that includes forecasting water demands, simulating supply reliability of MWD's imported water, characterization local groundwater under multiple hydrologies, and incorporating climate change impacts on overall supplies and demands. A systems modeling using WEAP was developed for this project to evaluate multiple scenarios of demand, regional supply project success, and implementation of the Delta Conveyance Project. Supply alternatives were then characterized and evaluated, which included potable reuse, stormwater capture, and desalination. An adaptive management strategy was developed to phase in future investments over time based on risk triggers. The development of the WRP involved input from a diverse stakeholder group as well as the Board of Water Commissioners.

Lead Modeler, Groundwater-Surface Water System Integrated Model, Upper San Gabriel Valley Municipal Water District, California. Working collaboratively with the District, Mr. Fernandez developed a water resources systems model that simulates the operation of the groundwater, imported, and surface water systems in the San Gabriel Valley. Bill managed the modeling team and interfaced with Watermaster and their consultants in defining major assumptions and developing consensus on design. This model contains many of the planning assumptions and decisions developed during Upper District's Integrated Resources Plan.

Lead Modeler, Comprehensive Regional Water Systems Plan, Metro Vancouver, Vancouver, British Columbia, Canada. Mr. Fernandez developed an implemented a regional water supply systems model for the largest regional water provided in Canada. This model was used to determine future water reliability under multiple scenarios of regional growth, climate change, water conservation effectiveness, and local water supplies. The model was also used to evaluate dozens of water supply alternatives such as reservoir storage, reuse, stormwater capture and desalination. An adaptive management strategy was developed for the highest-ranking alternatives that phased in investments over the next 100 years based on the outcome of risk triggers.

Education

MS – Water Resources Engineering, Tufts University, Medford, MA, 2000

BS – Engineering, Harvey Mudd College, Claremont, CA, 1998

Registration

Professional Engineer: California, 2009

William Y. Davis

Demand Forecasting and Conservation

Mr. Davis is a senior economist/planner with 35 years of experience in forecasting water demands, evaluating water conservation savings, and determining the cost-effectiveness of water supply projects. He is CDM Smith's national expert in econometric and statistical modeling, and he was the past chair of AWWA's Water Resources Committee.

Technical Advisor, Water Demand Forecasts for Orange County Retail Water Agencies, MWDOC & OCWD, California. Mr. Davis supervised and coordinated the estimation of municipal water demands from 2020-2050 for 30 retail water agencies. The single-family and multifamily sector demand forecasts included estimates of indoor water use among existing and new housing based on the history of California plumbing codes.

Subject Matter Expert, US Army Corps of Engineers, Institute for Water Resources. Training Module on Water Supply Alternatives for Reservoir Reallocation Studies. Mr. Davis developed and presented a training module for IWR personnel on the identification and evaluation of potential alternative municipal water supply. Topics covered the array of alternative water sources, criteria for the assessment of water sources, and methodologies for evaluating alternatives.

Task Manager, Water Demand Forecast for the Metro Vancouver Comprehensive Regional Water System Plan, Vancouver, British Columbia. Mr. Davis was responsible for development of residential and nonresidential water demand forecasts for the 17 municipalities served by Metro Vancouver, the regional water provider. The forecasts were developed using econometric demand functions for a 100-year planning horizon (2016-2116) and addressed changing trends in housing density, building codes and climate.

Task Manager, Water Conservation Potential Study, Los Angeles Department of Water and Power, Los Angeles, California. Mr. Davis was responsible for the development of a detailed Water End Use Conservation model for the largest conservation potential study in the U.S. This model was used to evaluate potential water savings from a wide range of conservation measures in terms of technical feasibility, economic feasibility, and maximum achievable potential. A detailed benefit-cost analysis was also performed for each measure. Data was collected from surveys of local residential and business customers.

Project Manager, Analysis of Commercial Water Use Conservation Potential, Metropolitan Water District of Southern California. Mr. Davis led the effort to conduct on-site surveys of high-water using business types within the MWD service area. Efficiency levels of water-using fixtures and appliances were documented. Estimates were developed for the potential for improved water efficiency, total service area commercial water use and total service area potential savings.

Project Manager, Updates of Long-term Water Demand Forecast, San Diego, California. Mr. Davis led the effort to develop the water demand forecasts for 135 hydraulic pressure zones within the city's service area using econometric modeling. A major re-assessment of forecast models was conducted in 2020 using water demands matched to customer parcel data for improved geospatial accuracy.

Education

MS – Agribusiness Economics, Southern Illinois University, 1986

MSW – Social Work, University of Kansas, 1974

BSW – Social Work/Psychology, University of Kansas, 1973

Other Experience/ Training

Peace Corps– Swaziland, Africa, 1978-1980

Technical Training, Renewable Energy Technology, 1978

Jon D. Ganz, PE, BCEE

Large Pipeline Engineering

Mr. Ganz has 24 years of experience in the design, construction and rehabilitation of both water and wastewater conveyance and treatment facilities. His experience includes managing the design of capital improvements projects for water and wastewater conveyance and treatment facilities with a total estimated design and construction cost of over $2 billion. He has provided field construction management for the construction and rehabilitation of conveyance and treatment facilities and supervised engineering and maintenance programs totaling over $30 million annually to support the operation of a large wastewater collection system (>1,000 miles).

Project Manager, PCCP Rehabilitation Project, Allen-McColloch Pipeline, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Ganz managed the preliminary design of this approximately $40 million project to rehabilitate approximately 50,000-feet of 54- to 78-inch diameter prestressed concrete cylinder pipe using sliplining methods, all within the Cities of Irvine, Lake Forest and Mission Viejo.

Project Manager, Urgent Relining of Allen-McColloch Pipeline, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Ganz managed final design and engineering support during construction of this accelerated project to rehabilitate approximately 1,200-feet of 78-inch diameter prestressed concrete cylinder pipe using sliplining methods, all within private property in the City of Irvine. Design was completed within two months to meet the Agency's aggressive timeline and allow material procurement in advance of a scheduled shutdown window.

Project Manager, San Jacinto Valley Raw Water Conveyance Facilities, Eastern Municipal Water District, California. Mr. Ganz managed the hydraulic modeling, alternatives analysis and preliminary design for approximately 23,000-feet of 60-inch diameter welded steel pipe to convey raw water from the Metropolitan Water District's Inland Feeder to proposed groundwater recharge facilities, all within the Cities of Hemet and San Jacinto.

Project Manager, Joint Outfall "C" Unit 1 Relief Trunk Sewer, Phase II, Los Angeles County Sanitation District (LACSD), California. Mr. Ganz managed design and engineering support during construction of this $30 million project to construct approximately 7,700-feet of 90-inch rubber gasketed reinforced concrete pipe using tunneling methods, all within private property and public right-of-way within the Cities of Carson and Los Angeles. This project included tunneling beneath three railroad crossings and through two oil refineries. Due to the potential gassy conditions posed by the oil refinery properties, the tunnel equipment and methods were required to comply with Class 1, Division 1 hazardous classification requirements.

Project Manager, Joint Water Pollution Control Plant Effluent Outfall Tunnel, LACSD, California. Mr. Ganz managed design of this $550 million project to construct approximately 7 miles of 18-feet tunnel from the City of Carson to San Pedro.

Education

MS – Environmental Engineering and Science, Stanford University, 1996

BS – Civil Engineering, Stanford University, 1996

Registration

Professional Civil Engineer: California, 1998

Honors/Awards

Board Certified Environmental Engineer (BCEE)

Christopher A. Ott, PE

Large Pipeline Engineering and Large Pipeline Maintenance/Hydraulic Control

Mr. Ott is a civil/environmental engineer specializing in the planning and design of water conveyance systems. He also has extensive experience managing the technical design of large multidisciplinary water infrastructure design projects and he has demonstrated expertise in pumping and pressure hydraulic systems.

Task Leader, Recycled Water Program, Metropolitan Water District, Los Angeles, California. Mr. Ott served as the pump station and hydraulics task leader for the planning and conceptual design of three large vertical turbine pump stations and 84-inch steel pipelines with capacities up to 150 mgd to support the conveyance and distribution of Metropolitan Water District's indirect potable reuse program. Conceptual design activities include locating the pump station sites, initial sizing of pumps, storage tanks, surge tanks, and support planning level cost estimates and control strategies.

Task Leader, Brackish Water Hydraulic Model, Eastern Municipal Water District, Perris, California. Mr. Ott led the effort to update EMWD's brackish water conveyance system hydraulic model. The conveyance system at buildout will include over 20 groundwater wells feeding reverse osmosis treatment facilities with a capacity over 17 mgd., Mr. Ott also led the effort to model hydraulic transients (surge) conditions in the system under various operating conditions across the different expansion phases.

Project Engineer, Orange County Sanitation District, P2-122 Headworks Modifications at Plant No. 2 for GWRS Expansion, Fountain Valley, California. Mr. Ott is serving as the technical lead on modifications and upgrades to an existing 340 mgd influent pump station and headworks facility, including pump modifications, gate installations, and new yard piping including a 75-in diversion pipeline. The work is necessary to expand Orange County Water District's Groundwater Replenishment System (GWRS), the world's largest water purification facility for indirect potable reuse (IPR).

Lead Process Mechanical Engineer, Southern Delivery System Raw Water Pump Stations, Colorado. Mr. Ott was the lead process mechanical and hydraulic engineer for the design of three new raw water pump stations for Colorado Springs Utilities Southern Delivery System (SDS). The pump stations will have ultimate capacities from 78 mgd to 100 mgd and include vertical turbine can pumps up to 2,750 horsepower pumping through pipelines up to 84-in diameter.

Staff Engineer, Diemer Water Treatment Plant Modifications, Metropolitan Water District of Southern California, California. Mr. Ott served as a staff engineer on the civil design team for the Metropolitan Water District of Southern California's Diemer oxidation retrofit project. He was involved with the design of new plant potable and fire water distribution systems to support the new ozone facilities. Mr. Ott performed hydraulic calculations and assisted with the routing of new small diameter pipelines through heavily congested tunnels and underground corridors. In addition, he was involved with the design of a new 2,600 gpm potable water pump station and a 4,000 gpm fire water pump station.

Education

BS – Civil Engineering, Colorado State University, 2003

Registration

Professional Engineer: California (2007), Colorado, Washington, and New Mexico

NCEES Record #35317

James Y. Kim, PE, PMP

Large Pipeline Hydraulic Modeling

Mr. Kim is a water resources engineer with 17 years of experience in hydraulic modeling of water distribution and wastewater systems, developing water master plans, performing hydraulic surge evaluations, and managing engineering projects. He has used hydraulic modeling and hydraulic evaluations to develop capital improvement programs, improve operations, and size pump stations. His expertise also includes evaluating transient/surge events such as pump station power failures and valve closures. Mr. Kim is proficient in InfoWater, InfoSewer, InfoSurge, InfoMaster, ArcGIS, WaterCAD, WaterGEMS, HAMMER, and AutoCAD.

Hydraulic Analyst, Eastern Municipal Water District/USACE, Perris II Desalter Brine Pipeline Project, Perris, California. Mr. Kim is finalizing the update of a hydraulic model and surge analysis of the brackish water conveyance system for existing and future scenarios of well operations. He sized and located combination air valves and pressure relief valves that would mitigate the system from potentially damaging surge events such as power failure.

Hydraulic Analyst, Pump Station Rehabilitation Project, Dallas Water Utilities, Dallas, Texas. As part of the rehabilitation and design of a major pump station, Mr. Kim performed surge evaluations that supplies multiple pressure zones within Dallas Water Utilities. Using InfoSurge software, surge evaluations were performed on a zone that includes 17 miles of 84-inch transmission pipeline and pumps that will convey 230 million gallons per day (mgd) of flow.

Hydraulic Analyst, Inland Empire Utilities Agency, San Bernardino Avenue Lift Station and Force Main System Analysis, Fontana, California. Mr. Kim used InfoSewer hydraulic modeling software to evaluate the feasibility of adding a gravity flow bypass of the San Bernardino Avenue Lift Station. The bypass would create flexibility in meeting flow demands that vary seasonally and provide some redundancy to potential mechanical equipment failure

Hydraulic Analyst, Metropolitan Water District of Southern California, Los Angeles, California. Mr. Kim developed a hydraulic model of the potential Regional Recycled Water Program transmission system from the Advanced Water Treatment Facility to various groundwater basins in Los Angeles and Orange County. He evaluated the steady state hydraulics of the system consisting of three pump stations, 190 miles of transmission pipelines 54 inches to 84 inches in diameter, and up to 150 mgd of flow. He observed undesirably low pressures in specific areas of the system and recommended alternatives to eliminate them.

Hydraulic Analyst, Honolulu Board of Water Supply Water Master Plan, Honolulu Hawaii. Mr. Kim served as a hydraulic analyst and lead hydraulic modeler for a three-year, $14M water resources planning study. This work included model development and hydraulic evaluation of 10 water distribution system models that cover the entire island of Oahu and serve 1 million people through over 2,100 miles of pipeline.

Education

MS – Civil and Environmental Engineering, Stanford University, 2003

BS – Mechanical Engineering, University of Illinois, at Urbana-Champaign, 1998

Registrations

Professional Engineer: California, 2006
Hawai'i, 2016

Project Management Professional, 2020

CDM Smith

Issei Tanaka

Large Pipeline Hydraulic Modeling

Mr. Tanaka is a water resources engineer with experience in conducting hydrology and hydraulics analysis, construction oversight, performing utility and site investigations, and has been involved in wastewater reuse and stormwater collection projects. He has extensive experience with ArcGIS and Infowater, as well as experience with HEC-RAS and AutoCAD.

Project Engineer, Site Investigation and Design, Los Angeles Bureau of Engineering, Los Angeles, California. Mr. Tanaka is serving on CDM Smith's design team to investigate and design BMP solutions for stormwater capture, treatment, and infiltration at a park in North Hollywood. He has extensively utilized ArcGIS for site investigation and figure creation, as well as PC-SWMM for hydraulic modeling for design of structures like pipes, catch basins, and infiltration galleries.

Project Engineer, Infowater Model Creation, AECOM, Klamath, California. Mr. Tanaka was part of the 50% design team and supported the creation of an Infowater model of a proposed fish hatchery. His responsibilities included the verification that the hydraulic head of the proposed water source is enough to provide adequate flow to all facilities.

Project Engineer, Infowater Model Update and Processing, Honolulu Board of Water Supply, Honolulu, Hawaii. As part of CDM Smith's modeling team, Mr. Tanaka was involved in updating Infowater water distribution model parameters based on as-built information. His responsibilities included verifying consistency and accuracy of model input values, as well as post-processing and creation of figures of model outputs to compare against SCADA data.

Project Engineer, HEC-RAS Model Processing, Federal Emergency Management Agency, Los Angeles, California. Mr. Tanaka served on CDM Smith's modeling team and used ArcGIS to pre-process culvert data for input into a 2D HEC-RAS model. He also conducted investigations of design storm rainfall intensity and depth of the project area.

Project Engineer, Infowater Model Update and Processing, Honolulu Board of Water Supply, Honolulu, Hawaii. As part of CDM Smith's modeling team, Mr. Tanaka was involved in updating Infowater water distribution model features based on as-builts and design documents. His responsibilities included collecting relevant data & reflecting it in the model, as well as post-processing and creation of figures of model outputs for a technical memorandum.

Education

MS – Environmental & Water Resources Engineering, University of California Los Angeles, 2018

BS – Civil & Environmental Engineering, Waseda University, 2017

Registration

Engineer-in-Training: California

Michael A. Zafer, PE

Water Quality and Treatment Issues

In his 34 years with CDM Smith, Mr. Zafer's drinking water experience has focused on treatment process selection and verification, facilities design, optimization of plant operations, and assisting water suppliers with complex regulatory compliance and water quality issues. He has lived in California since 1990 and his work encompasses conventional, innovative and advanced treatment techniques including desalination (brackish and seawater), hydraulic and mechanical mixing, high rate clarification, ozone and advanced oxidation, UV disinfection and UV-AOP, biologic filtration, membrane filtration, corrosion control, arsenic removal, PFAS removal, and other topics. Mr. Zafer's experience on relevant SWRO projects is summarized below.

Design and Commissioning Manager, Monterey Peninsula Water Supply Project Desalination Plant Design-Build, California American Water, Pacific Grove, California. Mr. Zafer served as the design manager for a new seawater desalination plant in Monterey, California. The plant will treat water from the first large-scale beach wells in Northern California and produce up to 6.4 mgd of drinking to replace surface water from the Carmel River. Design for the plant was completed in 2019, and the client continues efforts to secure State permits to advance the project to construction in 2021.

Design Manager, scwd² Regional Desalination Plant Design, Santa Cruz Water Department and Soquel Creek Water District, Santa Cruz, California. Mr. Zafer managed the preliminary design of a 2.5 mgd new seawater desalination plant to treat water from the first open-ocean intake in Northern California. Preliminary design was completed in 2012; however, the project was deferred to assess alternative supplies.

Technical Advisor, scwd² Seawater Reverse Osmosis Desalination Pilot Study, Santa Cruz Water Department and Soquel Creek Water District, Santa Cruz, California. In 2008-09, Mr. Zafer served as a technical advisor for a comprehensive 12-month pilot study to evaluate pretreatment alternatives, reverse osmosis, boron removal, removal of algal toxins and other treatment issues associated with the use of seawater from Monterey Bay as reliable and sustainable drinking water supply. The project was partially funded by the State of California Department of Water Resources and was awarded a 2011 ACEC Engineering Excellence Merit Award from the California chapter.

Process and Operations Specialist, Escondida and Spence SWRO Water Supply Projects, Santiago, Chile. From 2016 to 2018, Mr. Zafer served on the Owner's Advisor team for a variety of assignments associated with the implementation of two large open ocean intake, SWRO projects to supply process water to mining operations and drinking water to municipal and industrial users in Chile. Relevant assignments included review of startup and commissioning plans for the Escondida SWRO plant (57 mgd), pipelines, and pump stations; and evaluation of energy recovery at the Spence SWRO plant (23 mgd).

Education

MS – Civil Engineering, Southern Methodist University, 1991

BS – Civil Engineering, Southern Methodist University, 1986

Registration

Professional Engineer: California (1993) and Nevada (2008)

Certifications

Certified Drinking Water Treatment Operator: California T2 (2013)

Professional Affiliations

Former Instructor for Water Treatment Operators

Bay Area Consortium for Water and Wastewater Engineers, in conjunction with Solano Community College, California

Alan G. LeBlanc, PE, BCEE

Water Quality and Treatment Issues

Having completed 50+ water treatment projects during his 26-year tenure at CDM Smith, Mr. LeBlanc applies PFAS removal best practices, innovation, and regulatory knowledge to the planning and design of site layouts, treatment processes and equipment selection for pioneering groundwater supply projects throughout California and nationwide. His design and construction experience includes municipal water and wastewater treatment, PFAS removal, hydraulic piping and pumping analysis, sanitary and storm sewer collection systems, application of sustainable design concepts, and construction cost estimating. Mr. LeBlanc served as Chair of the New England Water Works Association Filtration Committee for eight years and he has led training courses on filtration and granular activated carbon (GAC) adsorption design and operation for the past 16 years.

Technical Advisor, PFAS Removal, City of Garden Grove, Garden Grove, California. Mr. LeBlanc serves as technical advisor for the 3,500 gpm (5 mgd) Well 21 West Haven Well Site. GAC, anion exchange (AIX), impacts on the pumping systems, and associated work requirements are being examined to aid the City's planning efforts. This work is being conducted as part of the Orange County Water District's overall PFAS program, with the end goal of mitigating the appreciable cost of purchased water being incurred by the City.

Technical Advisor, PFAS Removal, East Orange County Water District, Orange, California. Mr. LeBlanc serves as technical advisor for work on EOCWD's two-well system, where entrained air and PFAS removal are key treatment objectives. This work is being conducted as part of the Orange County Water District's overall PFAS program, with the end goal of mitigating the appreciable cost of purchased water being incurred by EOCWD.

Project Manager, Bench Scale Testing, Design and Construction for PFAS Removal, City of Westfield, Westfield, Massachusetts. Mr. LeBlanc led CDM Smith's work for the City of Westfield's 2,700-gallon-per-minute Well 7 and Well 8 treatment facility. The $5.5M project evaluated GAC at bench scale to treat the City's source water, followed by the design and construction of a new plant using GAC. The plant was placed into service in June 2020. Additionally, the project was approved to operate in a parallel mode (vs. a lead/lag mode) which saved the City significant cost, space, and construction time. Mr. LeBlanc managed CDM Smith's first drinking water project for PFAS removal, and the region's first permanent GAC installation. While only two GAC solutions were required for bench-testing – PFOA and PFOS – Mr. LeBlanc worked closely with CDM Smith's Bellevue lab to recommend and review additional compounds in our bench-testing, which paid off.

Project Manager, PFAS Removal Alternatives Analysis/Final Design for the Spectacle Pond WTP and Grove Pond WTP, Town of Ayer, Ayer, Massachusetts. Mr. LeBlanc managed the PFAS removal planning and design services at two separate WTPs (four miles apart) with the challenge of treating the PFAS within the existing footprint. He worked closely with our Bellevue lab staff to advise on the bench-scale testing that was performed on water samples from each plant. The samples produced different results, which resulted in one plant designed for IX (the region's first permanent IX installation for PFAS removal), and the other designed for GAC, resulting in an optimized treatment process for each plant.

Education

ME – Civil Engineering. Colorado State University, 2007

BS – Civil Engineering. Northeastern University, 1994

Registration

Professional Engineer: Colorado (1999), New Hampshire, Massachusetts, Connecticut, New Jersey, Maryland, Illinois, Maine and Rhode Island

State of New Hampshire Water Works Operator, Combined Grade CIA

Certifications

Confined Space Entry Certification

Honors/Awards

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Gregory D. Wetterau, PE, BCEE

Ocean Desalination Design

Mr. Wetterau serves as CDM Smith's Membrane Technology Leader and is an environmental engineer with 26 years of experience bringing best practices, innovation and creativity to the planning and design of water and wastewater treatment facilities. His expertise includes process and system design for membrane filtration, desalination, and advanced wastewater treatment facilities, having been involved with piloting, design, or facility start-up for more than 70 membrane treatment facilities globally. As a driver of change in the membrane industry, He serves on the Boards of Directors for the American Membrane Technology Association and the International Desalination Association, keeping him closely tied with industry direction and providing insights from related projects around the world.

Project Manager, Coastal Desalination Pilot Project, Municipal Water District of Orange County, Dana Point, California. Mr. Wetterau was project manager on pilot testing of a slant well intake and seawater desalination facility. CDM Smith's project role in included regulatory coordination, pretreatment process development, post-treatment evaluation, and review and assessment of all water quality results during pilot testing.

Project Manager, Coastal Desalination Facility, City of Sand City, Sand City, California. Mr. Wetterau served as design project manager for the design-build of a 0.6 mgd desalination facility employing beach wells and subsurface discharge of the brine. The plant, which went online in 2010, became the first desalination plant in California permitted under current surface water treatment regulations. The facility includes UV disinfection, single-stage RO with energy recovery, and post-treatment using carbon dioxide injection and calcite contactors.

Lead Practitioner, Confidential Seawater Desalination Client, Caribbean. Mr. Wetterau is an independent technical specialist and Lead Practitioner for a 40 million imperial gallons per day seawater desalination facility. He is responsible for coordinating CDM Smith support on the project, overseeing and reviewing the work of field engineers. The project includes quarterly visits to the facility to conduct condition assessments and review plant performance.

Technical Review, Monterey Regional Desalination Project, California American Water, Monterey, California. Mr. Wetterau is providing senior process review and permitting support for design-build of the 6.4-mgd seawater desalination facility. The facility will employ subsurface intakes, filtration for iron and manganese removal, reverse osmosis with energy recovery, UV disinfection, and post-treatment stabilization to supplement the threatened water supplies in the Monterey Peninsula.

Education

MS – Environmental Engineering, University of Illinois, Urbana, Illinois, 1994

BS – Civil Engineering, University of Illinois, Urbana, Illinois, 1992

BA – Liberal Arts, Wheaton College, Wheaton, Illinois, 1992

Registration

Professional Engineer: Washington (1998), Oregon, Florida and California

Honors/Awards

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers and Scientists

Christian Sanders

Ocean Desalination Design

Mr. Sanders in a senior environmental engineer with experience spanning the Americas and Australia/New Zealand in the areas of water treatment design development (seawater desalination, recycled water and conventional surface/groundwater treatment), treatment plant commissioning, large-scale pilot plant testing (desalination and fresh water), bench-scale testing, and implementation of operational optimization programs.

Design/Commissioning Lead, Desalination Plant Design-Build for the Monterey Peninsula Water Supply Project, California American Water, Monterey, California. As commissioning manager on this design-build project which delivered the 6-mgd Ft. Irwin water treatment plant, one of the largest zero liquid discharge plants of its kind in the USA, Mr. Sanders was onsite for nearly one year directing the commissioning and startup activities, which included a 90-day performance proving period. The novel plant design incorporated a complex treatment process including electrodialysis reversal (EDR), enhanced lime softening, close-coupled MF/RO, ion exchange (IX), and mechanical evaporation to reliably achieve greater than 99% recovery of its groundwater sources.

Technical Advisor, Escondida Water Supply Project, Chile. Mr. Sanders provided onsite pre-commissioning lead technical support on the 19-mgd expansion of the Escondida Water Supply Project, the largest seawater desalination plant in the western hemisphere, located in northern Chile. In this role, he prepared detailed test procedures, reviewed and marked up the contractor's commissioning documentation, and led weekly coordination meetings with both the owner's and contractor's staff. Mr. Sanders also worked with the client to setup an electronic software database to manage workflow and assist with record keeping of commissioning documentation, which was deployed on this project by the owner for the first time.

Commissioning Manager, Ft. Irwin New Water Treatment Plant Design-Build, US Army Corps of Engineers – Los Angeles District, National Training Center, California. As commissioning manager on this design-build project which delivered the 6 mgd WTP, one of the largest zero liquid discharge plants of its kind in the USA, Mr. Sanders was onsite for nearly one year directing the commissioning and startup activities, which included a 90-day performance proving period. The novel plant design incorporated a complex treatment process including electrodialysis reversal (EDR), enhanced lime softening, close-coupled MF/RO, ion exchange (IX), and mechanical evaporation to reliably achieve greater than 99% recovery of its groundwater sources.

Technical Advisor, DesalcoTT Seawater Desalination Plant, Trinidad and Tobago. As a desalination specialist, Mr. Sanders is engaged by DesalcoTT to perform regular technical evaluations of their facility which plays a critical role in the island nation's overall potable water supply.

Technical Advisor, Water Recycling Facility Design-Build, City of Carlsbad, California. Mr. Sanders provided technical and commissioning leadership during the final commissioning phase for the 3.38-mgd reuse project, which included a 60-day performance testing period. The plant utilizes ultrafiltration with downstream chlorine disinfection to treat secondary treated wastewater for water reuse applications.

Education

MPS – Agriculture and Life Sciences, Cornell University, 2005

BS – Environmental Engineering, University of Florida, 2000

Certifications

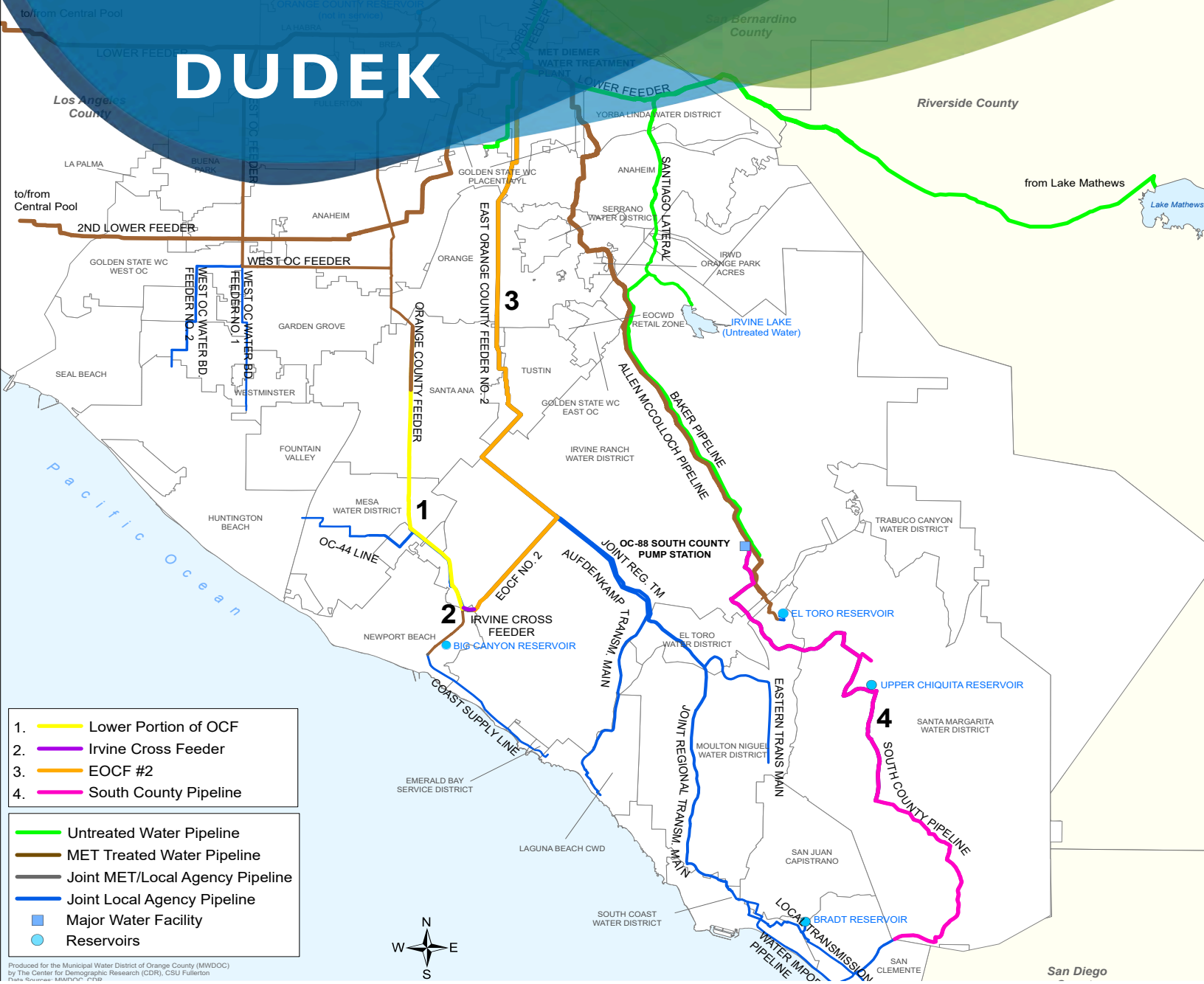
MIEAust CPEng (Environmental) **Professional Engineer (Australia)*

IntPE(Aus)

APEC Engineer


CDM
Smith
cdmsmith.com

DUDEK



On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development RFQ ENG 2021

PREPARED FOR

Municipal Water District of Orange County

March 25, 2021

27372 Calle Arroyo . San Juan Capistrano, CA 92675 . 949.450.1745 . dudek.com

DUDEK

27372 CALLE ARROYO
SAN JUAN CAPISTRANO, CALIFORNIA 92675
T 949.450.2525 F 949.450.2626

Cover Letter

March 25, 2021

Mr. Charles Busslinger
Municipal Water District of Orange County
Submitted via email to cbusslinger@mwdoc.com

Subject: **Statement of Qualifications for On-Call Technical Services to Support Reliability Planning, Engineering, & Resource Development (RFQ ENG 2021)**

Dear Mr. Busslinger:

Critical to the success of the Municipal Water District of Orange County's (MWDOC or District) On-call Technical Services, is the selection of value-focused, responsive, trusted professionals to provide guidance in assessing needs and identifying cost-effective, sustainable solutions that meet MWDOC's long-term goals. Our proposed team is comprised of experienced water engineers that can provide just that.

Dudek's expertise in water system planning provides the District the following advantages:

Efficient Planning and Engineering Services. Public agencies face the challenge of delivering superior services while managing tighter budgets, fluctuating workloads, more regulations, and increasingly complex projects requiring in-depth technical specialization. Maintaining a full-time, in-house staff to meet all those requirements can be difficult and expensive. The key to on-call services is seamless integration into the District's processes. Our professionals are skilled at understanding how your team and processes work and applying our expertise within that structure. The result is maximized efficiency without sacrificing valuable time and energy. Our method of integration has led to more than 160 successful municipal as-needed and extension-of-staff contracts, some lasting more than 15 years.

Team Personnel that Know and Understand District's Needs. Our proposed Program Manager/Principal in Charge, Bob Ohlund is a long-term Dudek employee and has focused his 38-year career in Southern California water, and more specifically in Orange County water system planning, design and construction. Supporting Bob is our proposed team that includes engineers, modelers, environmental planners and geographic information system (GIS) analyst that have worked together on water planning projects, providing a one-stop shop on which the District can confidently rely.

Bob Ohlund, Dudek Vice President of Engineering, will serve as the primary contact and project manager for this contract. If you have any questions or wish to discuss our statement of qualifications, please contact Bob at 949.373.8313/bohlund@dudek.com

Sincerely,

Bob Ohlund, PE
Vice President, Program Manager *(Bob Ohlund is authorized to sign on behalf of Dudek).*

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Section 1 / Firm Identification

The Dudek Advantage

We are a California-based engineering and environmental consultant with nationwide offices and more than 600 planners, scientists, civil engineers, contractors, and support staff. We assist private and public clients on a range of projects that improve and evolve our communities, infrastructure, and natural environment. From planning, design, and permitting through construction, we move projects forward through the complexities of regulatory compliance, budgetary and schedule constraints, and conflicting stakeholder interests.

Our professionals find practical, cost-effective approaches to help you achieve your specific project goals. We work to build your trust, which allows us to offer constructive solutions with your project's long-term success in mind.

Dudek Snapshot

- Multi-disciplinary engineering and environmental services
- 600+ employees
- Founded in 1980; employee-owned
- Top 500 California Design Firm (ENR)
- Top 50 Trenchless Design Firm (Trenchless Tech)

Firm Contact Information

Bob Ohlund, PE
27372 Calle Arroyo
San Juan Capistrano, CA 92675
T: 949.373.8313 | E: bohlund@dudek.com

Our team focuses on:

Client Needs We provide a high level of responsive service focused on understanding the District's needs with a goal of exceeding expectation through creative solutions, communication and successful completion.

Infrastructure Development We have in-depth experience developing solutions and planning infrastructure to meet water supply, treatment, storage and transmission needs. Reliable solutions include efficient collection and recycling of wastewater through water supplies augmentation, landscape irrigation and dual plumbing, as well as planning for potable raw water and treated water augmentation.

Regulatory Compliance To support implementation of infrastructure, our scientists and planners have established strong working relationships with the local staffs of state and federal regulatory agencies. Our knowledge of agency expectations, inter-agency agreements, and local regulations involving your project are vital for keeping projects moving forward and obtaining final approvals.

Natural Resource Management We provide science-based analysis for preserve design and species survey methodologies, coupled with habitat planning, permitting, design, and installation expertise.

As a mid-sized firm, we provide the personal service of project managers who stay with your project from start to finish, combined with the breadth and depth of capabilities characteristic of larger firms in order to meet your project's requirements. Our project managers are empowered to be problem-solvers with the ability to make decisions in a timely fashion to keep project momentum moving forward. We are proud of our low employee turn-over, our staff's long tenure means the project manager you see at the bidding stage will likely be with you at project completion.

Section 2 / Organization Chart

Project Organization

Our project team presents a collaborative group of highly trained and competent professionals that has a unique ability to find practical, cost effective solutions to the District's projects. Dudek has proven experience and leadership in planning and design of water infrastructure.

Dudek would like to be considered for the following categories:

- Water and Environmental Planning/Management
- Engineering
- Water Reliability Planning.

Mr. Bob Ohlund, PE will serve as your dedicated project manager, and the main point to contact for MWDOC. Bob has over 38 years of experience in water resources planning. Bob Ohlund has excellent experience with understanding Orange County's water supply issues and transmission facilities. From Bob's experience early in his career with the Allen McColloch Pipeline and Baker Pipeline for the Santiago Aqueduct Commission, then managed by Los Alisos Water District, and the South County Pipeline hydraulics (Bob managed the design of the South County Interim PS including hydraulics pumping to the SCP) to recent hydraulic analyses of conveying OC groundwater in the Joint Transmission Main, Water Importation Pipeline, Pico Pipeline, EOCF#2 as well as computer hydraulic modeling of IRWD's, SCWD's, MNWD's, LBCWD's and Cities of Huntington Beach, Garden Grove, Newport Beach and Santa Ana's water systems.

Our project with staffing functions is illustrated in the **Figure 1,** Project Organization Chart. One-page resumes for our key personnel are included in **Appendix A**.

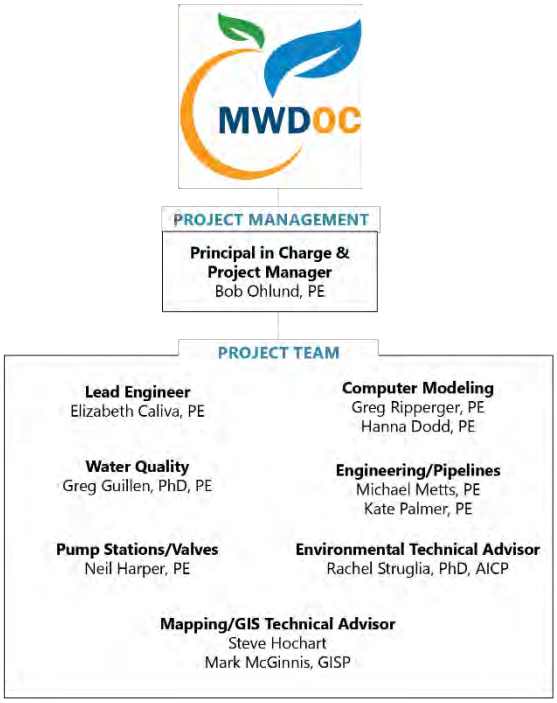


Figure 1. Project Organization Chart

Firm Capacity to Perform Work

Dudek has a staff of over 600 individuals, with a vast array of service offerings. As such, our project managers have the right people and staffing availability to bring resources to bear on any task assignment requirement at a moment's notice. We are dedicated to turning these tasks around quickly based on the needs of the District and the identified scope and schedule of each task. Dudek commits the proposed staff for the duration of this project. No changes in staff assignments will occur without prior written approval from the District.

Proposed Line of Communication

The most effective project manager is one who facilitates the continuous flow of information, data, instructions, and guidance between the MWDOC, Dudek team members and any subconsultants. When maintaining this flow, we utilize resources efficiently and minimize wasteful rework. We achieve constant communication through:

1. Regularly calling or emailing the MWDOC's key contact staff person to discuss project milestones, activities, and potential issues;

2. Holding regular project management meetings with key project staff to coordinate work efforts, monitor task completion, and review budget conformance;

3. Updating, as necessary, the project description, schedule, work progress reports, and inventories of available data so that all team members are aware of information that may affect their work products and schedules;

4. Meeting with MWDOC staff at design milestones and other strategic junctures; and

5. Diligent documentation of issues, action items, and decisions

Multi-Project Management

Dudek project managers use the same project tracking, scheduling, and budgeting systems. In addition, by utilizing a standard file management system, and flexible budget and schedule tracking systems, our project managers can manage multiple projects and quickly support other project managers should the need arise.

Section 3 / Firm Description

Dudek Qualifications

During our 40 years, Dudek's range of services has expanded to support the life cycle of a project, from planning, design and environmental compliance, to construction management and facility operation. We understand the importance of adhering to tight regulations and narrow budgets and know how to provide exemplary services within these constraints to produce sustainable infrastructure. From project inception to project closeout, our project managers will be with you every step of the way. Our goal is to deliver a finished project that exceeds client expectations.

Dudek has been providing engineering, resources development, water reliability planning, and environmental management for over 40 years. Our depth and breadth of experience means we can quickly assemble and mobilize the appropriate level of service to match your project needs and budget. Our 600+ person in-house team includes:

- Licensed professional engineers
- Certified GIS professionals
- Certified hydrogeologists
- Licensed geologists
- Environmental planners

Areas of Expertise

Water and Environmental Management

Our water supply professionals and environmental scientists have excellent experience and are available to provide service to MWDOC in a review capacity of State Water Project planned improvements. Dudek environmental specialists currently have contracts with the State Department of Water Resources providing support services directly on the SWP issues.

Engineering Related to Hydraulic and Water Quality Modeling

Dudek engineers are experienced in water infrastructure planning and hydraulic modeling of water systems. Dudek has direct experience with the MWDOC and surrounding water retailer systems through our past planning and modeling services. We have assembled a team of experienced professionals who are experienced in planning, water supply, and hydraulic modeling. In addition, our proposed staff is very experienced in using Innovyze's InfoWater software for water system analysis. Infowater is the industry standard for pressurized water distribution system modeling. It is a common computer modeling software and will not limit your resources, i.e. consultants, for using this tool once we complete the model development.

Our engineers are experienced in computational hydraulics, environmental fluid mechanics, as well as design and modeling of water, wastewater, and recycled water distribution systems. We are experienced in the analysis and design of water distribution and water quality issues. We have performed these services for surrounding municipalities and special districts such as Irvine Ranch Water District, South Coast Water District, Santa Margarita Water District, Moulton Niguel Water District, and Santa Ana Watershed Project Authority.

Water Reliability Planning

We have nearly four decades' experience on water projects. Much of our work has focused on California water supply, one of the largest and most complex water markets, challenged by severe supply-demand swings, strict regulatory oversight, and competing stakeholder interests.

Our engineers, hydrogeologists, and environmental professionals work collaboratively on water, recycled water, and groundwater projects to facilitate a reliable supply of water for communities. As a result, we have performed economic analysis for various water supply project ranging from water banking and water exchange, demand and forecasting related to climate change, and to water management policies at Federal, State, and local levels.

References

We are confident that our demonstration of project experience below will provide you with adequate information about our technical capabilities. Please contact our references, shown in this section, listed with each project to learn more about our performance.

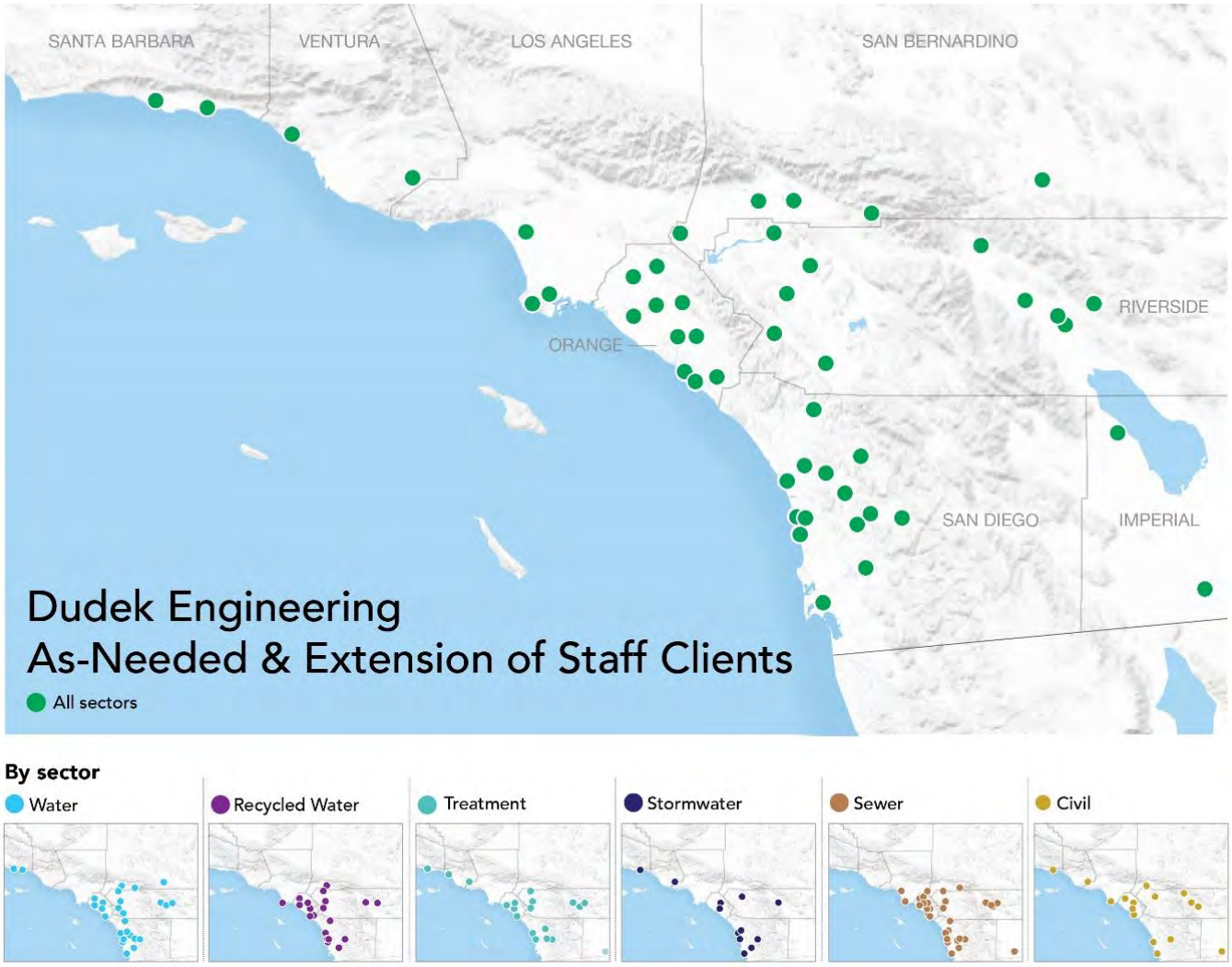
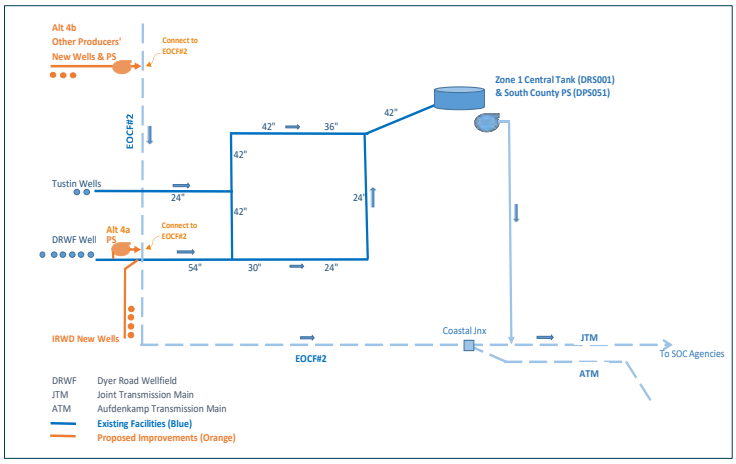


Figure 2. Dudek Engineering As-Needed Clients

Select Local Project Experience

South County Hydraulic Modeling Analysis

Client: Municipal Water District of Orange County/ Irvine Ranch Water District
Client Reference: Charles Busslinger/MWDOC 714.593.5003; Mark Marcacci/IRWD, 949.453.5300
Schedule/Budget: Dudek completed this project on time and budget



Services Provided Related to Scope of Services:
Engineering, Water Reliability

The South County Interconnection Agreement currently requires Irvine Ranch Water District (District or IRWD), to the best of its ability, to deliver Orange County Groundwater Basin groundwater supply to South Orange County agencies during times of Metropolitan Water District (MWD) outages. The District is able to direct flow through their distribution system to the Joint Transmission Main to South Orange County. This study evaluated the amount of flow IRWD can safely deliver via the South County pipeline while having minimal or negligible negative impacts on IRWD system performance. The objective of this analysis was to determine how the existing IRWD system, under existing demand conditions, would handle delivery of flows to South County agencies during two specific MWD outage and demand scenarios:

1. A two-week period (14 days) of consecutive "existing" Maximum Day Demand (MDD) conditions delivering the maximum amount of flow possible (MDD_14)

2. A 60-day scenario of two consecutive "existing" Maximum Month Demand (MMD) conditions back-to-back delivering 20 CFS (MMD_2)

On Call System Evaluations, Computer Modeling & Analysis

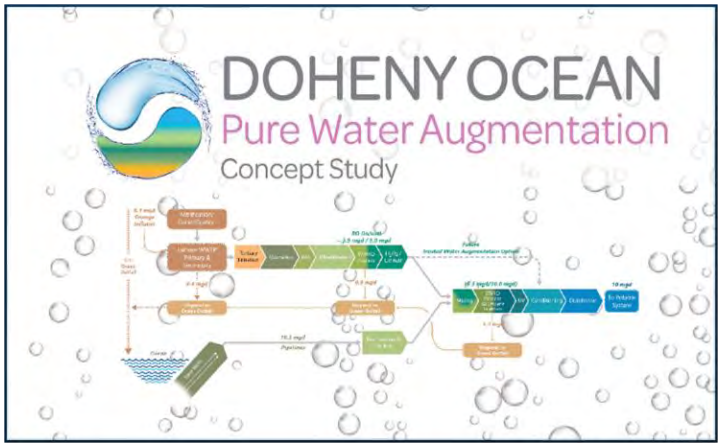
Client: Irvine Ranch Water District
Client Reference: Mark Marcacci, 949.453.5300, marcacci@irwd.com

Since 2005, Dudek has provided on-call systems analysis for the District's Potable, Non-Potable and Sewer Systems. These services include computer network modeling and specific area analysis to evaluate potential changes in operations, improvements to existing systems and analysis of new development requirements. Dudek is well versed in the IRWD computer models and systems' operation, as well as having an excellent working relationship on assignments sometimes similar to an extension of the District's staff.

Services Provided Related to Scope of Services:
Engineering, Water Reliability

Doheny Ocean Pure Water Augmentation

Client: South Coast Water District
Client Reference: Rick Shintaku, 949.342.1140

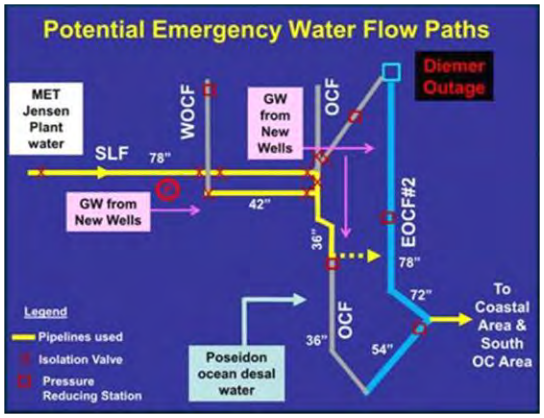


Services Provided Related to Scope of Services:
Engineering, Water Reliability

Dudek engineers developed this cutting-edge concept and provided engineering evaluation of the Doheny Ocean Pure Water Augmentation Project (DOPWA). DOPWA is a conceptual water supply project to use advanced purified water to augment the supply from the Doheny Ocean Desalination Plant (DODP) proposed by South Coast Water District (SCWD) to assist advancement of a purified water project. As an alternative to a 10 mgd Ocean Desalination Plant, this conceptual project would augment the ocean supply to the Doheny Ocean Desalination Plant with 5 mgd of advanced treated sewage from the J.B. Latham WWTP, reducing ocean water supply required to produce a total of 10 mgd of product water. Currently the California State Water Resources Control Board (SWRCB) has no requirements for permitting advanced purified water projects of this nature. The conceptual study was performed in anticipation of both raw water and treated water augmentation regulatory requirements. It is anticipated that regulatory requirements will be available from the State as early as 2023.

Second Lower Cross Feeder Study & Construction Cost Estimate

Client: Municipal Water District of Orange County
Client Reference: Karl Seckel, Assistant General Manager, 714.593.5024, kseckel@mwdoc.com

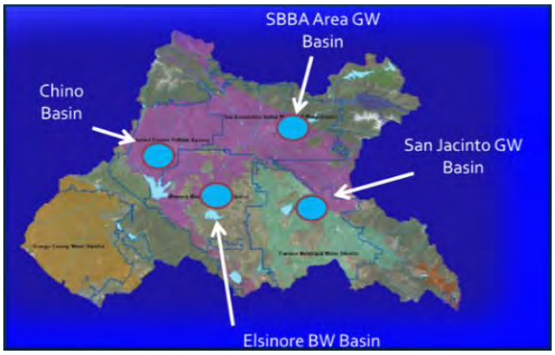


Services Provided Related to Scope of Services:
Engineering, Water Reliability

Dudek, teamed with DLM/Don MacFarlane, provided an evaluation of an alternative and construction cost estimate to construct a “cross feeder” in North Orange County’s transmission system to provide additional water supply reliability to South Orange County water agencies. The Second Lower Cross Feeder (SLCF) is a pipeline that would connect the Second Lower Feeder (SLF), owned by the Metropolitan Water District of Southern California (Metropolitan), and the East Orange County Feeder Number 2 (EOCF2), jointly owned by Metropolitan and several Orange County water entities, and shown in Figure 1. The primary purpose of the SLCF is to convey water from Metropolitan's Jensen Water Treatment Plant into South Orange County in the event of a planned or emergency outage at Metropolitan's Diemer Water Treatment Plant, or an outage in the pipelines that deliver water from the Diemer Plant. The water from the SLCF could also be utilized in the central portions of Orange County, depending on the need for water during the emergency situation.

Santa Ana River Conservation & Conjunctive Use Project (SARCCUP)

Client: SAWPA Member Agencies/San Bernardino Valley Municipal Water District
Client Reference: Doug Headrick, General Manager, 909.387.9200, dheadrick@sbvmwd.org

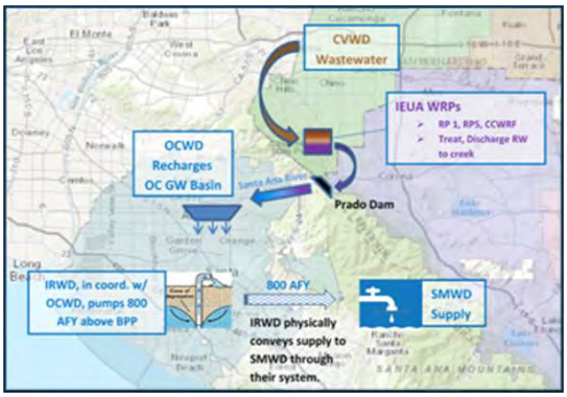


Services Provided Related to Scope of Services:
Engineering, Water Reliability

Bob Ohlund served as project manager for the implementation of the Santa Ana River Watershed Scale Conjunctive Use project. The work consisted of establishing goals for wet-year recharge and dry-year extraction, while comparing the Agencies' goals with their existing facilities to identify gaps, including any new facilities required to achieve their planned recharge and extraction goals. Bob facilitated 'brainstorming' sessions with experts from the five SAWPA agencies to identify potential large water supply projects. From this work resulted a list of projects that could be implemented in the following 2-5 years and could be funded by California Proposition 84, Round 3 grant application. The work was a collaborative effort with the Regional Water Agencies and Santa Ana Watershed Project Authority (SAWPA) to summarize work performed on existing and proposed conjunctive use projects. The goals were to maximize the use of available water supplies by integrating watershed-wide recharge, banking, extraction and transmission systems that improved water reliability during emergencies and drought. Other benefits explored were to facilitate and improve regional watershed collaboration or water resources and reduce salt-loading and energy consumption/costs, thereby improving overall the stewardship of the watershed. Dudek drafted the Prop 84 grant application facilitating $55M in grant funding for SARCCUP as well as $12M in grant funding for a watershed-scale Water Use Efficiency program.

CVWD-SMWD Water Transfer Pilot Conceptual Design

Client: Santa Margarita Water District
Client Reference: Dan Ferons, General Manager, 949.459.6400, danf@smwd.com



Services Provided Related to Scope of Services:
Engineering, Water Reliability

Dudek/Bob Ohlund worked closely with SMWD to develop a conceptual approach for conveyance of recycled water supply from Cucamonga Valley Water District (CVWD) to Santa Margarita Water District (SMWD). The two agencies have an existing agreement to create a water supply "insurance policy" for SMWD, which enables the District to purchase up to 4,250 acre-feet per year of groundwater (for 25 years, with a 25-year extension) through exchange with Municipal Water District of Orange County (MWDOC) and Inland Empire Utility Agency (IEUA). CVWD and SMWD are exploring alternative delivery methods other than the exchange that was contemplated in the agreement. The alternative includes delivery of recycled water produced by IEUA on CVWD's behalf through the Santa Ana River, with groundwater then transferred via Irvine Ranch Water District's or MWDOC's systems.

Consequence of Failure Analysis

Client: South Coast Water District
Client Reference: Taryn Kjolsing, Engineer, 949.499.4555 x317

Services Provided Related to Scope of Services:

Engineering, Water Reliability

The South Coast Water District (District) contracted Dudek to prepare a Consequence of Failure Analysis (CoFA) for the District's linear infrastructure. The CoFA is intended to provide a better understanding of the consequences of potable waterline failures in their distribution system. This understanding will support the District in development of contingency plans and capital improvement programs to lessen the impact of any system failures. The objectives of this project include: (1) providing the District with a CoFA ranking for all pipelines in the potable water distribution system; (2) summarizing the analysis parameters and results, including a table of the highest ranked facilities; and (3) recommending "next steps" for mitigating major sources of failure. The CoFA is being performed in two parts. Part 1 included a software analysis by Sedaru to rank each pipeline based on available GIS input data, including number of valves needed to isolate, number of customers impacted, length of pipe affected, volume of water impacted, and number of pipes that need flushing. Each pipeline was assigned a criticality factor, ranging from 1 to 100, with higher values indicating higher consequence of failure. Part 2 includes augmentation of the criticality factor using a global fire flow analysis in the District's current hydraulic water model. The results of the two analysis will be compiled to create a list of the pipelines with the highest consequence of failure and recommendations for each result to aid the District in future infrastructure contingency and improvement planning.

Section 4 / Firm Capacity

Our proposed team is ready and able to begin work on this project. Our team is organized and includes those listed in Section 2. We have included brief biographies for our team members that identifies our proposed personnel, role in project, professional qualifications, and availability. One-page resumes for these key individuals with demonstrated capability in producing cost effective projects can be found in **Appendix A**.

Bob Ohlund, PE
Program Manager/ PIC

Qualifications

- 38 years of engineering consulting experienced focused on developing creative and sustainable solutions to infrastructure
- Pipelines: up to 60-inch transmission mains
- Pump Stations: 12 pump stations up to 25 cfs/350 hp
- Expertise in system planning and hydraulic analysis
- Established relationship with MWDOC

Related Experience

- District Engineering Services, South Orange County
- South Orange County Hydraulic Modeling Analysis, Irvine Ranch Water District
- Second Lower Cross Feeder Study, MWDOC
- On Call System Evaluations, Irvine Ranch Water District
- Conceptual Design for SARCCUP, San Bernardino Valley Municipal Water District

Education/License(s)

Civil Engineer, CA No. 41006
BS Civil Engineering

Commitment: 50%

Elizabeth Caliva, PE
Lead Engineer

Qualifications

- Over 17 years of modeling and master planning experience
- Experienced computational hydraulics and environmental fluid mechanics, design and modeling of water, wastewater, and recycled water distribution systems
- Expertise in using InfoWater for development of modeling
- Established relationship and understands MWDOC's system

Related Experience

- Consequence of Failure Analysis, South Coast Water District
- South Orange County Hydraulic Modeling Analysis, Irvine Ranch Water District
- On Call System Evaluations, Irvine Ranch Water District
- Conceptual Design for SARCCUP, San Bernardino Valley Municipal Water District
- 1832 Pressure Zone Evaluations, Eastern Municipal Water District

Education/License(s)

Civil Engineer, CA No 64331
MS Water Resources Engineering
BS Environmental Engineering

Commitment: 50-100%

Greg Guillen, PhD, PE
Water Quality

Qualifications

- Senior chemical and environmental engineer focused on water/wastewater treatment
- Focused on advanced membrane materials and processes for separations for those found in water treatment
- Authored papers in the field of desalination and membrane filtration

Related Experience

- Chlorine Contact Tank Tracer Study at Harmony Grove Village Water Reclamation Plant, TC Construction Company
- Chlorine Contact Basin Tracer Study at Water Recycling Facility, Western Municipal Water District
- San Jacinto Valley Enhanced Recharge and Recovery Program, Eastern Municipal Water District
- Water Reclamation Facility Chloride Discharge Limits, Confidential Client

Education & License

Civil Engineer, CA No. 83897
PhD/MS Civil Engineering
BS Environmental Engineering

Commitment: 20%

Kate Palmer, PE
Engineering/Pipelines

Qualifications

- 18 years of experience in engineering design of water, wastewater, and recycled water infrastructure
- Expertise in system analysis, modeling, and design
- Experienced in trenchless design methods
- Pipeline design experience includes sizes up to 72" pipe

Related Experience

- El Monte 68" Water Transmission Pipeline Rehabilitation, City of San Diego
- El Mirlo 30" Transmission Main Repair, San Dieguito Water District
- 54" Central Intertie Pipeline Improvements, Moulton Niguel Water District
- 42" Los Coches Reservoir Inlet Pipe Repairs, Padre Dam Municipal Water District
- Chino Product Water Pipeline Crossing of the Santa Ana River

Education/License(s)

Civil Engineer, CA No. 68695
MS Civil and Environmental Engineering
BS Biosystem Engineering

Commitment: 30%

Michael Metts, PE
Engineering/Pipelines

Qualifications

- Over 37 years of experience in civil engineering
- Experience encompasses water, wastewater and recycled water engineering design, permitting, water resources planning, facility design, and construction management and assistance
- Project experience includes the evaluation and expansion of existing facilities as well as the design of new facilities

Related Experience

- Chino Product Water Pipeline Crossing of the Santa Ana River, Chino Basin Desalter Authority
- Anaheim South Recycled Water Project, City of Anaheim
- Inland Empire Brineline Reach V Rehabilitation, Santa Ana Watershed Project Authority
- Chino II Desalter Pipeline, Chino Basin Desalter Authority
- Non-Potable Water Distribution System, Yucaipa Valley Water District

Education/License(s)

Civil Engineer, CA No. 42586
BS Civil Engineering

Commitment: 20%

Neil Harper, PE
Pump Station/Valves

Qualifications

- 21 years of experience in project management, engineering, planning, design, and construction support services for a variety of municipal and public agency projects
- Specific areas of practice include water, wastewater, and water reuse systems.
- Relevant experience includes water distribution and treatment facilities, pumping facilities, and reservoirs.

Related Experience

- 16th Street Pump Station Backup Generator and Upgrade Project, City of Newport Beach
- 16th Street Pup Station Upgrades, City of Newport Beach
- E Reservoir Replacement and Pump Station, Vista Irrigation District
- Ontario Potable Water Booster Pump Station, City of Ontario

Education/License(s)

Civil Engineer, CA No. 63228
BS, Bio-Resource and Agricultural Engineering

Commitment: 30%

Rachel Struglia, PhD, AICP
Environmental Technical Advisor

Qualifications

- 21 years of experience in preparing CEQA/NEPA documents for public agencies
- Experienced in managing large infrastructure proejcts related to EIR/EIS, general plans, and specific plans
- Approaches environmental planning with a broad platform of advanced studies in environmental planning, including social ecology, analysis and design

Related Experience

- OCSD, Facilities Master Plan PEIR
- Los Angeles County Sanitation District, Clearwater Program EIR/EIS
- Port of Los Angeles, San Pedro Waterfront EIR/EIS
- MWD of So Cal, Distribution System Infrastructure Protection Program EIR
- IRWD, On-Call Environmental Documentation

Education/License(s)

American Institute of Certified Planners (AICP)
PhD Environmental Analysis Design
MS Justice Studies
BA Anthropology

Commitment: 30%

Greg Ripperger, PE
Computer Modeling

Qualifications

- 12 years of experience water, wastewater, and recycled water engineering
- Specializing in master planning, water system design, and hydraulic modeling
- Expertise in using InfoWater for development of modeling
- Thrives on managing complex projects with unique solutions

Related Experience

- 2020 Water Master Plan and Rate Study, City of Covina
- 2020 Water Master Plan Update, City of Brea
- 2017 Water Master Plan, San Antonio Water Company
- Loma Linda Pipeline Upgrade, City of Beverly Hills

Education/License(s)

CA PE No. 79499
Water Audit Validator, American Water Works Association
BS Civil Engineering

Commitment: 30%

Hanna Dodd, PE
Computer Modeling

Qualifications

- 8 years of experience in water and wastewater infrastructure
- Experience includes a large array of water and wastewater design analysis.
- Experienced in computer based hydraulic modeling using InfoWater, InfoSewer, H2O Map Water, H2O Map Sewer and in GIS

Related Experience

- InfoWater Model Update, Ramona Municipal Water District
- InfoSewer Model Analysis, South Coast Water District
- Sanitary Sewer Master Plan and Condition Assessment, City of Placentia
- San Jacinto Well Configuration, Eastern Municipal Water District
- Development of a Water System Hydraulic Model, Moulton Niguel Water District

Education/License(s)

CA PE No. 88525
MS Civil and Environmental Engineering
BS Mechanical Engineering

Commitment: 50%

Mark McGinnis, GISP
GIS/Survey Technical Advisor

Qualifications

- 19 years of experience in geospatial technologies and application development
- Experience includes database development and management, spatial analysis, spatial model building, and online Web and mobile applications
- He has also provided needs assessments and as-needed GIS services to municipalities and agencies.

Related Experience

- As Needed GIS Services, Indio Water Authority
- As Needed GIS Services, Ramona Municipal Water District
- Sewer Master Plan, City of Chino
- Wastewater Master Plan Update and EIR, City of Vista
- As Needed GIS Services, City of Indian Wells

Education/License(s)

Certified GIS Professional, No. 00060883
MA Geography
BA Geography

Commitment: 30%

Steve Hochart
GIS/Survey Technical Advisor

Qualifications

- 20 years of experience in mapping and survey consulting
- Managed various projects ranging from mapping/survey to database/system implementation and feasibility studies to vegetation and stream mapping, species modeling, and reserve planning.
- Extensive experience in IT and strategic master planning, compliance monitoring, land use permitting, and GIS analysis and mapping

Related Experience

- Asset Management Design and Implementation, City and County of Honolulu
- IBM Maximo Implementation and Custom Mapping Application, City and County of Honolulu
- Pavement Management System Implementation, City and County of Honolulu

Education/License(s)

BA Geography

Commitment: 30%

Section 5 / Quality Control

Beginning the project with a clear understanding and vision of the end is critical to managing a project's quality, scope, and schedule for success. We are currently within the COVID-19 pandemic, however the Dudek team is well-prepared and offers a number of tools to facilitate efficient, productive virtual collaboration with the District. The following are several project management advantages the Dudek team will provide to achieve the project goals and objectives.

Define Critical Success Factors and Project Management. The critical success factors are unique to every project and every client and represent Dudek's barometer of how we are performing towards meeting the expectations of the District. Meeting your critical success factors requires effective project management. The project management sections below provide further detail in the specific project management tools, planning, communication, procedures, and processes Dudek uses for managing the workflow, quality control and completion of projects.

Communication. Beginning at the Kickoff Meeting, Dudek will clearly outline the project work plan, schedule, budget, and communication process with the project team so that all parties have a uniform understanding of roles, responsibilities, requirements, stakeholders, deliverables, objectives, and goals. During the project, Dudek will communicate regularly with the District providing monthly written progress reports, email documentation of verbal direction, and conference calls with the District's Project Manager.

Monitoring/Controlling: Project schedule, budget and progress are monitored by earned-value schedules and budget tracking. The tracking system uses the project Work Breakdown Structure (WBS), combined with the project schedule to map the estimate the projected accumulation of cost from beginning to end, referred to as the Base Line. As the project advances, the project manager communicates with the team on a regular basis to evaluate each task for completion, and compares total earned value to project billings to establish a highly accurate budget status at any point in the project.

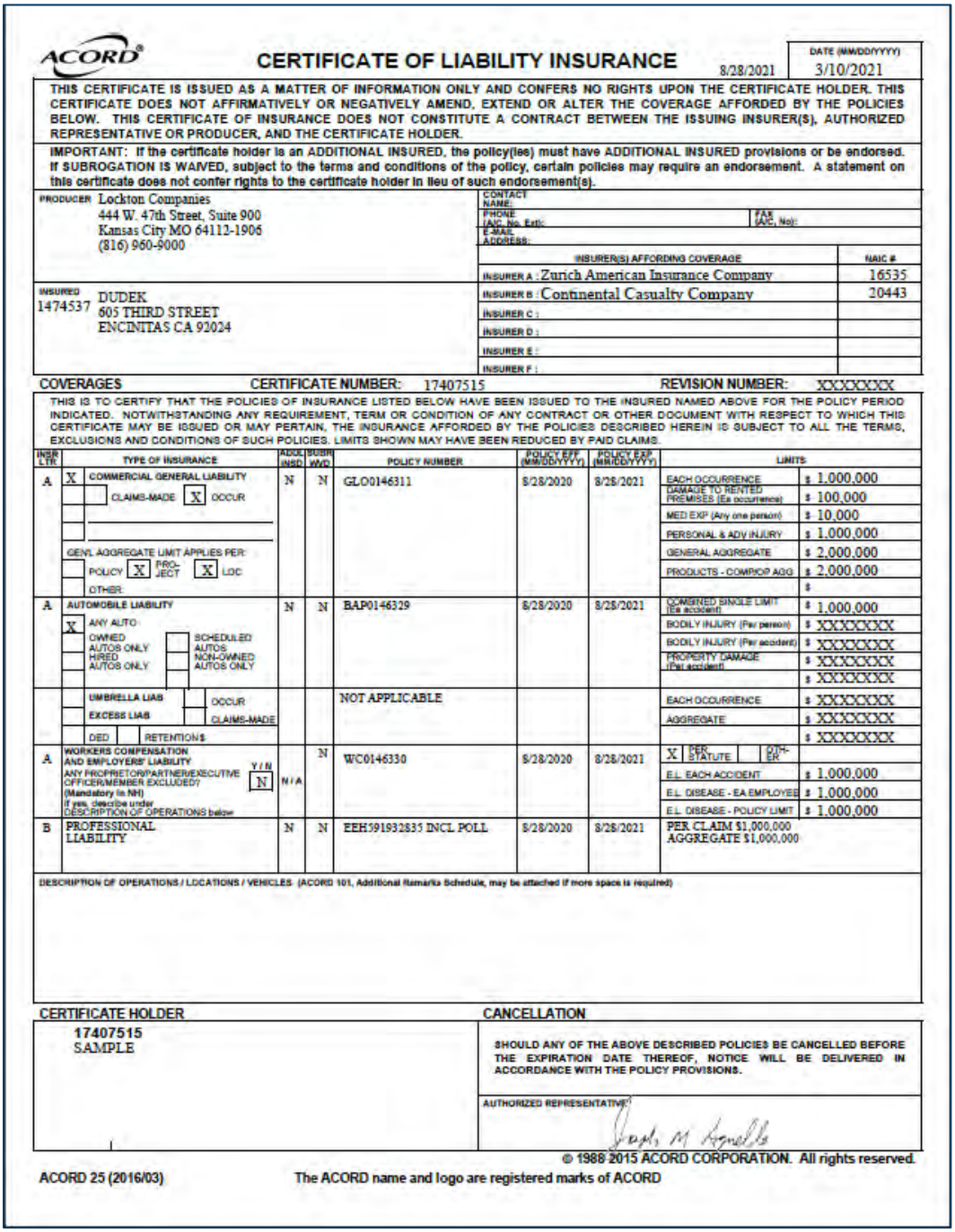
Quality Control. Our Project Manager and Quality Control Manager are responsible for quality assurance and monitoring the completion of quality control reviews. The quality control review for specific project elements is delegated to senior staff with expertise in the project scope elements. Application of proven project management and quality review principles assures that client satisfaction is improved, project quality is improved, and cost savings realized.

Management of Sub-Consultant QA/QC. Dudek works to build strong relationships with sub-consultants who work to the same levels of excellence and quality Dudek expects from our own employees. We view our sub-consultant as an extension of our staff, and as such, we review their work under our QA/QC program for interdisciplinary coordination and require that they conduct independent technical reviews of all deliverables.

Section 6 / Insurance

Dudek has reviewed the District's Professional Services Agreement is able to comply and provide professional liability and errors and omissions insurance as stated.

We have included our standard hourly rates in **Appendix B.**



ACORD

CERTIFICATE OF LIABILITY INSURANCE 8/28/2021

DATE (MM/DD/YYYY): 3/10/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER: Lockton Companies, 444 W. 47th Street, Suite 900, Kansas City MO 64112-1906, (816) 960-9000

CONTACT NAME: | PHONE (A/C, No, Ext): | FAX (A/C, No): | E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Zurich American Insurance Company	16535
INSURER B : Continental Casualty Company	20443
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED: 1474537 DUDEK, 605 THIRD STREET, ENCINITAS CA 92024

COVERAGES CERTIFICATE NUMBER: 17407515 REVISION NUMBER: XXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY	N	N	GLO0146311	8/28/2020	8/28/2021	EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
							MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY	N	N	BAP0146329	8/28/2020	8/28/2021	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$ XXXXXXX
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$ XXXXXXX
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$ XXXXXXX
								$ XXXXXXX
	UMBRELLA LIAB OCCUR			NOT APPLICABLE			EACH OCCURRENCE	$ XXXXXXX
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$ XXXXXXX
	DED RETENTION $							$ XXXXXXX
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N		N	WC0146330	8/28/2020	8/28/2021	X PER STATUTE OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N	N/A					E.L. EACH ACCIDENT	$ 1,000,000
	(Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
B	PROFESSIONAL LIABILITY	N	N	EEH391932835 INCL POLL	8/28/2020	8/28/2021	PER CLAIM $1,000,000 AGGREGATE $1,000,000	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER: 17407515 SAMPLE

CANCELLATION: SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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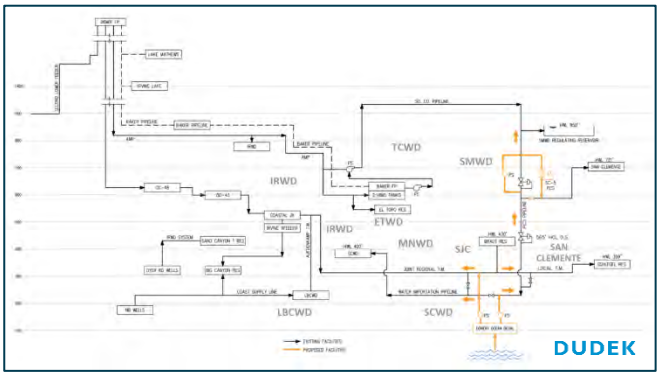
Section 7 / Experience

Expertise and Demonstrated Experience

Our Project Team will be a resource for you, in any form of a support role, to help develop and implement your strategic plan for water supply in Orange County. We pride ourselves in bringing value-added service to the District.

Our Project Manager, Bob Ohlund, is experienced in the development of creative solutions and implementation of projects by working closely with District Staff, facilitating discussion of issues and "brainstorming" potential solutions. Mr. Ohlund's 38-year career has been rooted in Orange County water agencies' issues. From master planning and design of water facilities to positions as District Engineer working closely with Management and Boards of Directors, Bob's experience is offered as a resource to implementing MWDOC's strategic plan.



Orange County Water Supply Transmission System Schematic

Our team understands the specific issues affecting water supply in Orange County including the following:

Water Demands

All water planning of infrastructure and supplies begins with realistic water demands. Projections are a key to implementing the MWDOC reliability strategies in a cost-effective manner.

South OC Reliance on MWD imported water supplies

MWD imported water supply fueled the development of Orange County, especially South Orange County. Now, sustainability and reliability of cost-effective sources of supply are the overarching focus to the MWDOC strategic plan.

PFAS Contamination in the Orange County Groundwater Basin

The Orange County Groundwater Basin has been an invaluable water resource for both typical supply as well as storage to accommodate seasonal variations, drought conditions and emergency supply in the event imported water supplies are curtailed. The discovery of PFAS in the groundwater has had a significant impact, especially on northern Orange County agencies such as Yorba Linda Water District that overnight had to shift to reliance on nearly 100-percent imported water. OCWD has led the way in developing treatment recommendations and funding assistance.

OCWD Groundwater Augmentation

The Orange County Water District Groundwater Replenishment System is a world leader in potable reuse with groundwater augmentation in the Orange County Groundwater Basin. As GWRS has expanded, OCWD has now looked to the possibility of ocean desalination with the proposed Poseidon project in Huntington Beach. While excellent projects to secure water reliability in north Orange County, these projects do introduce challenges for base loading of more expensive water supply and possibly forgo recharging free stormwater as a consequence in the name of reliability.

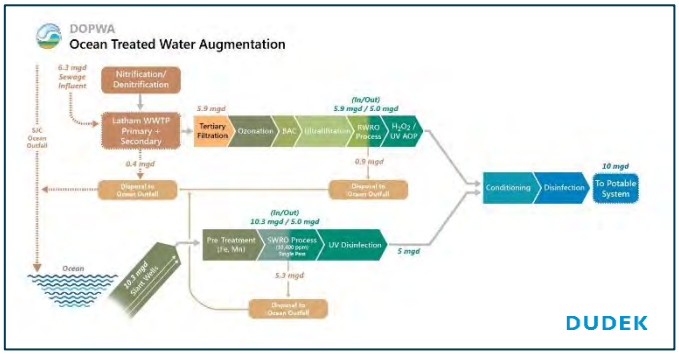
West Orange County Groundwater Leakage to the North

As OCWD fills the OC Groundwater Basin, increase leakage out of the basin toward Los Angeles can occur. Development of wells in the west part of the basin will help facilitate maximizing the amount of

water that can be stored in the OC Basin as well as retain this local supply in Orange County.

Groundwater, Surface Water, Raw Water and/or Treated Water Augmentation Planning

California Department of Water Resources has a target date of the end of 2023 to develop regulations and requirements for potable reuse. Currently, Groundwater Augmentation and Surface Water Augmentation applications are permitable. However, the new 2023 regulations will additionally address Raw Water Augmentation and Treated Water Augmentation. Member agencies are beginning to plan for these new regulations that will allow creation of a new, local water supply.



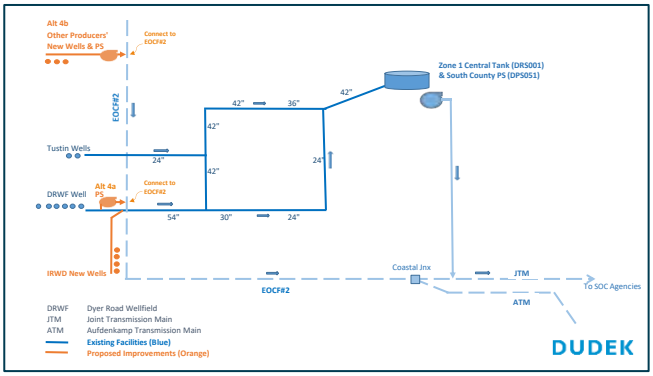
Example of ocean treated water augmentation flow schematic

Economics and Local Control of Developing Local Supplies and Reducing Dependence on MWD Imported Supplies and, therefore, Reducing Dependence on the Delta

The State, under encouragement of the environmental community, continue to apply pressure and inducements to reduce dependence on the Northern California Delta. Complementary to this, local MWDOC and other MWD agencies are motivated to reduce dependence on imported supplies for economic and reliability concerns. MWD will be impacted by reduced reliability and use of their system. In addition to stranded assets (discussed below), an interesting condition is developing where MWD's rates are increasing due to the reduced use of their supply, and this increase of rates is further incentivizing agencies to reduce their reliance on MWD.

Emergency Supply in the Event of a Scheduled or Unscheduled Diemer Plant Shutdown, or other Transmission System Shutdowns due to Seismic Events, Power Outages or Manmade Events

As Southern California has developed and increase its need for water supply, MWD's supply has evolved from its promises about 70 years ago in the "Laguna Declaration" to provide unlimited water supply to each member agency's boundary to providing water supply when available. While MWD has done and excellent job in increasing the available water supply, this now obsolete guarantee, for lack of better terms, has changed the complexation of member agency strategic water planning.



Schematic showing conveyance of GW to So. Orange County Water Agencies

Emergency Conveyance of Orange County Groundwater Basin supply to South Orange County Agencies utilizing IRWD's system, EOCF#2, Joint Transmission Main, South County Pipeline, Aufdenkamp Transmission Main, Coast Supply Line and the Water Importation Pipeline

South Orange County water agencies must increase their emergency water supply due to their nearly complete dependence on imported water. Alternative water supplies such as ocean desalination and potable reuse are possible however costly and represent another challenge in base-loading supplies to meet demands. The OC Groundwater Basin represents a potential solution for emergency supply. However, both required infrastructure and administration of supplies are complicated due to groundwater ownership. Transmission mains such as EOCF#2 and the JTM are physically available and represent what may be a cost-effective solution, control of water quality (MWD issues) and capacity ownerships (pipeline ownership) must be resolved.

MWD Regional Recycled Water Program Conveyance and Supply Options to Orange County

MWD has extensive planning to reduce discharges of treated sewage to the ocean and increasing recycle water and potable reuse as a new supply. Of course, this new supply will benefit Los Angeles County agencies, MWD is also considering the extension of this potable reuse supply to Orange County, perhaps for recharge in the OC Groundwater Basin.

Shift of Base-Loading of Supplies

As new, local supplies are developed based on consistent, 24/7/365 operation, base loading of supplies from MWD imported supplies to local groundwater, Baker Filtration Plant as well as planning for future ocean desalination in Huntington Beach (Poseidon) and Dana Point (SCWD Doheny Plant, Groundwater Augmentation in SJC (SMWD), Doheny Ocean Pure Water Augmentation Concept (SCWD), and others.

Stranded Assets

The possibly significant effect of the above issues and projects creating stranded assets in the MWD system represent unintended consequences that could come back to affect MWDOC member agencies associated with water quality issues and cost of service from MWD. MWDOC is looking to evaluate these effects and unintended consequences to incorporate into local project planning. While stranded assets can be a negative issue, the freed-up capacity in these facilities may be the yang to their yin. Opportunities will likely present themselves more realistically in the near future as MWD better accepts the impact of local projects being planned and implemented that free up capacity in their transmission system. The existing transmission system, with stranded capacities, may be effective elements to local water supply projects to assist water reliability in Orange County plus mitigate MWD's water quality issues and acceptable funding of O&M costs.

Groundwater Banking and Conjunctive Use

Mr. Ohlund led the Dudek team in working with the SAWPA member agencies' original, conceptual design of the Santa Ana River Conservation and Conjunctive Use Program (SARCCUP). This CUP is intended to recharge and bank excess SWP supply in wet years for use in local dry years. This initiation of a local conjunctive use program required intensive coordination and collaboration of the General Managers and their Staffs of OCWD, EMWD, WMWD, IEUA and SBVMWD as well as SAWPA to develop the SARCCUP concept and prepare the successful Prop 84 grant application obtaining $55 million in funding.

Appendix A

Resumes

Bob Ohlund, PE / Vice President & Project Manager

Bob Ohlund is Vice-President of Dudek, with 38 years' engineering consulting experience focused on developing creative and sustainable solutions for public infrastructure. Mr. Ohlund is an expert in wastewater, water, and recycled water resource projects, serving in program management, project management, and construction management roles. His leadership in planning, design and construction of new facilities and rehabilitation of existing facilities has culminated in many successful projects.

Bob Ohlund, PE

Education

University of Southern California
BS, Civil Engineering, 1983

Certifications

Professional Civil Engineer (PE), CA No. 41006

Commitment

50%

District Engineering Services, South Orange County. Mr. Ohlund provided district engineering services for: Baker Pipeline, Santiago Aqueduct Commission; Joint Transmission Main (JTM), TCMWD/South Coast Water District; Los Alisos Water District and South Coast Water District

South County Hydraulic Modeling Analysis, Irvine Ranch Water District, Irvine, California. Project Manager for this study evaluating the amount of Orange County Groundwater Basin groundwater that IRWD can safely deliver via the South County pipelines while having minimal or negligible negative impacts on IRWD system performance. The objective of this analysis was to determine how the existing IRWD system, under existing demand conditions, would handle delivery of flows to South County agencies during two specific MWD outage and demand scenarios.

Second Lower Cross Feeder Study and Construction Cost Estimate, Municipal Water District of Orange County, Orange County, California. Project Manager for an evaluation of an alternative and construction cost estimate to construct a "cross feeder" in North Orange County's transmission system to provide additional water supply reliability to South Orange County water agencies.

On Call Systems Evaluations, Computer Modeling and Analysis, Irvine Ranch Water District, Irvine, California. Project Manager providing on-call systems analysis for the District's Potable, Non-Potable and Sewer Systems. These services include computer network modeling and specific area analysis to evaluate potential changes in operations, improvements to existing systems and analysis of new development requirements. Dudek is well versed in the IRWD computer models and systems' operation, as well as having an excellent working relationship on assignments sometimes similar to an extension of the District's staff.

Conceptual Design for SARCCUP and Grant Application, San Bernardino Valley Municipal Water District, San Bernardino County, California. Project manager for the implementation of the Santa Ana River Watershed Scale Conjunctive Use project. The work consisted of establishing goals for wet-year recharge and dry-year extraction, while comparing the Agencies' goals with their existing facilities to identify gaps, including any new facilities required to achieve their planned recharge and extraction goals

CVWD-SMWD Water Transfer Pilot Conceptual Design, Santa Margarita Water District, Santa Margarita, California. Project Manager to develop a conceptual approach for conveyance of recycled water supply from Cucamonga Valley Water District (CVWD) to Santa Margarita Water District (SMWD). The alternative includes delivery of recycled water produced by IEUA on CVWD's behalf through the Santa Ana River, with groundwater then transferred via Irvine Ranch Water District's or MWDOC's systems.

Elizabeth Caliva, PE / Lead Engineer

Elizabeth Caliva, PE

Education

University of California, Berkeley
MS, Water Resources and Water Quality Engineering, 2003
BS, Environmental Engineering, 1999

Certifications

Professional Civil Engineer (PE), CA No. 64331

Commitment

50-100%

Elizabeth Caliva specializes in water, wastewater and recycled water planning and design. In addition to hydraulic modeling and master planning, she has performed a variety of tasks pertaining to odor control, treatment plant design, lift station design, and sewer pipeline design. Ms. Caliva has served in the Project Engineer and Project Manager roles, developing and operating water, recycled water, and wastewater hydraulic models for numerous master plan and on-call modeling projects. She is experienced in GIS-based and stand-alone hydraulic modeling software including **InfoWater**, InfoSewer, InfoSWMM, H2O Map Water, H2O Map Sewer. Her tasks also included database and GIS development, model development, model calibration, results analysis, improvement recommendations/CIP development, report preparation and coordination with water district/city staff.

Consequence of Failure Analysis (CoFA), South Coast Water District, Dana Point, California. Lead engineer. The CoFA is being performed in two parts. Part 1 included a software analysis by Sedaru to rank each pipeline based on available GIS input data, including number of valves needed to isolate, number of customers impacted, length of pipe affected, volume of water impacted, and number of pipes that need flushing. Each pipeline was assigned a criticality factor, ranging from 1 to 100, with higher values indicating higher consequence of failure. Part 2 includes augmentation of the criticality factor using a global fire flow analysis in the District's current hydraulic water model. The results of the two analysis will be compiled to create a list of the pipelines with the highest consequence of failure and recommendations for each result to aid the District in future infrastructure improvement planning.

South County Hydraulic Modeling Analysis, Irvine Ranch Water District, Irvine, California. Modeler for this study evaluating the amount of Orange County Groundwater Basin groundwater that IRWD can safely deliver via the South County pipelines while having minimal or negligible negative impacts on IRWD system performance. The objective of this analysis was to determine how the existing IRWD system, under existing demand conditions, would handle delivery of flows to South County agencies during two specific MWD outage and demand scenarios.

On Call Systems Evaluations, Computer Modeling and Analysis, Irvine Ranch Water District, Irvine, California. Modeler/Task Manager providing on-call systems analysis for the District's Potable, Non-Potable and Sewer Systems. These services include computer network modeling and specific area analysis to evaluate potential changes in operations, improvements to existing systems and analysis of new development requirements. Dudek is well versed in the IRWD computer models and systems' operation, as well as having an excellent working relationship on assignments sometimes similar to an extension of the District's staff.

Conceptual Design for SARCCUP and Grant Application, San Bernardino Valley Municipal Water District, San Bernardino County, California. Project engineer for the implementation of the Santa Ana River Watershed Scale Conjunctive Use project. The work consisted of establishing goals for wet-year recharge and dry-year extraction, while comparing the Agencies' goals with their existing facilities to identify gaps, including any new facilities required to achieve their planned recharge and extraction goals

Gregory Guillen, PhD, PE/ Water Quality

Dr. Guillen is a chemical and environmental engineer focused on water and wasterwater treatment. Dr. Guillen's education covered the fundamentals of chemical and environmental engineering with an emphasis on water and wastewater treatment. His graduate work focused on advanced membrane materials and processes for separations including those found in water and wastewater treatment. Dr. Guillen has authored several peer-reviewed papers in the field of desalination and membrane filtration, holds multiple patents for membrane formation, and has lectured in the Department of Civil and Environmental Engineering at UCLA. Dr. Guillen has 10 years of experience designing water and wastewater treatment processes as well as odor control systems.

Greg Guillen

Education

University of California, Los Angeles
MS, Civil Engineering
PhD, Civil Engineering

University of California, Riverside
BS, Environmental Engineering

License

Professional Civil Engineer
CA No. 83897

Commitment

20%

Chlorine Contact Tank Tracer Study at Harmony Grove Village Water Reclamation Plant, TC Construction Company, Inc., Santee, California. Dr. Guillen served as project manager and developed a protocol for conducting a tracer study on a chlorine contact basin at Harmony Grove Village WRP. Dr. Guillen provided technical oversight for multiple successful tracer studies performed using Rhodamine WT dye. Dr. Guillen led coordination between the Division of Drinking Water and the facility contractor (TC Construction). A report was developed with findings on chlorine contact tank performance and was submitted to DDW for permitting.

Chlorine Contact Basin Tracer Study at Water Recycling Facility, Western Municipal Water District, Riverside, California. Dr. Guillen developed a protocol for conducting a tracer study on a chlorine contact basin at WMWD's WWRF. Dr. Guillen provided technical oversight of a successful tracer study performed using Rhodamine WT dye and an in the field dye measurement device. A report was provided to WMWD to summarize the study findings.

San Jacinto Valley Enhanced Recharge and Recovery Program, Eastern Municipal Water District, San Jacinto, California. Dr. Guillen created the preliminary design for a centralized iron, manganese, and nitrate treatment system. Several new wells were considered for returning to service, all of which exceeded drinking water quality standards for iron, manganese, and/or nitrate. Dr. Guillen designed a treatment system to bring all of these constituents to below their MCLs without the need for costly ion exchange or reverse osmosis.

Water Reclamation Facility Chloride Discharge Limits, Confidential Client, Ventura County, California. Dr. Guillen has analyzed existing influent/effluent water quality and flows and researched potential sources of chloride at a Ventura county WRF. In addition, Dr. Guillen has examined and selected appropriate chloride reduction technologies and is currently sizing and designing a desalination process that will allow the WRF to meet its chloride discharge requirements. Brine reduction and disposal options are currently being evaluated.

Neil Harper, PE / Pump Stations/Valves

Neil Harper is a certified professional engineer (PE) with 21 years' experience in project management, engineering, planning, design, and construction support services for a variety of municipal and public agency clients. Specific areas of practice include water, wastewater, and water reuse systems, and relevant experience includes water distribution and treatment facilities, pumping facilities, and reservoirs.

He successfully manages projects and communicates regularly with clients to develop a thorough understanding of the project and the client's needs. Mr. Harper focuses on tracking project milestones and their relation to the project schedule and budget, allowing for ongoing knowledge of project status.

Neil Harper, PE

Education

California Polytechnic State University, San Luis Obispo
BS, Bio-Resource and Agricultural Engineering

Certifications

Professional Civil Engineer (PE), CA No. C63288

Professional Affiliations

Orange County Water Association, 2002–present; Board of Directors (2014–2017); President (2017)

American Society of Civil Engineers

Project Experience

16th Street Pump Station Backup Generator and Upgrades Project – Phase 2 (2020), City of Newport Beach, Orange County, California. Served as project manager for preliminary design and final design for the addition of a 1,000-kilowatt generator and replacement of three constant-speed, 1,200 RPM, 350 hp vertical turbine booster pumps with three variable-speed, 1,800 RPM, 300 hp pump assemblies.

16th Street Pump Station Upgrades – Phase 1 (2014), City of Newport Beach, Orange County, California. Served as project manager for preliminary design, final design, and construction support services for replacement of two constant-speed, 1,200 RPM, 350 hp vertical turbine booster pumps with two variable-speed, 1,800 RPM, 300 hp pump assemblies. The new VFDs at each well site were 400 hp and 250 hp, and allowed the wells to pump at a constant rate without the use of a pulsed flow control-type diaphram check valve. The purpose of this project was to reduce energy consumption and was partially paid for with SCE rebates.

E Reservoir Replacement and Pump Station, Vista Irrigation District, City of Vista, San Diego County, California. Served as project manager for the preliminary and final design of the E Reservoir pump station and replacement of the existing E Reservoir. As part of the E Reservoir replacement project, a new pump station was designed on the E Reservoir site that conveys water from the 752 Zone to the 984/976/900 zones. Multiple analyses and scenarios were modeled that concluded with the recommendation for a 3,000 gpm pump station composed of five duty and one standby 50 hp pumps situated within a 35- by 25-foot CMU building and operated with VFDs.

Ontario Potable Water Booster Pump Station, City of Corona, Riverside County, California. Served as project manager for design of 25-million-gallon-per-day booster pump station facility that included six 2,500 gpm, 200 hp vertical turbine pumps (Zone 3 pump station); three 1,250 gpm, 200 hp vertical turbine pumps (Zone 4 pump station); surge and flow metering facilities; facility piping (12 to 30 inches in diameter); nitrate blending facilities; nitrate sampling and analyzers; flow control and pressure-reducing valve vault; 750-kilowatt emergency generator set; 3,000 amp electrical service; two motor control centers, which included nine 200 hp VFDs; pump station controls, PLC/SCADA system; fiber-optic telemetry; and miscellaneous site upgrades.

Michael Metts, PE / Engineering / Pipelines

Michael Metts is a principal engineer and manager of Dudek's engineering services with 37 years' experience in civil engineering and is a registered engineer in the State of California. Mr. Metts' engineering experience encompasses water, wastewater and recycled water engineering design, permitting, water resources planning, facility design, and construction management and assistance. He has provided project management and principal in charge services throughout the southwestern United States. Mr. Metts' project experience encompasses the evaluation and expansion of existing facilities as well as the design of new facilities, allowing him to anticipate project challenges, to the benefit of his clients. He is committed to maintaining clear and open communication with the client, while maintaining control of the project budget and schedule, as well as proactively delivering cost-effective and innovative project solutions.

Michael Metts

Education

University of Kentucky
BS, Civil Engineering, 1983

License

Professional Civil Engineer (PE), CA No. 42586

Commitment:

20%

Chino Product Water Pipeline Horizontal Directional Drilling Crossing of the Santa Ana River, Chino Basin Desalter Authority, Norco, California. Principal Engineer for design of approximately 1,500 lineal feet of new 30-inch diameter CML&C welded steel water pipeline and 36-inch DR9 HDPE pipeline and appurtenances, including a 1,000-lineal-foot crossing beneath the Santa Ana River.

Anaheim South Recycled Water Project, City of Anaheim, California. Project manager and Principal in Charge for the preliminary design report which will form the basis of the final design documents leading to the construction of new City recycled water infrastructure, including a new GWRS pipeline connection structure, recycled water pump station, and ultimately 10.5 miles of recycled water conveyance pipelines.

Santa Ana Watershed Project Authority, Inland Empire Brineline Reach V Rehabilitation and Improvements, Riverside, California. Serves as the project manager and Principal in Charge providing new assess structures to Reach V of the Inland Empire Brine Line, as well as CIPP lining of approximately 23,000 linear feet of 24-inch PVC pipeline.

Chino II Desalter – Riverside/Hamner, Chino Desalter Basin Authority, Chino, California. Project manager for the design of a new 11,000-foot alignment of 30-inch-diameter welded steel pipe within the City of Eastvale and the City of Jurupa Valley to connect to the new product water pipeline.

Yucaipa Valley Water District Phase I Non-Potable Water Distribution System, Yucaipa, California. Served as project manager for Phase I of the Yucaipa Valley Water District's Non-Potable Water Distribution System. Engineering services included preparing of a preliminary design report, completing final design documents, and subsequent construction services. The project focuses on the physical facilities needed for transport and delivery of both raw and recycled water to recycled water customers, as well as a proposed wetlands habitat. The project includes definition of facilities for environmental review and construction within jurisdictional timelines. Phase 1A has recently completed construction and included 3,600 linear feet of 24-inch pipeline and 5,700 linear feet of 12-inch pipeline. Phase 1B consists of 12-inch and 24-inch ductile iron pipe and appurtenances.

Kate Palmer, PE / Engineering / Pipelines

Kate Palmer is a professional engineer with 18 years' experience. Ms. Palmer's engineering responsibilities include project engineering and management; systems analysis, modeling, and planning; and design of water, wastewater, and reclaimed water facilities. Ms. Palmer is experienced in computational hydraulics and environmental fluid mechanics; design and modeling of water, wastewater, and recycled water distribution systems; physical and chemical processes in water; and wastewater treatment plant design. She is knowledgeable in computer-based hydraulic modeling using InfoWater, InfoSewer, InfoWorks, InfoSWMM H2O Map Water, H2O Map Sewer, and geographic information systems (GIS) using Environmental Systems Research Institute (ESRI) ArcView 10.0 SP4, ESRI ArcGIS Desktop 10.0 SP4, and Autodesk Map 3D 2012.

Kate Palmer

Education

Stanford University
MS, Civil and Environmental Engineering, 2003

Michigan State University
BS, Biosystems Engineering, 2001

Certifications

Professional Civil Engineer (PE), CA No. 68695

Commitment

30%

El Monte Water Transmission Pipeline Rehabilitation, City of San Diego, California. Ms. Palmer oversaw the design of rehabilitation measures for Segment 2, including repairs to over 6 miles of 68-inch-diameter reinforced concrete steel cylinder pipe, constructed in the mid-1940s.

El Mirlo 30-inch Transmission Main Repair, San Dieguito Water District, Rancho Santa Fe, California. Served as project manager. Responsible for completion of design of repairs of the San Dieguito Water District's 30-inch cement mortar lined and coated welded steel pipe transmission main within El Mirlo in Rancho Santa Fe.

54-Inch Central Intertie Pipeline Improvements, Moulton Niguel Water District, Laguna Niguel, California. Served as senior engineer for design improvements to the District's 54-inch cement mortar lined and coated welded steel pipe Central Intertie Pipeline, which delivers over half of the total imported potable water by the district.

42-Inch Los Coches Reservoir Inlet Pipe Repair Project, Padre Dam Municipal Water District, Santee, California. Served as the senior engineer for the design of repairs to the 42-inch concrete cylinder pipe (CCP) bringing water to the Los Coches Reservoir, in a location where the existing pipeline is approximately 20 feet deep and within the water table.

Chino Product Water Pipeline Horizontal Directional Drilling Crossing of the Santa Ana River, Chino Basin Desalter Authority, Norco, California. Served as project manager for the design of approximately 1,500 linear feet of new 30-inch diameter cement mortar lined and coated welded steel water pipeline and 36-inch DR9 high density polyethylene (HDPE) pipeline and appurtenances, including a 800 linear foot crossing beneath the Santa Ana River using HDD.

Chino II Riverside Product Water Pipeline Project, Chino Basin Desalter Authority, Eastvale/Jurupa Valley, California. Served as a project engineer for the alignment analysis and design of approximately 2 miles of new 30-inch diameter cement mortar lined and coated welded steel water pipeline and appurtenances for the Chino Desalter Phase 3 expansion to complete connection from Hamner Avenue, along Riverside, to the Chino II Desalter Facility.

Greg Ripperger, PE/ Computer Modeling

Greg Ripperger is a project manager with 12 years' professional experience as a water engineer specializing in master planning, water system design, construction management, and hydraulic modeling.

Mr. Ripperger has worked as a project manager and as a project engineer for the U.S. Army Corps of Engineers and other local consulting firms. Mr. Ripperger works with clients to quickly understand and solve their water/wastewater issues throughout a wide range of projects. He thrives in managing complex projects with unique solutions.

Greg Ripperger

Education

Oklahoma State University
BS, Civil Engineering, 2008
Cum Laude, Honors

Certifications

Professional Engineer, CA No. 79499; AZ No. 67991

Water Audit Validator, American Water Works Association

Professional Affiliations

American Water Works Association

Southern California Water Utilities Association

2020 Water Master Plan and Rate Study, City of Covina, California. Served as project manager. Completed a full review of the City of Covina's water system, including a full asset condition assessment, system analysis, water model update, and water rate study (conducted in coordination with Raftelis). Compiled and prioritized the projects identified to establish a 5-year capital improvement plan. Presented the recommendations of the Water Master Plan and Rate Study to the Covina City Council for adoption. The Water Master Plan was finalized in July 2020, and the Rate Study was finalized and implemented in February 2021.

2020 Water Master Plan Update, City of Brea, California. Served as project manager. Completed a thorough update of the City of Brea's 2009 Water Master Plan, which included updating supply and demand projections, reviewing buildout projections, and re-analyzing all the system's assets. Worked with Psomas to rebuild the City's geographic information system database and water model based on existing as-builts. Compiled a detailed capital improvement plan based on analyses performed, evaluation of operational issues, and review of previous Master Plan capital improvement programs. Prioritized projects, created cost estimates, and developed individual project descriptions for the capital improvement plan. The draft report was completed in December 2020.

2017 Water Master Plan, San Antonio Water Company, Upland, California. Served as project manager. Performed analysis on the San Antonio Water Company's two separate distribution systems: retail potable water to San Antonio Heights and wholesale irrigation water. The irrigation system is a complex system that sells water to other water agencies through direct connections and groundwater basin recharge. The purpose of the Water Master Plan was to analyze both systems to identify necessary infrastructure improvements. It also included facilitating and implementing a strategic plan within the organization to provide a company-wide vision for the future. The Company is a stakeholder-owned water mutual company that includes the City of Upland, Inland Empire Utilities Agency, several water agencies, and the residential and commercial customers on the retail side. The Water Master Plan was published in December 2017.

Loma Linda Pipeline Upgrade, City of Beverly Hills, California. Served as project manager. Designed an 8-inch replacement of approximately 1,500 linear feet of pipeline in Loma Linda Avenue to improve fire flow to the area. The winding, narrow residential street had multiple buried utilities and a sewer line that zigzagged through the street. The design required careful alignment of the water line as well as working with the Division of Drinking Water to obtain a waiver due to being unable to meet the water–sewer separation requirements.

Hanna Dodd, PE / Computer Modeling

Hanna Dodd is a project engineer focused on water resources and water and wastewater infrastructure. Her experience includes a large array of water and wastewater design analyses. She is experienced in computer based hydraulic modeling using InfoWater, InfoSewer, H2O Map Water, H2O Map Sewer and in Geographic Information System (GIS) using ESRI ArcView 10.0 SP4, ESRI ArcGIS Desktop 10.0 SP4 and Autodesk Map 3D 2012. Her project experience includes:

Hanna Dodd

Education

Stanford University
MS, Civil and Environmental Engineering, 2015

California Institute of Technology
BS, Mechanical Engineering, 2013

License/Certifications

Professional Civil Engineer (PE), CA No. 88525

Commitment

50%

InfoWater Model Update, Ramona Municipal Water District, Ramona, California. Project engineer. Ms. Dodd used operation staff's input and as-built drawings to update significant portions of Ramona Municipal Water District's (RMWD) InfoWater Model depicting the RMWD treated water system. The project calibrated the model to current conditions and modeled eight future demand scenarios.

InfoSewer Model Analysis, South Coast Water District, Dana Point, California. As project engineer, analyzed the South Coast Water District (SCWD) InfoSewer model to determine whether a proposed development's sewage generation would exceed the modeled future sewer flows in the Dana Point Town Center area. Ms. Dodd prepared a memo for SCWD summarizing her calculations and findings.

Sanitary Sewer Master Plan and Condition Assessment, City of Placentia, California. Project Engineer. Ms. Dodd created an InfoSewer model of the City of Placentia's sanitary sewer system to analyze how flows from future developments would affect the City's sanitary system capacity. The project included analyzing CCTV videos of the sanitary system to recommend areas for future capital improvement projects to fix pipes in poor condition. Ms. Dodd's findings were summarized in a master plan document.

San Jacinto Well Configuration, Eastern Municipal Water District, City of Perris, California. Served as project engineer to investigate the most cost-effective approach to conveying proposed well water to the Hewitt/Evans water treatment plant. Dudek was hired to develop six alternative pipeline configurations, prepare a hydraulic model to test system performance, and identify pipeline sizes. With pipe sizes and lengths determined, Dudek prepared a project alternative analysis with project costs to identify the preferred approach to constructing the pipeline network. The resulting recommended project totaled 15,500 linear feet of pipe with a project cost of $11 million. This recommendation provided the District with the information necessary to budget the land purchase and construction of the wells.

Development of a Water System Hydraulic Model, Moulton Niguel Water District, Laguna Niguel, California. Project engineer assisting the Moulton Niguel Water District in the development of the district's water system hydraulic model. The last water system master and hydraulic model was prepared over 10 years ago; as a result, the process associated with the custom hydraulic model was not retained through district staff and is no longer running due to error codes and settings. Dudek worked through the elements of the model, simplifying connectivity, nodes, and elements to address error codes. Once the model was running within 10% of current maximum day demand supervisory control and data acquisition data, a scenario from a previous simplified model alternatives analysis was replicated in the new full-system calibrated model.

Rachel Struglia, PhD, AICP / Environmental Technical Lead

Rachel Struglia is a principal and project manager with 22 years' experience preparing California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) documents in both the public and private sectors. Dr. Struglia is experienced in managing CEQA documents for large infrastructure projects and has completed program environmental impact reports (PEIRs) for Metropolitan Water District, Orange County Sanitation District, Riverside County Community College District, North Orange County Community College District, and Coast Community College District (CCCD). She has also managed general plan environmental impact reports (EIRs) and specific plans, as well as infill, residential, commercial, industrial, and school EIR projects.

Rachel Struglia

Education

University of California, Irvine
PhD, Environmental Analysis and Design, 1998

Arizona State University
MS, Justice Studies, 1993

University of Connecticut
BA, Anthropology, 1991

Certifications

American Institute of Certified Planners (AICP)

Commitment

30%

Facilities Master Plan PEIR, PS17-08, Orange County Sanitation District, Fountain Valley, California. Served as project manager to prepare a PEIR for the Sanitation District's 2017 Facilities Master Plan. The analysis covers projects included in a 20-year Capital Improvement Program to ensure that the Sanitation District can sustain its infrastructure, meet future regulatory requirements, and continue to provide a reliable service to the public. These include facilities at Reclamation Plant No. 1 in Fountain Valley and Treatment Plant No. 2 in Huntington Beach, the sewer collection system, and improvements at various pump stations. The project area spans 15 cities, as well as jurisdictional areas, in the County of Orange. The EIR is a combined Program/Project EIR, including 30 projects that are assessed at the project level and 45 at the program level. An innovative aspect of the project is an interactive project map and a web-based approach to public scoping developed by Dudek.

Distribution System Infrastructure Protection PEIRs, Metropolitan Water District of Southern California, Orange County and Western San Bernardino County, California. Served as project manager for two PEIRs for Metropolitan's Distribution System Infrastructure Protection Program. The contract included preparation of the Operations and Maintenance Manuals, biological surveys, assistance with permit applications, and preparation of the PEIRs for each region. The programmatic analysis addressed maintenance activities that are conducted on a recurring or as-needed basis within existing Metropolitan facilities. The PEIRs described each category of maintenance activities and identified capital projects, expected impacts, and avoidance and minimization measures applicable to each category of activities to minimize potential environmental impacts where practical.

On-Call Environmental Consulting Services, Los Angeles County Sanitation District, Whittier, California. Served as project manager for an on-call contract involving the completion of nine task orders, including a new stormwater capture basin at the Puente Hills Materials Recovery Facility, a compressed natural gas station upgrade project at the Puente Hills Materials Recovery Facility, a replacement facility at the Gardena Pumping Plant, visual simulations at the Calabasas Landfill, and the Joint Outfall "F" Unit 3A Trunk Sewer Rehabilitation Project. All projects were IS/MNDs except for the landfill project, which was visual simulations with a supporting memo.

Steven Hochart / Survey & Mapping Technical Advisor

Steven Hochart is a project manager with 20 years' mapping and surveying consulting experience. Mr. Hochart connects a diverse range of clients, including private companies, cities and counties, universities, and the military with the right mapping/surveying solutions to enhance project operations. He has managed various projects ranging from mapping/survey to database/system implementation and feasibility studies to vegetation and stream mapping, species modeling, and reserve planning.

Steven Hochart

Additionally, Mr. Hochart has extensive experience in IT and strategic master planning, compliance monitoring, land use permitting, and GIS analysis and mapping. He has managed large on-call contracts for state, municipal, and federal agencies across multiple lines of services for a diverse set of clients.

Education

University of California, Santa Barbara
BA, Geography, (Environmental Studies emphasis), 2001

City and County of Honolulu Fire Department Asset Management Design and Implementation, Hawai'i. As project manager/technology lead, was responsible for working with all project stakeholders in the City and County of Honolulu Fire Departments to create the first map-based asset management system for the city. The system was integrated with ESRI ArcServer and IBM Maximo platforms. The results enabled the fire department to view the location of all assets on the island of O'ahu.

IBM Maximo Implementation with Custom Mapping Application, City and County of Honolulu, Hawai'i. As project manager, was responsible for the implementation of the Maximo Asset Management System for the City and County of Honolulu. Managed the implementation team and was responsible for customer communication with all project stakeholders throughout the process of implementing the new system for the client. The final system utilized IBM's Maximo Asset Management system and a custom Environmental Systems Research Institute (ESRI) interface that enabled the users to create and process work orders using a custom map interface.

Pavement Management System Implementation, City and County of Honolulu, Hawai'i. As project manager/technology lead, was responsible for working with the project stakeholders to identify the requirements for a new pavement management system that would be used to plan for future capital improvement projects. Mr. Hochart then developed a technology solution for the city and county that met their requirements by using a suite of different "off the shelf" software solutions.

Super Ferry Feasibility Study, State of Hawai'i Harbor Division, Honolulu, Hawai'i. Served as project lead/geographic information system (GIS) analyst. Responsible for creating an infrastructure inventory for all of the harbors in the state of Hawai'i and creating a feasibility model to identify the harbors with highest suitability for accommodating the Hawai'i Super Ferry.

Mark McGinnis, GISP / GIS & Survey Technical Advisor

Mark McGinnis is Dudek's geographic information systems (GIS) group manager and has 19 years' experience in geospatial technologies and application development in both the private and public sectors. Mr. McGinnis has been responsible for project management and coordination, application development, software integration, spatial modeling/analysis, best practices initiatives, data development, and map production. His experience includes database development and management, spatial analysis, spatial model building, and online Web and mobile applications.

Mr. McGinnis has assisted in the preparation of habitat conservation plans (HCPs), biological resources technical reports, and environmental impact reports (EIRs). He has also provided needs assessments and as-needed GIS services to municipalities and agencies. In addition, Mr. McGinnis has provided GIS support for numerous biological resources reports, wetlands permitting and jurisdictional delineation.

Mark McGinnis

Education

San Diego State University
MA, Geography (Geographic Information Science emphasis), 2001

University of California, Santa Barbara
BA, Geography (Geographic Information Science emphasis), 1998

Certifications

Certified GIS Professional (GISP), No. 00060883

FEMA Basic Hazards – U.S. Multi-Hazard

Commitment

30%

As-Needed GIS Services, Indio Water Authority, Indio, California. GIS Manager currently working with the Indio Water Authority (IWA) providing GIS support for their projects. This work also involves the City of Indio, as both agencies have similar data needs and data-sharing agreements. Developed a comprehensive Needs Assessment involving both agencies to assess the current environment, make recommendations, and develop an implementation plan. Dudek set up systems to help IWA edit and maintain their data, and set up replication between the IWA and the City of Indio. IWA employs Cityworks and Dudek assisted with fine tuning, and modifying as necessary, the application to optimize IWA's use of Cityworks. Other client and server-side programs and applications were developed to automate IWA's data production, maintenance, and workflow.

As-Needed GIS Services, Ramona Water District, Ramona, California. GIS manager working with the Ramona Water district for over two years providing a variety of GIS services. Work has involved as-needed data creation and analysis for various projects, as well as comprehensive GIS database management. Dudek built a web-based application in JavaScript and HTML 5 to view, edit, and analyze data. The application has query functions, data feature and attribute editing capabilities, and the ability to add attachments to data features. The application incorporates an ArcSDE database, and is hosted on Dudek's IT infrastructure. Dudek performs regular data updates, as well as technical application support.

Syphon Reservoir Project, Irvine Ranch Water District, Orange County, California. Served as principal GIS analyst supporting Irvine Ranch Water District in expanding the Syphon Reservoir. Technical studies include a geotechnical report and a California gnatcatcher focused survey report. Project involves developing numerous maps for stakeholders and consultants. A diverse suite of GIS layers has been developed to facilitate analysis of the project. Project has analyzed potential mitigation areas near Irvine Ranch Water District's existing reservoirs. Project is in progress.

Appendix B

2021 Standard Hourly Rate Schedule

DUDEK
2021 STANDARD SCHEDULE OF CHARGES

Engineering Services

Project Director	$295.00/hr
Principal Engineer III	$275.00/hr
Principal Engineer II	$265.00/hr
Principal Engineer I	$255.00/hr
Program Manager	$240.00/hr
Senior Project Manager	$240.00/hr
Project Manager	$235.00/hr
Senior Engineer III	$230.00/hr
Senior Engineer II	$220.00/hr
Senior Engineer I	$210.00/hr
Project Engineer IV/Technician IV	$200.00/hr
Project Engineer III/Technician III	$190.00/hr
Project Engineer II/Technician II	$175.00/hr
Project Engineer I/Technician I	$160.00/hr
Senior Designer	$180.00/hr
Designer	$170.00/hr
Assistant Designer	$165.00/hr
CADD Operator III	$160.00/hr
CADD Operator II	$150.00/hr
CADD Operator I	$135.00/hr
CADD Drafter	$125.00/hr
CADD Technician	$115.00/hr
Project Coordinator	$140.00/hr
Engineering Assistant	$120.00/hr

Environmental Services

Project Director	$245.00/hr
Senior Specialist IV	$230.00/hr
Senior Specialist III	$220.00/hr
Senior Specialist II	$200.00/hr
Senior Specialist I	$190.00/hr
Specialist V	$180.00/hr
Specialist IV	$170.00/hr
Specialist III	$160.00/hr
Specialist II	$145.00/hr
Specialist I	$130.00/hr
Analyst V	$120.00/hr
Analyst IV	$110.00/hr
Analyst III	$100.00/hr
Analyst II	$90.00/hr
Analyst I	$80.00/hr
Technician V	$100.00/hr
Technician IV	$90.00/hr
Technician III	$80.00/hr
Technician II	$70.00/hr
Technician I	$60.00/hr
Compliance Monitor	$95.00/hr

Data Management Services

GIS Programmer I	$185.00/hr
GIS Specialist IV	$160.00/hr
GIS Specialist III	$150.00/hr
GIS Specialist II	$140.00/hr
GIS Specialist I	$130.00/hr
Data Analyst III	$100.00/hr
Data Analyst II	$90.00/hr
Data Analyst I	$80.00/hr
UAS Pilot	$100.00/hr

Construction Management Services

Principal/Manager	$195.00/hr
Senior Construction Manager	$180.00/hr
Senior Project Manager	$165.00/hr
Construction Manager	$155.00/hr
Project Manager	$145.00/hr
Resident Engineer	$145.00/hr
Construction Engineer	$140.00/hr
On-site Owner's Representative	$140.00/hr
Construction Inspector III	$130.00/hr
Construction Inspector II	$120.00/hr
Construction Inspector I	$110.00/hr
Prevailing Wage Inspector	$135.00/hr

Hydrogeology/HazWaste Services

Project Director	$285.00/hr
Principal Hydrogeologist/Engineer II	$265.00/hr
Principal Hydrogeologist/Engineer I	$250.00/hr
Sr. Hydrogeologist IV/Engineer IV	$235.00/hr
Sr. Hydrogeologist III/Engineer III	$220.00/hr
Sr. Hydrogeologist II/Engineer II	$205.00/hr
Sr. Hydrogeologist I/Engineer I	$190.00/hr
Hydrogeologist VI/Engineer VI	$180.00/hr
Hydrogeologist V/Engineer V	$170.00/hr
Hydrogeologist IV/Engineer IV	$160.00/hr
Hydrogeologist III/Engineer III	$150.00/hr
Hydrogeologist II/Engineer II	$140.00/hr
Hydrogeologist I/Engineer I	$130.00/hr
Technician	$100.00/hr

District Management & Operations

District General Manager	$195.00/hr
District Engineer	$185.00/hr
Operations Manager	$160.00/hr
District Secretary/Accountant	$120.00/hr
Collections System Manager	$135.00/hr
Grade V Operator	$125.00/hr
Grade IV Operator	$110.00/hr
Grade III Operator	$100.00/hr
Grade II Operator	$75.00/hr
Grade I Operator	$70.00/hr
Operator in Training	$65.00/hr
Collection Maintenance Worker	$75.00/hr

Creative Services

3D Graphic Artist	$180.00/hr
Graphic Designer IV	$160.00/hr
Graphic Designer III	$145.00/hr
Graphic Designer II	$130.00/hr
Graphic Designer I	$115.00/hr

Publications Services

Technical Editor III	$145.00/hr
Technical Editor II	$130.00/hr
Technical Editor I	$115.00/hr
Publications Specialist III	$105.00/hr
Publications Specialist II	$95.00/hr
Publications Specialist I	$85.00/hr
Clerical Administration	$90.00/hr

Forensic Engineering – Court appearances, depositions, and interrogatories as expert witness will be billed at 2.00 times normal rates.

Emergency and Holidays – Minimum charge of two hours will be billed at 1.75 times the normal rate.

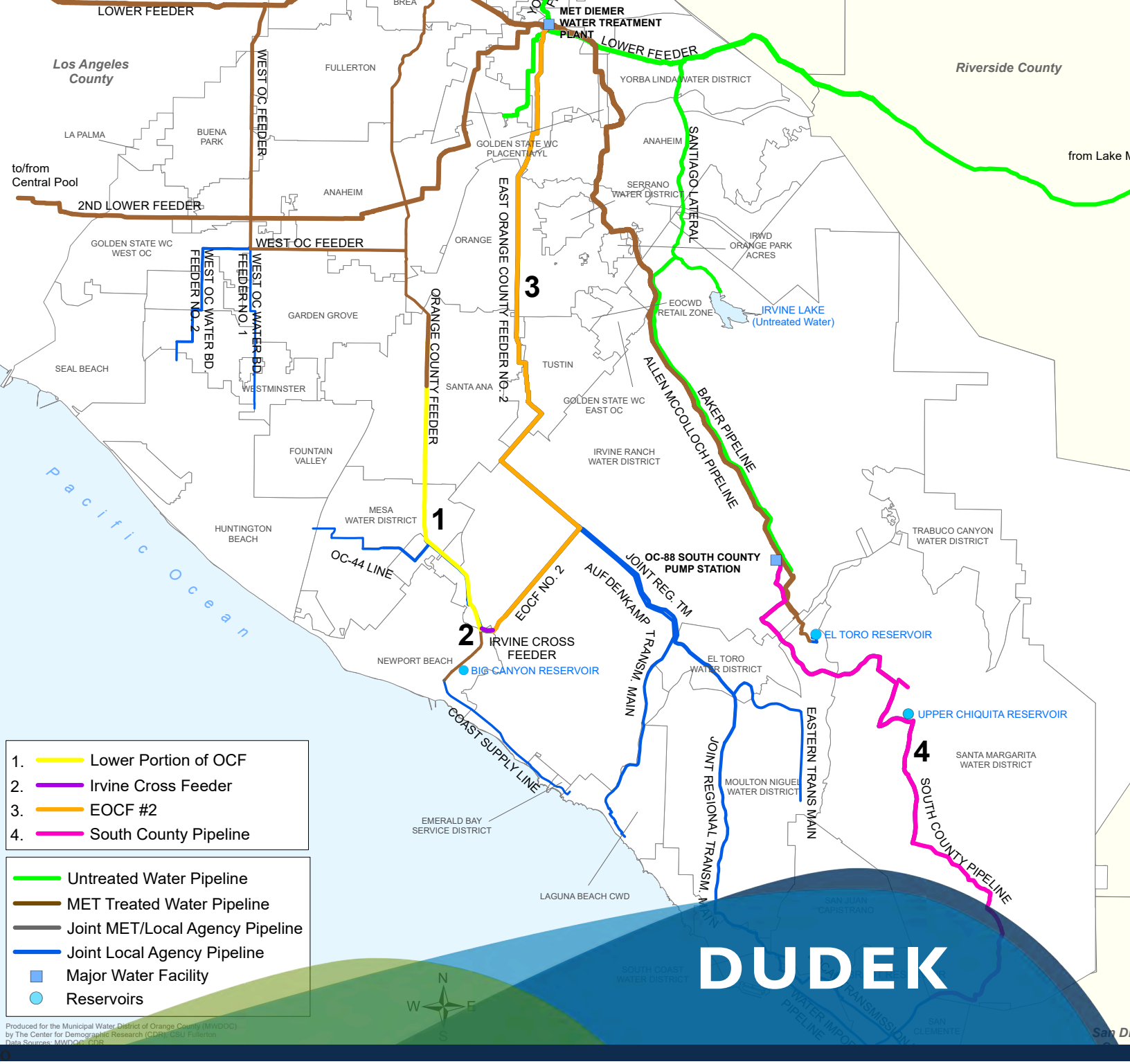
Material and Outside Services – Subcontractors, rental of special equipment, special reproductions and blueprinting, outside data processing and computer services, etc., are charged at 1.15 times the direct cost.

Travel Expenses – Mileage at current IRS allowable rates. Per diem where overnight stay is involved is charged at cost

Invoices, Late Charges – All fees will be billed to Client monthly and shall be due and payable upon receipt. Invoices are delinquent if not paid within 30 days from the date of the invoice. Client agrees to pay a monthly late charge equal to 1% per month of the outstanding balance until paid in full.

Annual Increases – Unless identified otherwise, these standard rates will increase 3% annually.

The rates listed above assume prevailing wage rates does not apply. If this assumption is incorrect Dudek reserves the right to adjust its rates accordingly.



800.450.1818 | DUDEK.COM | HELLO@DUDEK.COM

SOUTHERN CALIFORNIA
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Riverside
San Diego
San Juan Capistrano

CENTRAL CALIFORNIA
Bakersfield
Santa Barbara
Santa Cruz

NORTHERN CALIFORNIA
Auburn
Oakland
Sacramento

HAWAI'I
Kailua, O'ahu

OREGON
Portland

FLORIDA
Lake Worth Beach

Hazen

MWDOC

Statement of Qualifications for

On-Call Technical Services

March 25, 2021

Table of Contents

Hazen and Sawyer
7700 Irvine Center Drive, Suite 200
Irvine, CA 92618 • 949.557.8549

March 25, 2021

Mr. Charles Busslinger, P.E. | Principal Engineer
Municipal Water District of Orange County
18400 Ward Street | Fountain Valley, CA 92708

Subject: Statement of Qualification for On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development (RFQ ENG. 2021)

Dear Mr. Busslinger:

The Hazen and Sawyer (Hazen) Team is excited for the opportunity to continue to support the Municipal Water District of Orange County (MWDOC) by providing engineering planning for MWDOC's next phase of development of future reliable, high quality water supplies for Orange County. Hazen's successful relationship with MWDOC in the preparation of the "White Paper - Integration of Doheny Desalinated Water with MWD Water, other Desalinated Supplies, and Local Groundwater" (July 2019), demonstrates the value Hazen's team provides to MWDOC. Specifically, our team provides the following benefits:

- **Hazen's Team Understands Orange County's Water Supply Landscape:** Hazen's Team includes *Kevin Alexander* (Principal-in-Charge) and *Cindy Miller* (Project Manager), both of whom have worked on some of the largest and most complex water supply projects in Orange County over the last 25+ years, and led Hazen's White Paper preparation.
- **Hazen's Team Brings Valuable Experience with Metropolitan Water District of Southern California (MWD):** Hazen and its specialty subconsultant, Scott Foster, have worked closely with MWD on many significant projects, including West Basin's Water Quality Integration project (*Dr. Nicole Blute, Dr. Silvana Ghiu,* and *Troy Walker*), and hydraulic and surge modeling for various MWD projects (Scott Foster). This knowledge was critical to MWD's acceptance to the White Paper and successful integration of a new water supply in the future.
- **Hazen's Team Brings a Deep Bench of Experts in All Facets of Water Resources Planning:** This deep bench includes specialists such as *Hampik Dekermenjian*, who brings 30+ years of water resources experience and is an accomplished strategist and stakeholder facilitator; *Dr. Jack Kiefer*, an expert in forecasting potable water demands for some of the largest utilities in the United States; and *Dr. Nicole Blute*, expert in drinking water treatment and aquatic chemistry. This deep bench allows Hazen to effectively support MWDOC with all required areas of focus, including Bay-Delta Environmental Planning and Management, water demand analysis and impacts of future base-loaded water supply projects; water quality evaluations; and economic analyses for project alternatives evaluation.
- **Hazen's Team Brings Trust:** Our Team has successful long-standing relationships with MWDOC, MWD, and many MWDOC member agencies, built from Hazen's exceptional client service and project delivery. MWDOC can trust Hazen to continue to deliver high quality work, on time, within budget, and with superior client service.

The Hazen Team has reviewed the Request for Qualifications (RFQ) and stands ready to deliver all projects identified under the RFQ scope of work categories. Our goal is to exceed your expectations in the completion of every project awarded to the Hazen Team under this On-Call services contract. We look forward to discussing our team, our approach, and our ideas with you in greater detail. The Hazen Team has reviewed MWDOC's Standard Consulting Agreement and has no exceptions. We are prepared to execute the agreement.

1014-043

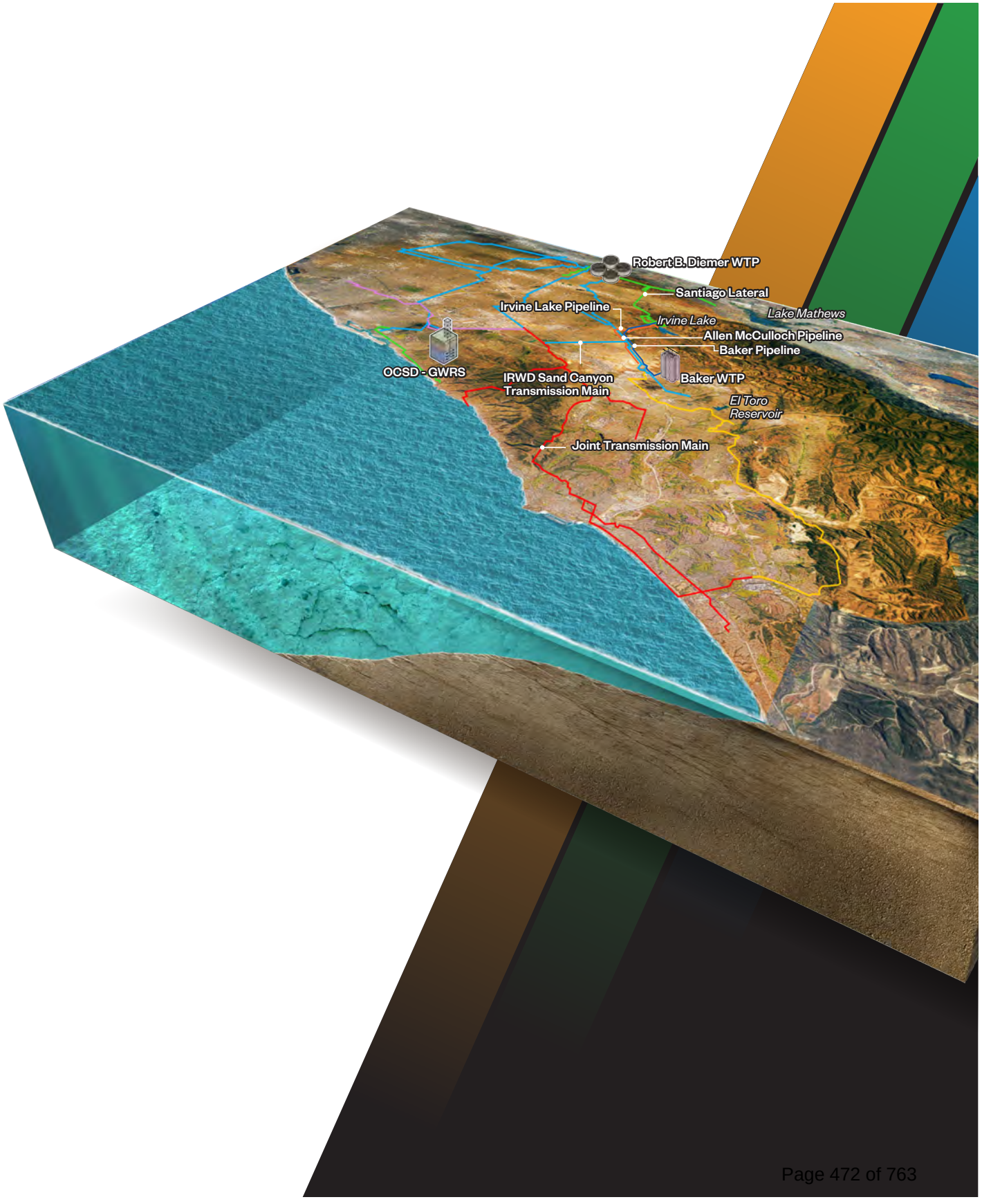
Sincerely,

Cindy Miller, PE
Vice President

Kevin Alexander
Vice President

Section 1

Identification of Firm



Section No. 1

Identification of Firm

Hazen is qualified to assist Municipal Water District of Orange County (MWDOC) in all areas of focus identified in MWDOC's RFQ, which include Reliability Planning, Engineering, and Resource Development. MWDOC will realize the strength and depth of a national firm, coupled with the local management and technical expertise, along with a deep understanding of Orange County's water supply landscape.

Proposal Contact

Cindy Miller, PE
Vice President
Hazen and Sawyer
7700 Irvine Center Drive
Suite 200
Irvine, CA 92618
(714) 814-4909
cmiller@hazenandsawyer.com

Hazen is client-service oriented. While we are an international firm, we have remarkably little bureaucracy. When a client needs something accomplished, **our focus is on meeting that need as soon as possible.** We believe this is a hallmark of our service and we are proud of our record. As one company with a singular purpose, we have the ability to bring the best, most experienced resources to meet your needs.

Continuity of staff. Hazen prides itself on maintaining continuity of staff throughout the life of our projects, **Cindy Miller, PE will be your main point of contact and is committed throughout this contract.**

The benefits of working with Hazen

We have a deep understanding of Orange County's water supply landscape. Members of Hazen's team, including our Project Manager, have spent their entire careers serving the water supply needs of numerous Orange County clients. As such, our team has an in-depth understanding of the water supply challenges faced by Orange County and have been involved in providing technical planning and design services **to deliver some of the most significant water supply projects in the region, including many projects for and with MWDOC.**

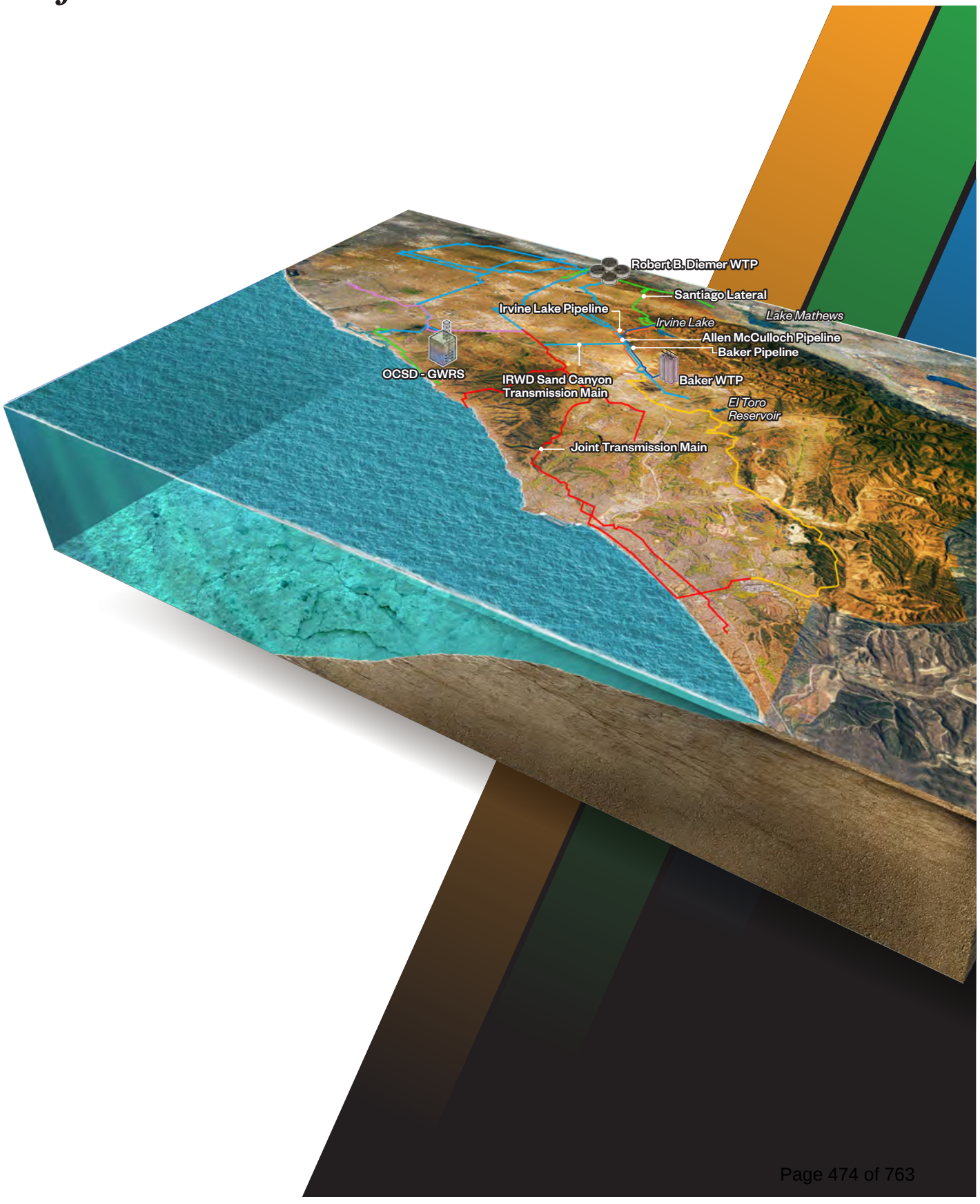
Our staff have worked together, as a team, for a long time. Many of our key staff members have worked together for well over a decade (in fact, several for over 20 years). **This cohesiveness results in value to our clients.** Teamwork and long-term local experience significantly improves project performance as measured by schedule, cost control, and quality.

Hazen specializes in Water. We focus on **water resources** from start to finish; from supplies thru treatment and back again through recycling. We offer local, national and international experience. Our experience includes water and environmental planning, climate resiliency, including demands forecasting, conservation, hydraulic analyses, system modeling, water quality evaluations, seismic evaluation, regulatory coordination, economic studies, assets condition assessments.

1014-043

Section 2

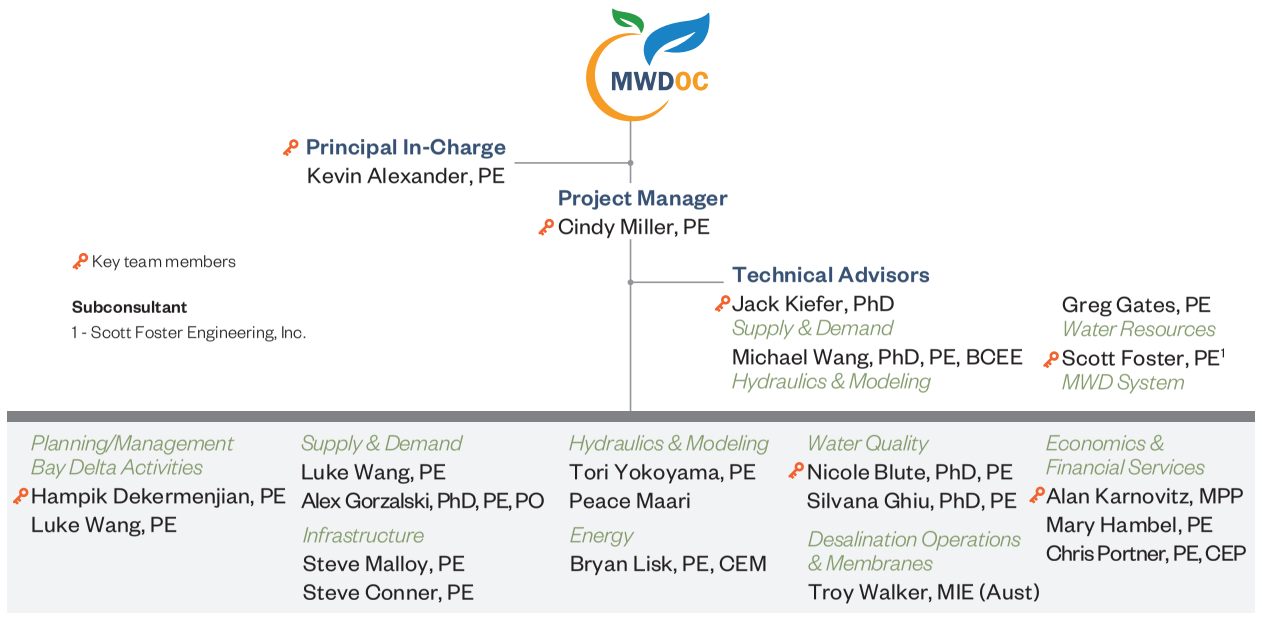
Project Team



Section No. 2

Project Team

Hazen has assembled a team of local and national experts that possess experience in reliability planning, engineering and resource development with detailed understanding of statewide, regional and local water resource and implementation challenges. Led by Cindy Miller of Irvine, CA, the Hazen Team is prepared to support MWDOC in its mission to provide reliable, high-quality water supplies to Orange County.



Cindy Miller, PE

Project Manager

Ms. Miller is a hands-on Senior Project Manager, who also serves as Hazen and Sawyer's Irvine Office Manager. She has spent her entire career of over 26 years successfully delivering numerous drinking water projects for water districts and cities throughout Orange County and Southern California. These projects have included both planning and design projects, including hydraulic modeling, master plans, pipelines, water storage reservoirs, pump stations, wells, hydraulic control and metering facilities, and groundwater and surface water treatment plants. Ms. Miller served as Project Manager and Engineer-of-Record for the Baker Water Treatment Plant, a regional 28 MGD microfiltration and UV treatment plant that is a critical local drinking water supply for five South County water agencies, in partnership with MWDOC. As Program Manager, Ms. Miller has delivered some of the largest regional drinking water supply projects in California, including most recently the $150 million Phase 3 Groundwater Expansion Project for the Chino Basin Desalter Authority (CDA), and the $30 million South Archibald Plume Cleanup Project for the Inland Empire Utilities Agency and CDA.

Kevin Alexander, PE

Principal

Mr. Alexander serves as Hazen's Regional Manager for California and is authorized to negotiate, represent, and contractually bind Hazen and Sawyer. As Principal-in-Charge, Kevin will be dedicated to ensuring that the right resources are available to the project for full client satisfaction. Kevin will periodically check-in with the District to make sure that Hazen Staff are meeting the District's expectations on project deliverables. In addition, Kevin's long standing history with delivering high profile membrane projects for several Orange County clients providing added value to Hazen's Team.

Nicole Blute, PhD, PE

Water Quality

Dr. Blute serves as Hazen and Sawyer's Drinking Water Practice Lead for the West Region. She has over 20 years of experience in drinking water treatment and aquatic chemistry. She specializes in drinking water treatment and system planning particularly for impaired groundwater. She is a leader in chromium-6 treatment, having led over a decade of technology testing forming the basis for the Best Available Technologies set by California. Dr. Blute develops and is the project manager on a wide variety of water projects, notably facility planning, groundwater treatment projects, distribution system water quality projects, technology testing for emerging inorganic and organic constituents, and disinfection strategy evaluations. Dr. Blute has experience in regulatory agency compliance and funding applications for municipalities. She has also been the Program Director on complex projects from planning through design.

Hampik Dekermenjian, PE

Planning/Management Bay Delta Activities

Mr. Dekermenjian serves as Hazen and Sawyer's West Region Client Service Leader and Operations Manager for the Los Angeles office. He has 30 years of experience in water resources, drinking water, recycled water, wastewater and conveyance projects. He has spent the last 15 years specializing in water resources, specifically stormwater management and integrated resource planning throughout the state of California.

An accomplished strategist, stakeholder facilitator and project director, he provides technical and management capabilities to work in collaborative settings involving complex projects and stakeholder interests. He has a wide variety of experience in large project executions, stakeholder collaboration and stormwater management strategies. He has managed a wide variety of projects from initial planning, through design, construction and operation.

Jack Kiefer, PhD

Technical Advisor - Supply & Demand

Dr. Kiefer is an expert in forecasting the demand for potable water. He has performed numerous analyses of water demand, including the development of long term water demand forecasts for some of the largest water utilities in the United States, including the Metropolitan Water District of Southern California, Tampa Bay Water, and San Diego County Water Authority. Dr. Kiefer is also an expert in conducting empirical evaluations of demand management programs. He has led water conservation studies for large utilities in the Southwest and demand management plans for Tampa Bay Water, the City of Phoenix, and New York City. He has also served as principal investigator on several Water Research Foundation (WaterRF), projects where he has led evaluations of urban water demands as part of WaterRF's Strategic Climate Change initiative and Water Demand Forecasting focus area.

Scott Foster, PE

Technical Advisor - MWD System

Mr. Foster will serve as the Technical Advisor of the MWD System for the project. He is the Principal and Owner of Scott Foster Engineering, Inc. Mr. Foster has 31 years of experience in the hydraulic modeling and analysis of pipeline surges and transients for over 700 systems in both gravity and pressure potable water, recycled water, wastewater, reverse osmosis, and microfiltration pipeline systems, as well as forensic analyses, field testing, expert testimony and value engineering services. Much of this work has been performed for most of the largest consulting engineers and governmental agencies in the western United States. including: LADWP, Los Angeles County Sanitation District, Metropolitan Water District of Southern California, San Diego County Water Authority, Orange County Sanitation District, Orange County Water District, City and County of San Francisco, Coachella Valley Water District, Olivenhain Municipal Water District, Otay Water District, Las Vegas Valley Water District, King County Washington, the Calleguas Municipal Water District as well as the cities of San Diego, Riverside, Anaheim, Santa Barbara, Sacramento, Phoenix, Portland, Oklahoma City, and Scottsdale.

Mr. Foster has conducted training courses on pressure transient analysis and surge protection design for the State of California DWR, Los Angeles Department of Water and Power, City of Riverside, City of San Francisco, Arizona Public Service Company, American Society of Civil Engineers, and a number of major consulting engineering companies.

Silvana Ghiu, PhD, PE
Water Quality

Dr. Ghiu has extensive experience in membrane treatment systems covering many aspects of project development, from feasibility study, pilot testing, detailed design and design review, manufacturing, cost estimation, comprehensive energy consumptions estimation and optimization, and O&M integration with design. She has been closely involved with seawater reverse osmosis facilities in the US (California) as well as internationally (Australia and Middle East). Silvana's expertise also includes groundwater water quality assessment and treatment as well as evaluation of disinfection stability in distribution water systems. She has hands on experience in piloting both membranes and conventional water and advance treatment waste water systems.

Steve Malloy, PE
Infrastructure

Mr. Malloy brings to Hazen and Sawyer's Irvine Office over 40 years of experience in drinking water, recycled water, wastewater, and biosolids projects. He has spent the last 20 years specializing in planning, design, and construction management of various treatment projects in South Orange County for IRWD. Prior expertise included capital projects for drinking and recycled water distribution pipelines, pump stations, and reservoirs as well as sewage collection systems throughout the Irvine Ranch Water District service area. He provides his technical and project management experience to problem solving and review of project designs. He has experience with treatment plant control systems, community outreach, regulatory agency compliance, and communication with water district management. He has managed a wide variety of projects from initial planning, design, and through construction while coordination with operations and maintenance staff.

Michael Wang, PhD, PE, BCEE
Technical Advisor - Hydraulics & Modeling

Dr. Wang specializes in computer modeling and hydraulic design and analysis of water treatment facilities. His experience includes studies, planning, and design. He is a Project Manager and has taken projects from conceptual design through the construction administration process. Dr. Wang has also designed and conducted start-up and troubleshooting of chemical facilities for numerous water treatment plants.

Luke Wang, PE
Planning/Management Bay Delta Activities | Supply & Demand

Mr. Wang specializes in water resources planning and operations and has extensive experience in data management, analytics, and decision support. His experience includes reservoir operations, source water allocation planning, demand projection, and infrastructure capacity planning. He is a skilled data scientist and has designed models for system optimization and water supply / quality forecasting. He is a specialist in data visualization and communication as he has developed analytical dashboards for several applications in the water industry.

Greg Gates, PE
Technical Advisor - Water Resources

Mr. Gates serves as Hazen's Corporate Water Resources Practice Lead. He brings over 25 years of experience in groundwater modeling, water supply, and integrated water resource planning. For the last decade, he has specialized in long-term integrated planning with projects primarily in the in the Western United States. Throughout his career, Mr. Gates has applied his expertise in a variety of roles from field work such as completing drilling, aquifer testing, and sampling to studies that include database development, ground and surface water modeling, GIS, and dynamic simulation. He is also a recognized expert in New Mexico Water rights and has served as an expert witness for a number of water rights processes as well as in Federal Court on NEPA issues.

Tori Yokoyama, PE
Hydraulics and Modeling

Mr. Yokoyama has extensive experience developing hydraulic models, performing hydraulic analyses, and preparing master plan reports for various public sector clients. He is proficient in all hydraulic modeling platforms commonly used by various agencies. He is a detailed and hands-on engineer that understands how to efficiently move a project forward from start to finish. His most recent master plan experience includes management of master plans for the Cities of Beverly Hills, Chino Hills, and Chino. Mr. Yokoyama is also an experienced engineer and Project Manager in the design and preparation of construction plans, specifications and cost estimates for large water and wastewater projects throughout Southern California.

Mary Hambel, PE
Economics & Financial Services

Ms. Hambel is a registered professional engineer in California with over 20 years of experience responsible for delivering many water supply projects, including large-scale regional water supply programs. Ms. Hambel has been responsible for the economic and funding aspects of multi-million- dollar projects and regional programs, including preparing an economic evaluation of alternatives, whereby Ms. Hambel led the development of Capital and Operating cost estimates, calculated cost of water, investigated alternative funding sources, including state and federal grant programs, prepared and updated project capital masters, balance sheets, and worked with agency financial staff to assist with preparing single and multi-year capital outlay and operating budgets, as well as reconciliation of costs as part of final project closeout.

Alan Karnovitz, MPP
Economics & Financial Services

Mr. Karnovitz is a Senior Associate and Economist with the Hazen and Sayer and has more than 36 years of experience performing economic, financial, and environmental evaluations for utilities, local, state, and federal agencies and International financial institutions. Mr. Karnovitz leads Hazen's Economic and Financial Services Group. Mr. Karnovitz recently led a study to assess the benefits and challenges of initiating a stormwater fee for New York City.

Bryan Lisk, PE, CEM
Energy

Mr. Lisk is the Energy Management Practice Leader for Hazen and Sawyer. He specializes in water and wastewater energy management. His expertise includes evaluation of demand management opportunities, coordination and negotiations with electric utilities, biogas utilization evaluations, process optimization evaluations, and energy management master planning services. Other energy management experience includes design and optimization of on-site power generation systems, energy-efficient lighting and motor control systems, power monitoring system design, variable speed systems, and power quality evaluations. Mr. Lisk is a Certified Energy Manager with the Association of Energy Engineers.

Mr. Lisk also has extensive experience with low- and medium-voltage power distribution systems, motor control systems, combined heat and power systems, standby power generation and peak shaving systems, lighting design, and variable frequency drive systems. In addition to his electrical design experience, Mr. Lisk specializes in coordinating with electrical utility companies to install new utility services and negotiate favorable utility rates for clients. Mr. Lisk has conducted power system studies for multiple large projects that include circuit device coordination, load flow analysis, dynamic motor starting analysis, and arc flash hazard studies.

Troy Walker, MIE (Aust)
Desalination Operations and Membranes

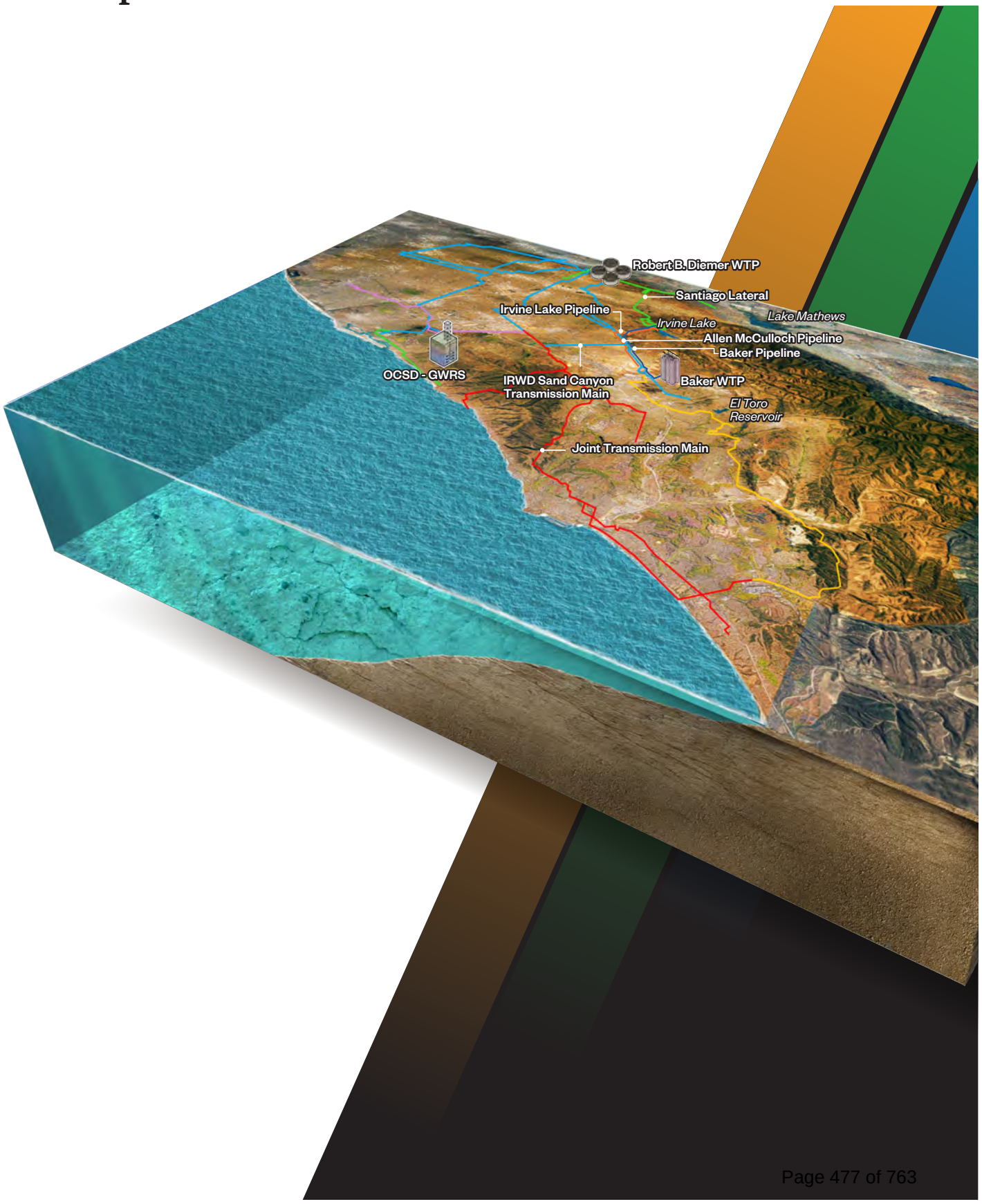
Mr. Walker is the corporate Water Reuse Practice Leader and Membrane Service Group Leader for Hazen and Sawyer. He has over 25 years' experience in the planning, design, construction and operations management of advanced water reuse, seawater desalination and advanced drinking water facilities.

Mr. Walker has a wealth of experience in piloting, detailed design, construction, commissioning and long-term operations of membrane treatment technologies focused on the treatment of municipal effluent for direct, indirect potable as well as industrial reuse. This began at the start of his career in 1994, where he was involved in the commissioning of the first ever application of microfiltration and reverse osmosis together for reuse of municipal effluent. He has been involved internationally including the Newater indirect potable reuse projects in Singapore, the Western Corridor Recycled Water Project (Indirect Potable reuse in Brisbane Australia and multiple reuse for industrial users. In the United States Mr Walker has been involved in membrane and water reuse projects in multiple states including California, Arizona, Texas, Florida and Virginia ranging from leading design of a membrane bioreactor to provide low ammonia recycled water for an oil refinery in California, design of membrane filtration systems for reuse application and operations support for multiple membrane treatment and reuse facilities.

Mr Walker has been at the forefront of research into the application of Direct Potable Reuse, and was the Principal Investigator for three operationally focused reuse projects, WRRF 13-03 investigating the use of the critical control point methodology for direct potable reuse (DPR), WRRF 13-13 to develop an operations and operator training framework for DPR and WRRF 15-05 Development of a training curriculum for potable reuse technologies.

Section 3

Description of Firm



Section No. 3

Description of Firm

*Hazen is a nationally-recognized environmental engineering firm and one of the largest firms in the U.S. specializing in **WATER**. We offer highly skilled and responsive staff in our Southern California offices supported by our top technical experts from around the country.*

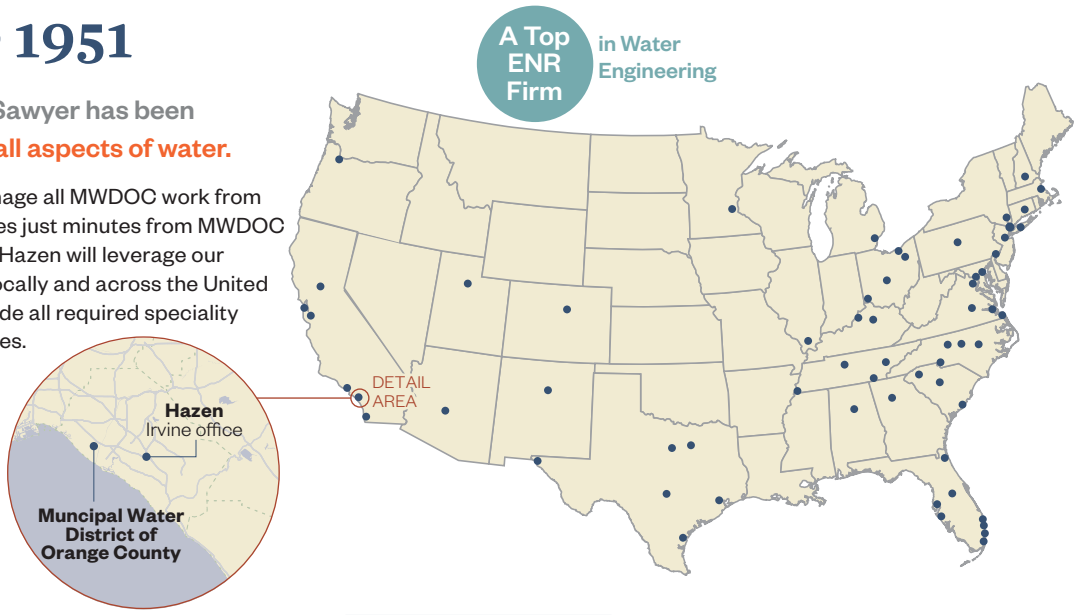
Since 1951 Hazen has advanced the boundaries of reliability planning, engineering, and resource development including water supply planning and design, distribution system hydraulics and modeling, water quality evaluation and modeling, water treatment planning and design (including ocean desalination), and long-term demand forecasting and economic evaluations of alternative supply sources.

Our corporate culture focuses on entrepreneurialism. We pride ourselves on a lack of bureaucracy; our project managers are also technical resources who will be actively working on assignments. This approach allows for more efficiency and higher accuracy in project communications, translating into cost savings and a better product to you.

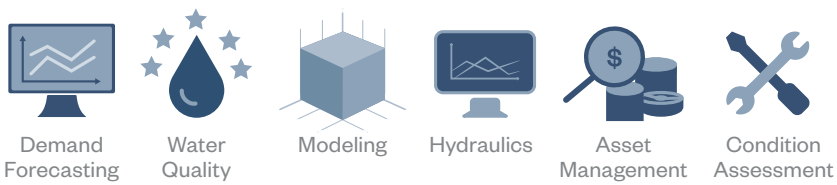
Since 1951

Hazen and Sawyer has been focused on all aspects of water.

Hazen will manage all MWDOC work from our Irvine offices just minutes from MWDOC headquarters. Hazen will leverage our experts both locally and across the United States to provide all required speciality areas of services.



Areas of Service



1014-043

Hazen Benefits

Successful Track Record of On-Call Delivery

Responsive and Collaborative Approach

Innovative Solutions

Deep Bench of Resources

Hazen has a singular focus on "**All Things Water**." By providing excellent engineering to our clients, Hazen has grown to more than 1,200 engineering professionals in 62 offices across the United States and around the world. Engineering News Record has listed Hazen as one of the top firms in the nation, focused entirely on the domestic wastewater, recycled water, and potable water market. As a "water-only" firm we bring unique expertise and specialists to each project. One client even suggested that we "do all things water except make it rain!".

Our breadth of capabilities enables communities to trust us with projects that encompass broad services such as demand forecasting, modeling, water quality evaluation, treatment and conveyance planning and design, as well as economic evaluation, regulatory coordination, distribution system planning, condition assessment, structural and electrical among many others. Hazen has a track record of providing services to large and small communities within Orange County, throughout the State, and throughout the country.

Experience with Task Order-Based, Master Services Contracts

Hazen's significant master contract experience includes clients throughout California and the country ranging in size and complexity of service which demonstrates our ability to adapt to the needs of each client individually. From San Francisco to Los Angeles and across the country to New York, Hazen has helped agencies solve their most difficult issues through on-call and standard contracts. Because all we do is water, our technical expertise reaches across all MWDOC's assets and facilities. In California, Hazen has almost 40 on-call contracts with public utilities with services similar to those requested by MWDOC for this on-call contract.

Track Record of Delivering Large-Scale Water Supply Projects in Southern California

During her 26+ year professional engineering career, our proposed Project Manager, Cindy Miller, has delivered some of the most significant water supply projects in Southern California, including a major water supply

Baker Water Treatment Plant

Cindy Miller served as Project Manager and Engineer-of-Record

- 28.1 MGD drinking water treatment plant.
- Joint regional project by five South Orange County water agencies
- Project located in City of Lake Forest, California.
- Treats multiple water supply sources, including State Project Water, Colorado River Water, and Irvine Lake water.
- Provides reliable local drinking water supply during emergencies or extended facility shutdowns on the MWD delivery system.
- Uses advanced microfiltration treatment and ultraviolet disinfection technologies to produce water that meets standards stricter than current regulatory requirements, resulting in a consistent, high quality source of drinking water for South Orange County.
- Construction Completion: 2016
- Overall project cost: $107 million

Chino Phase 3 Expansion Project

Cindy Miller served as Program Manager

- Expands existing Chino II Desalter production by 10,000 acre-ft/year.
- Joint regional project led by the Chino Basin Desalter Authority, a joint powers authority.
- Treatment Plant located in Jurupa Valley, California. Wells located in Cities of Chino and Ontario. Pipelines located throughout Inland Empire, but primarily in Cities of Jurupa Valley, Eastvale and Ontario.
- Uses innovative brine reduction technology to increase overall treatment plant recovery to over 94%.
- Expanded wellfield supply by over 7,000 gpm. Installed five low capacity and three high capacity wells and associated piping.
- Construction Completion: 2019
- Overall project cost: $150 million

1014-043

Proven Water Supply and Demand Planning Experience

Hazen's experience covers a wide range of projects directly relevant to the areas of focus identified by MWDOC. Specifically, the projects shown in the map below demonstrate projects delivered by Hazen's West Region that have included aspects of planning and/or design of NEW water supply projects integrated into existing systems, as well as demand forecasting (including climate change) to justify the need for these new water supply projects.

1014-043

ENGINEERING: The table below highlights projects Hazen and its Team members completed or are currently in progress that demonstrate Hazen's expertise in the areas of ENGINEERING described in MWDOC's RFQ.

Engineering		
Project	**Project Description**	**Relevance to MWDOC Projects**
MWDOC White Paper-Integration of Doheny Desalinated Water with MWD Water, other Desalinated Supplies, and Local Groundwater.	Provided a high-level evaluation and recommendations for follow-on studies, modeling, engineering analysis, etc. related to the Doheny Beach Ocean Desalination Project.	• MWDOC experience with OC Doheny Beach Ocean Desalination project • MWD Coordination • Focus on impacts to existing MWD and member agency pipeline delivery systems
Metropolitan Water District Colorado River Aqueduct Emergency Relief Structure Improvements	Performed seismic evaluation and surge analysis of a section of Colorado River Aqueduct (CRA) in Cabazon, in the location of an existing emergency relief structure. Evaluated adequacy of existing infrastructure and made recommendations for improvements. Designed improvements to the gate structure to allow greater flow diversion capabilities predicted in the event of a large seismic-driven surge event.	• Large-size MWD water conveyance structure experience • Seismic Risk evaluation for an MWD facility • Surge analysis for MWD facilities • Hydraulic analysis for closed conduit open channel structure
Geysers Recharge Pipeline Project, Santa Rosa, CA	Design of 2-miles section of a 40-mile, 48-inch diameter welded steel pipeline which conveys up to 40 mgd of recycled water to groundwater recharge for steam production in the world's largest geothermal facility.	• Large-diameter pipeline experience • Groundwater recharge pipeline infrastructure design experience • Multiple agency coordination and interaction • Significant community outreach • Route alignment analysis and selection for final design
Irvine Ranch Water District, Baker Pipeline and Product Water Pump Station *(Hazen Team member project while at another firm)*	Design of a 53 cfs pump station at MWDOC WEROC site, to deliver water from Irvine Lake Pipeline to the Baker Pipeline / Baker WTP; Design of a 42 CFS pump station at the Baker WTP to deliver Baker product water into the South County Pipeline; Design of a 6 cfs pump station to deliver water from the Baker Pipeline to Trabuco Canyon Water District. Scott Foster performed surge analysis on the Santiago Lateral, ILP, Baker Pipeline, and South County Pipeline. Retrofit MWD turnout OC-33 metering facility – upsized meter from 10 cfs to 100 cfs, added air release valves along Santiago Lateral.	• In-depth knowledge of South Orange County domestic water delivery system • MWD coordination • MWD design modifications to Santiago Lateral • MWD flow control facility design • MWDOC South County member agencies coordination • MWD plans and specifications knowledge
Jurupa Community Services District Water Supply Evaluation Study	Currently providing an evaluation of alternative water supply alternatives for Jurupa Community Services District (JCSD), including purchasing imported water supplies from MWD (through member agencies), wheeling imported water through Cucamonga Valley Water District, and/or Western Municipal Water District, purchasing supplies from nearby water agencies such as City of Ontario, Rubidoux CSD, and building local treatment plants to allow use of existing wells currently offline due to water quality.	• Example of comprehensive water supply evaluation study • Used OASIS software to evaluate alternative new water supply alternatives • MWD supply sources considered as part of new water supply alternatives evaluation • Comprehensive water quality evaluation completed, with focus on NPDES permit limits for TDS, and PFAS for groundwater supplies

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Engineering		
Project	**Project Description**	**Relevance to MWDOC Projects**
City of Beverly Hills Integrated Water Resources Master Plan	Prepared a comprehensive integrated water resources master plan that evaluated the City's water, sewer and stormwater systems, including: comprehensive evaluation of alternative water supplies, emergency water storage evaluation, hydraulic modeling for water, sewer, and stormdrain systems, non-potable water supply alternatives evaluation, in-lieu water supply programs, economic evaluation, CIP, and report preparation.	• Example of "All Water Sources" master plan • Hydraulic modeling of water, sewer, and stormwater systems • Included comprehensive evaluation of new water supply options, including advanced treated wastewater from City of Los Angeles and West Basin MWD • Water storage evaluation with emphasis on adding storage due to climate change factors, such as severe drought and wildfires
City of Chino Water Master Plan and Operations Staff Evaluation	Currently preparing a water master plan and operations staff evaluation report for the City of Chino. Includes developing a comprehensive hydraulic model of the City's water system.	• Hydraulic modeling using Innovyze software • Provided Operations staff analysis with recommendations of new staff positions necessary for planned water treatment systems
Metropolitan Water District of Southern California Allen McCulloch Pipeline/OC-88 Pump Station *(Scott Foster experience)*	Hydraulic, surge and forensic analysis for 150 CFS pump station. System operating approach and valve timing to prevent surge	• In-depth knowledge of South Orange County water transmission system • MWD experience • MWDOC South County Member agencies experience
Western Municipal Water District Sterling Booster Pump Station *(Hazen Team member project while at another firm)*	Design of a 30 cfs, 450 psi discharge pressure domestic water booster pump station, including 8, 700 hP pumps (6 with electric motors, and 2 with natural gas-driven engines), 937 kVa backup generator,1.1 MG pre-stressed concrete reservoir, partially buried, chloramination facility.	• Large water supply pump station • Provides regional pumping from Chino Basin to Mills Gravity Feed Line • Also capable of pumping Arlington Desalter Water • Able to reverse flow deliveries from Mills Gravity Feed Line to the Chino Basin through flow control system
Los Angeles Department of Water and Power, San Fernando Valley Projects	Planning, design and Implementation of 4 large groundwater supply projects with integration into imported surface water supplies, hydraulic analysis, surge analysis, operations impact considerations	• Large-scale new water supply project in Southern California • Groundwater treatment experience • Integration of surface water supplies with new water supply source • Analysis of operations staff requirements • Alternatives analysis to converge on best value project for LADWP

WATER QUALITY: The table below highlights projects Hazen and its Team members completed or are currently working on that demonstrate the Hazen Team's expertise in the areas of WATER QUALITY described in MWDOC's RFQ.

Water Quality		
Project	**Project Description**	**Relevance to MWDOC Projects**
West Basin Municipal Water District Seawater Desalination Integration Study	Pilot test of samples of distribution system piping to evaluate corrosion and stability when blended with MWD water	• Modeled water age, and water quality impacts in distribution system from comingling new source of ocean desalination supply with MWD supplies.
Chino Water Quality Feasibility Study	Provided a comprehensive evaluation of alternative new water supply sources for the City of Chino. Particular effort was placed on developing a feasibility level design for local groundwater treatment systems.	• New water supply sources alternatives evaluation • Evaluation considered new sources from MWD (through MWD member agencies) versus developing local supplies. • Economic analysis performed for project alternatives analysis
Coachella Valley Water District – Source of Supply Study	Groundwater, surface water and reuse treatment evaluation for alternative water supplies	• New water supply sources alternatives evaluation
Los Angeles Department of Water and Power San Fernando Valley Project	Planning, design and Implementation of 4 large groundwater supply projects with integration into imported surface water supplies, hydraulic analysis, surge analysis, operations impact considerations	• Evaluation of treated groundwater into surface water supplies, stability, corrosion, salinity
City of Signal Hill - Well No. 9 Nanofiltration Treatment Plant	Design of Nanofiltration treatment plant for color and hardness.	• Water quality integration into existing system combined with MWD water and local groundwater supplies, stability and corrosion evaluation
Monterey Park – Central Groundwater Treatment Facility – Advanced Oxidation and PFAS Improvements Projects	Design of UV/AOP and GAC System for treatment of groundwater with multiple contaminants including 1,4 Dioxane, PFAS/PFOA and PCE/TCE. The Project was in two phases initial phase for 1,4 Dioxane, and second phase to address PFAS/PFOA.	• Addressed similar groundwater contaminants as member agencies of MWDOC • Multiple Water Supply Sources, groundwater, surface water and water exchanges
City of Scottsdale - Central Groundwater Treatment Facility	Incorporating stabilized RO treated water into a distribution system to improve hardness and prevent pipe scaling. Evaluated stabilizing and blending desalinated ground-water into surface water within distribution system	• Modeled water quality in distribution system with multiple sources (brackish RO and surface water), identified areas of concern and made recommendations to resolve concerns.
Tampa Bay Water - Seasonal Source Allocation Decision Support Tool	Evaluated water quality from multiple sources including groundwater, surface water and desalinated seawater to make decisions on impacts to stability and chlorination	• Created water quality model for distribution system with multiple sources (including ocean desal), identified areas of concern and made recommendations to resolve concerns.

OPERATIONS: The table below highlights projects Hazen and its Team members completed or are currently working on that demonstrate the Hazen Team's expertise in the areas of OPERATIONS described in MWDOC's RFQ.

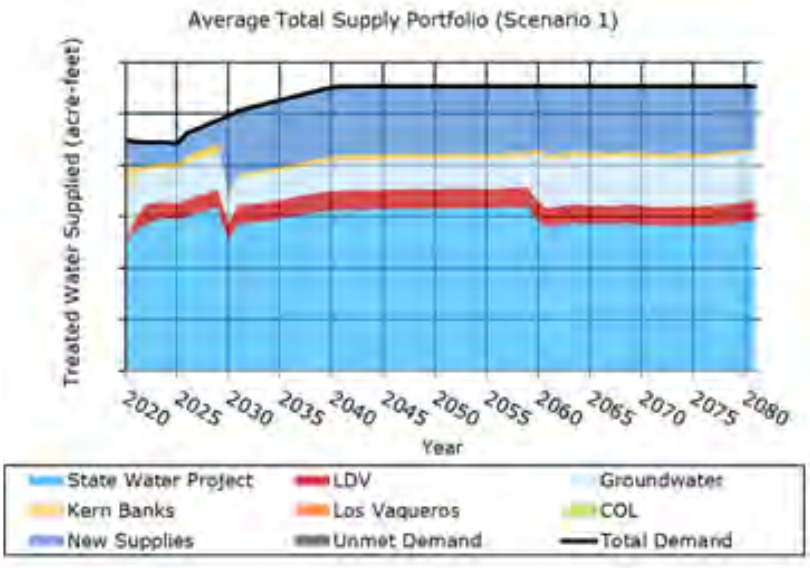
Operations	
Hazen's Operations Projects Experience	**Project Description**
Coachella Valley Water District - Chrome 6 Treatment Project	Operations evaluation and permitting treated water supplies
Los Angeles Department of Water and Power San Fernando Valley Projects	Operations evaluation, integration, water quality impacts
City of Signal Hill - Well No. 9 Nanofiltration Treatment plant	Permitting, Operations with existing wells and MWD connections
City of Monterey Park - Central GW Treatment Facility	Division of Drinking Water Permitting
Los Angeles Department of Water and Power San Fernando Valley Projects	Alternative Delivery Contracts development as Owners Agent
West Basin Municipal Water District Seawater Desalination Integration Study	Contract mechanisms, evaluate impact of varying water flows on stability and blending
City of Beverly Hills - RO Treatment Plant	Operations optimization and treatment system startup evaluation for distribution system
Tampa Bay Water - Seasonal Source Allocation Decision Support Tool	Decision tool to assist with water demands and water supplies to 6 agencies
City of Goodyear - Bullard Water Campus RO Operations Support	Evaluated operations and bypass controls for water quality
City of Scottsdale - Water Campus - Large Diameter RO Evaluation	Operations support of large RO desalination system for IPR

2021 Water Supply Evaluation Update

Zone 7 Water Agency

Hazen is currently assisting Zone 7 Water Agency (Zone 7) to conduct an update to their long-term water supply evaluation. As a part of the project, Hazen is using Zone 7's existing water supply risk model to provide analytical support for the upcoming 2020 Urban Water Management Plan (UWMP). Hazen is using the risk model to evaluate several future water supply scenarios, including an assessment of Zone 7's water supply reliability under 1-5 year drought conditions. The model incorporates Zone 7's current and future water supply portfolio, operating rules governing source water allocation, representations of physical infrastructure constraints, projections of water demand, and projected future availabilities of supply availability. Future supply availabilities include the latest projected State Water Project (SWP) Table A availabilities (including climate change impacts) identified in the latest 2019 deliver capability report from the CA Department of Water Resources (DWR). As a part of these analyses, Hazen is assisting Zone 7 understand the impact of investment in several regional water supply projects, including Sites Reservoir.

As a part of this project, Hazen is also assisting Zone 7 maintain reliable water supply modeling software. In support of this Hazen conducted a peer review of Zone 7's existing water supply risk model and is scoped to conduct several model upgrades to allow for enhanced planning and operational support.



Project Relevance

- Long-term water supply evaluation
- Includes analysis of water supply reliability under drought conditions.
- Water demand projections
- Analysis of future water supply availability, including Table A water.
- Includes analysis of climate change impacts to water supply reliability.

Project Team

Greg Gates
Luke Wang

Reference

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1014-043

White Paper - Integration of Doheny Desalinated Water with MWD Water, other Desalinated Supplies, and Local Groundwater

Municipal Water District of Orange County (MWDOC)

Hazen and Sawyer reviewed available information, studies, engineering reports and agency coordination to summarize and identify the recommended next steps/approach to resolve key outstanding integration issues pertinent to the proposed Doheny Beach Ocean Desalination Project located in Dana Point, California. The areas of focus for which recommendations were made in the white paper included:

- Changes in Regional Operation with the Introduction of Doheny
- Plant Operating Scenarios based on economic, operation, and reliability criteria
- Operational Reliability to ensure optimum system operation and integrity by employing the Hazard Analysis and Critical Control Point (HACCP) methodology, and integrating effective communication at the operator interface.
- Hydraulic design and management recommendations, including recommendations for future analysis of HGL changes, flow reversal patterns, high/low velocities, stagnation and water age and effects of transients and pressure surges.
- Corrosion potential and water stabilization strategies when ocean desalinated water is introduced into an existing distribution system.
- Avoidance of impacts to end-use plumbing, including consideration of lead, copper, and iron-based pipe materials.

The white paper recommendations were presented to MWD and MWDOC South County member agencies for input on prioritization of next steps. The paper, along with recommendations from MWD, MWDOC member agencies, and MWDOC, will serve as the roadmap for follow-on studies and evaluations to identify required distribution system improvements, water quality parameters, and operational strategies to successfully introduce future Doheny desalinated water into existing pipeline infrastructure, including the Joint Transmission Main, and Water Importation Pipeline.

Project Relevance

- Orange County Water Supply Project of interest to MWDOC and its South County member agencies.
- MWD coordination
- MWDOC member agency interaction
- Hydraulic and surge high- level evaluation
- Water quality high-level evaluation
- Provides recommendations for next steps/follow-on studies and investigations

Project Team

- Kevin Alexander
- Cindy Miller
- Nicole Blute
- Troy Walker
- Scott Foster

Reference

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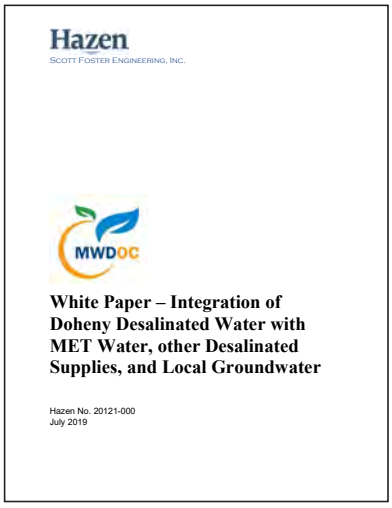

1014-043

Engineering Treatment and Conveyance 2017-2019

Metropolitan Water District of Southern California

Low Alkalinity Water Operating Strategy. Periods of historically low alkalinity runoff, such as in 2017, stress the Metropolitan corrosion control approach. Operating strategies are necessary for anticipated conditions from snowmelt, desalination and direct potable reuse that will meet finished water quality targets to minimize corrosion in conveyance systems. The project convened an expert panel to discuss limitations and possibilities to simultaneously achieve the goals of effective treatment coagulation and corrosion control in the treatment plants. Several effective alternatives were identified and preliminary design criteria developed to meet targets for pH, Calcium Carbonate Precipitation Potential, and alkalinity. Chemical delivery and handling, staff safety and training, and integration with existing treatment processes and infrastructure were evaluated. Hazen is currently advising Metropolitan during bench-scale testing of chemical feed and coagulation strategies.

Colorado River Aqueduct – Whitewater Siphons. Mountain storms in the winter of 2018-2019 damaged the erosion control structure that protects the 13' and 11'3" diameter double barrel siphon of the Colorado River Aqueduct beneath the Whitewater River near Coachella Valley. Hazen conducted damage assessment and design with fast-track collaborative reviews to allow competitive bidding and construction while the river is mostly dry prior to the next rainy season. HEC-RAS modeling gave insight into the capacity and velocity distribution across the width of the structure. 8T rip-rap provided a surface profile that would dissipate fluid energy, with full depth grouting to withstand dynamic forces and maintain large masses that can differentially settle in the event of future foundation shifting. Rip rap was locally sourced within 150 miles, and sand and gravel relocated from within the washed out river bed to meet permit requirements.

Colorado River Aqueduct – San Jacinto Tunnel and Cabazon Gate Facility. Hydraulic transients triggered by seismic damage in an aqueduct can cause waves of severe pressure and suction that can damage conveyance conduits and pipelines. Surcharging and full pipe conditions can also impose structural risk to unreinforced concrete pipe that was designed to flow partly full. Hazen is evaluating the resiliency of the existing features in the San Jacinto Tunnel, Cabazon to Whitewater segments. Concepts to relieve pressure using passive overflows, mechanical flow controls, operating strategies are being developed and considered. The local engineering team is working with Hazen technical experts from the New York Catskill conveyance system, along with Metropolitan's hydraulics, operations, geotechnical and engineering staff, and a specialty surge analysis modeler. The objective is to incorporate appropriate upgrades into the 80-year old Cabazon Gate Facility at the San Gorgonio Wasteway.

Project Relevance

- Engineering Design
- Water Distribution
- Water Quality

Project Team

- Nicole Blute

Reference

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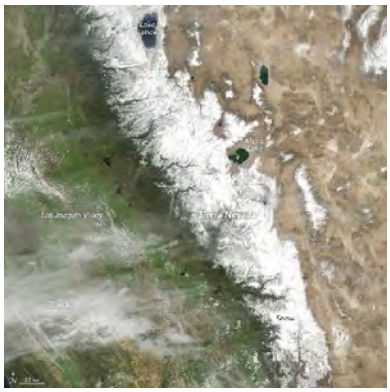
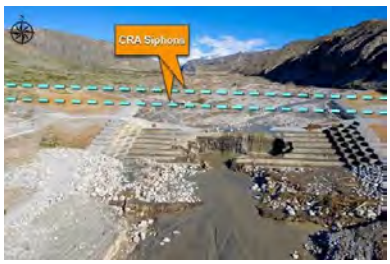


Low Alkalinity Water Operating Strategy



Colorado River Aqueduct – Whitewater Siphons

Colorado River Aqueduct – Cabazon Gate Facility

1014-043

Owner's Agent for the San Fernando Basin Groundwater Remediation

Los Angeles Department of Water and Power

As the Owner's Agent, Hazen is providing the full range of engineering and consulting services for initiation, planning, design, permitting, procurement support, alternative delivery, construction, commissioning, close out and operations of the San Fernando Groundwater Remediation Facilities to restore full use of the groundwater basin and meet funding deadlines.

The planning and permitting tasks in the program have involved extensive coordination with DDW since the groundwater is an extremely impaired source subject to 97-005 permitting requirements. Bi-monthly DDW meetings were held to evaluate potential approaches and review permit submittals.

In the first of four anticipated projects, Hazen's team designed the North Hollywood West Well Field facilities and is providing engineering services during construction. The design included well rehabilitation, pump replacements, new wellhead piping, control building, site and security, well purge system, sand separators, utility connections, treatment, maintenance and storage facilities. Professional services included feasibility study, public participation, geotechnical investigation, hydrogeology, transient surge analysis, and well testing. Integration of new facilities into an existing system took close coordination with City staff on access and parking, power line clearances, maintaining space around wells and structures, operational controls, landscaping and fencing adjacent to athletic fields.

The second and third projects are 25 and 49 MGD facilities at the North Hollywood Central and Tujunga wellfields. For these projects, Hazen provided technical and managerial oversight as Owner's Agent for a Progressive Design Build team.

Project Relevance

- Water Quality
- Engineering Design
- Resource Planning and Coordination

Project Team

- Nicole Blute
- Chris Portner
- Kevin Alexander
- Silvana Ghiu
- Peace Maari

Client Reference

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1014-043

Water Quality Integration Study

West Basin MWD and Metropolitan Water District of Southern California, CA

West Basin Municipal Water District had a goal of serving 12 percent of the local water supply with desalinated ocean water by the year 2020. Hazen was selected in partnership with Metropolitan Water District of Southern California to assess feasibility of integrating ocean water desalination into its water supply portfolio.

Key features of this study included:

- Collaboration with multiple groups including West Basin, Metropolitan, and water purveyors, with technical input from the EPA and national experts.
- Investigation of corrosion and disinfection impacts from future combinations of imported water, desalinated water, and groundwater.
- Use of harvested pipes and meters from a local distribution system to conduct a pilot study to directly assess the impact of the desalinated water on the water quality and infrastructure.

This study evaluated a proposed approach to stabilize desalinated water to minimize corrosion in the distribution systems. Experienced Hazen staff developed the test plan, constructed and operated the pilot system, performed sampling and analysis. Hazen developed, constructed, and operated a pilot system to investigate and compare corrosion outcome from comingling desalinated water with Metropolitatan water and local groundwater, and the impact of blending different sources on common materials in the distribution system (e.g. cement-mortar lined pipe, unlined cast iron mains, copper pipe joined with lead solder, and brass water meters).

Hazen determined that introducing post-treated desalinated water into the distribution system via blending with local groundwater or Metropolitan water did not adversely impact the infrastructure. The results also confirmed the water quality targets that West Basin should use to minimize corrosion in the distribution system when integrating desalinated water.

A second phase of the project involved close collaboration with Metropolitan to plan and interpret findings from bench-scale testing of disinfectant stability and disinfectant by-product (DBP) formation to address the concern of increasing bromide levels on disinfectant stability, DBP specification, and NDMA formation.

Project Relevance

- Corrosion control
- Integration of new water supplies
- Water quality stability in distribution systems

Project Team

- Nicole Blute
- Silvana Ghiu
- Kevin Alexander
- Chris Portner

Reference

Shivaji Deshmukh
Former Assistant General Manager at West Basin Municipal Water District (currently GM at IEUA)
(909) 993-1926

1014-043

2050 Water Demand Study

East Bay Municipal Utility District, Oakland, CA

The East Bay Municipal Utility District (EBMUD) selected Hazen and Sawyer to provide professional consulting services associated with their 2050 Water Demand Study.

Hazen is currently assisting EBMUD to develop their water demand forecasts through the 2050 planning period, using cutting-edge econometric modeling to develop the forecasts, which integrates local land use plans/trends, environmental factors (e.g. the recent California drought), and local economic conditions. Our key team members, Jack Kiefer and Luke Wang blend national econometric experience projecting water demand with local supply and demand expertise.

Results of the study will support updates to EBMUD's System Capacity Charge and 2020 Urban Water Management Plan, and provide an automated tool for generating forecast scenarios. The project will involve collaboration with EBMUD's Demand Projections Committee, made up of representatives from several planning and operational divisions within the agency. The project will culminate in a PowerBI forecasting tool that permits generation and visualization of forecast scenarios in a dashboard design.

Project Relevance

- Demand Forecasting using cutting-edge econometric modeling
- Climate change and other environmental factors incorporated into economic model.
- Multi-stakeholder collaboration.
- Uses Power BI forecasting tool

Project Team

- Jack Kiefer
- Luke Wang

Reference

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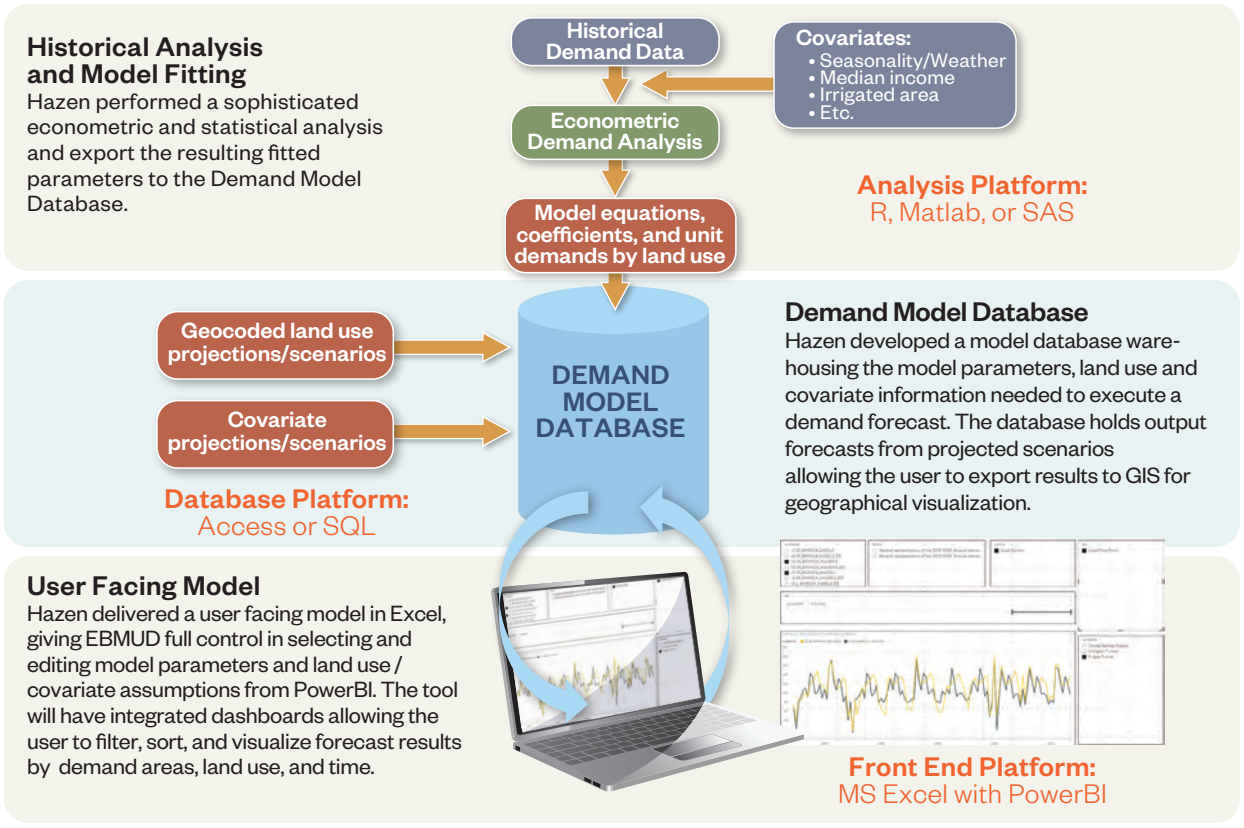

Hazen has implemented a comprehensive modeling and forecast tool development process for EBMUD.

1014-043

Development of Water Demand Models and Forecasts for Urban Water Management

San Diego County Water Authority, CA

The San Diego County Water Authority (SDCWA) is a regional wholesale water supplier to 24 member retail agencies, which include the City of San Diego and Pendleton Military Reservation. Through its member retail agencies, the SDCWA provides water to more than 3 million urban, suburban and rural customers, who reside across an expansive area of both coastal and inland climate zones. For long-term planning purposes, the Water Authority must forecast water needs to support decisions concerning capital expenditures, implementation of water conservation programs and changes to the structure and level of its water prices.

Dr. Jack Kiefer of Hazen, has directed and managed SDCWA water demand forecasting efforts since the mid-1990s, starting with Planning and Management Consultants, Ltd. (PMCL), through PMCL's acquisition by CDM in 2003, and now with Hazen. As part of these efforts, predictive models of water demands have been created and periodically updated for the SDCWA region for single-family, multifamily, nonresidential and agricultural customer classes. Most recently with Hazen, Dr. Kiefer and his team are developing projection models and long range forecasts of water demands out to 2050 in support of the Water Authority's 2020 Urban Water Management Plan.

This project included the following major components relevant to the current RFP:

- **Utility survey of member agencies** to collect historical water use and retail pricing data
- **Compilation of historical and projected socioeconomic and land use data** from the San Diego Association of Governments (SANDAG)
- **Estimation and calibration of econometric models** for single-family, multifamily, nonresidential and agricultural sectors, using advanced statistical analysis techniques, controlling for economic, land use, and demographic differences, as well for the effects of water supply shortage restrictions
- **Development of weather response relationships** at the member agency level and corresponding weather indices for identifying single and multi-year weather scenarios
- **Development of climate change scenarios** using regionally downscaled climate projection
- **Preparation of SDCWA, member agency and sectoral forecasts** on annual and monthly time steps, embodied in a relational database

The forecasts developed in support of the 2020 Urban Water Management Plan (UWMP) are based on an innovative, robust, and flexible set of sectoral demand models that reflect regional socioeconomic relationships, as well as the diverse range of climatic conditions that can be experienced across the region.

Project Relevance

- Population Projections
- Demand and Supply Analyses
- UWMP preparation coordination

Project Team

- Jack Kiefer
- Luke Wang

Reference

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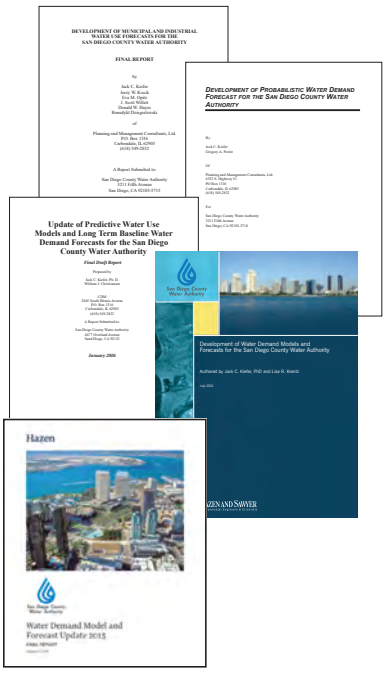


Hazen developed the current set of SDCWA water demand models and the demand forecast utilized by the 2010, 2015, and 2020 Urban Water Management Plans.

1014-043

JCSD Water Supply Evaluation Study

Jurupa Community Services District, Jurupa Valley, CA

Hazen is providing engineering and water supply services to Jurupa Community Services District (JCSD) for the Water Supply Evaluation Study project. The project includes evaluation of water quality data for the JCSD's existing groundwater wells (18 wells) which are impacted with various organic and inorganic contaminants such as VOCs, PFAS compounds, nitrate, and TDS. Based on the evaluation of the water quality data, Hazen develops conceptual design for the treatment system options, including equipment sizing, site layouts, capital cost estimate and O&M cost estimates.

In parallel with the water quality and treatment evaluation, Hazen is tasked with comparing new groundwater treatment water supply projects with alternative imported water projects, including water from MWD's Rialto Feeder, and WMWD's Mills Gravity Feed Line, including the infrastructure required to make this water available to JCSD. Hazen software is using OASIS (Operational Analysis and Simulation of Integrated Systems), a mass balance water accounting model, to help make data-driven decisions. Based on demand forecasting estimates, and OASIS model results, Hazen is developing a 20-year water supply CIP. In addition, evaluation of various treatment technologies is included as part of the study to demonstrate removal mechanisms, effectiveness for multiple contaminants, design considerations, permitting considerations, and waste residuals management.

In addition, Hazen team prepares a summary of CEQA and permitting requirements as part of the project. The CEQA and permitting summary are framed in immediate, intermediate, and long-term timing horizons, where appropriate, for the project implementation of the proposed treatment systems.

Project Relevance

- OASIS modeling used to evaluate alternative new water supply sources
- Demand forecasting
- New MWD supplies from two MWD member agencies is part of alternatives evaluation
- New groundwater treatment projects developed as part of alternatives evaluation.

Project Team

- Cindy Miller
- Alex Gorzalski
- Luke Wang
- Steve Malloy
- Nicole Blute
- Chris Portner

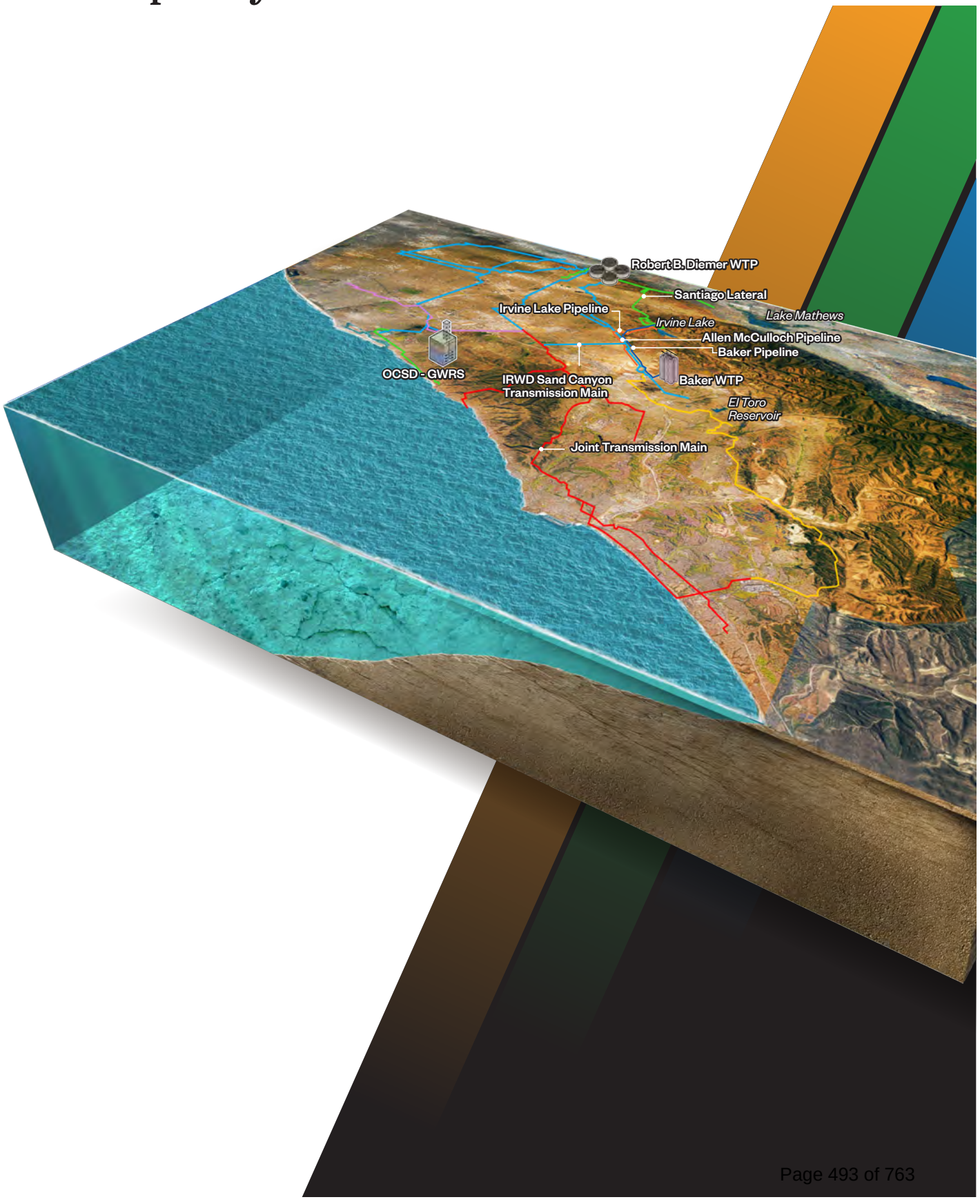
Reference

Keith Backus
Project Manager
(951) 685-7434 Ext. 135
kbackus@jcsd.us

1014-043

Section 4

Firm Capacity



Section No. 4

Firm Capacity

Hazen's commitment to MWDOC is to provide the necessary resources to address any project through this on-call contract. Since the scope of work will be defined as project needs arise, we have projected availability of our team within the potential timeframe of this agreement. In addition to this, Hazen has 1,200 professionals nationally, who are available to support this contract as needed.

California Resources

Cindy Miller based in our Irvine office has the authority to access all the expertise and professionals within Hazen on short notice.

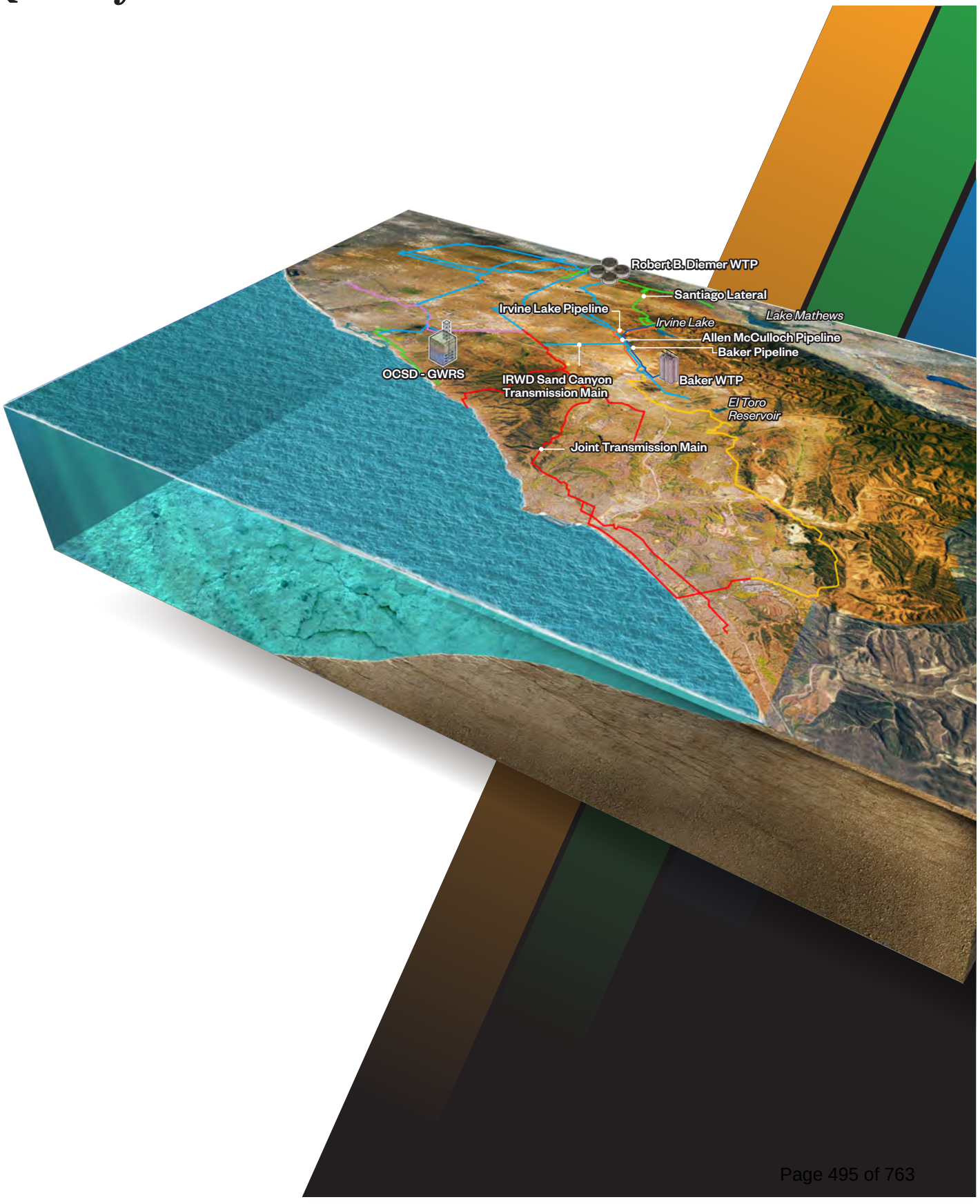
Hazen's discipline leads all have staff that can get up to speed, and support on a moments notice.

Team Member	Availability for this Contract	Current Workload
Cindy Miller, PE	50%-75%	25%
Kevin Alexander, PE	25%-50%	25%
Jack Kiefer, PhD	25%-50%	50%
Michael Wang, PhD, PE, BCEE	25%-50%	45%
Greg Gates, PE	25%-50%	25%
Scott Foster, PE	25%-50%	50%
Hampik Dekermenjian, PE	30%-60%	15%
Luke Wang, PE	30%-60%	60%
Alex Gorzalski, PhD, PE, PO	30%-70%	60%
Tori Yokoyama, PE	40%-60%	50%
Peace Maari	40%-70%	60%
Nicole Blute, PhD, PE	50%-70%	50%
Silvana Ghiu, PhD, PE	50%-75%	50%
Alan Karnovitz, MPP	25%-50%	25%
Mary Hambel, PE	30%-60%	60%
Chris Portner, PE, CEP	30%-60%	60%
Steve Malloy, PE	40%-60%	25%
Steve Conner, PE	30%-50%	50%
Bryan Lisk, PE, CEM	30%-60%	50%
Troy Walker, MIE (Aust)	30%-60%	50%

1014-043

Section 5

Quality Control



Section No. 5

Quality Control

A core element of Hazen's business practice is to provide quality engineering services and products. Commitment to providing quality to our Clients is inherent to Hazen's culture and evident in the work products we deliver.

Project Controls

Within two (2) weeks of award of contract, Hazen's Project Manager will submit an updated project schedule to the District for review. The schedule will show each task assignment and activities required to complete the work, the level of effort (in labor hours) planned for each task and subtask and will identify key milestones. We understand the importance of schedule and budget management on your project and will use our project controls expertise to track and control budget and schedule. This enables us to identify issues and options for resolution as early as possible to ensure that high quality deliverables are submitted on time and within budget.

Timely, frequent, and detailed communication. Communication is an essential component to project success. Hazen utilizes Microsoft Teams for coordination, progress calls, and presentations. With remote work measures in place since March 2020, our engineering and scientific teams have continued to maintain schedules and productivity. At Hazen, having focused and efficient meetings to keep projects on track is a regular part of our workday.

Progress Reporting

Project Manager Cindy Miller will lead the monitoring and reporting of progress, with a focus on maintaining the project schedule and cost as well as early identification of any issues which may lead to scope, cost or schedule variances. We utilize several management tools including critical path scheduling, budget projections, and monthly project budget updates, proven to benefit project delivery.

Quality Assurance/Quality Control (QA/QC)

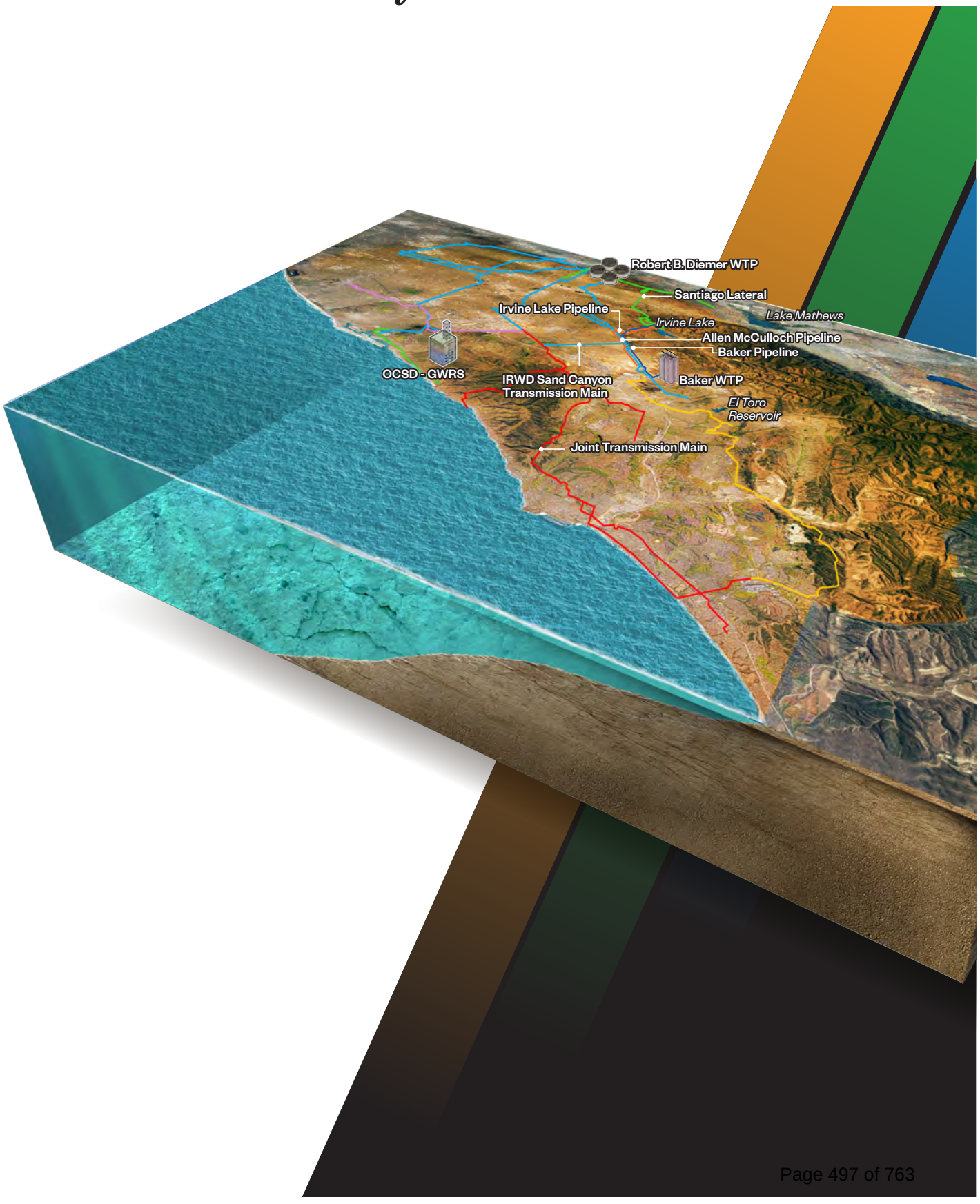
We build quality into everything we do at Hazen. A Quality Culture is an attitude that touches the entire project team, establishes the quality standards the team works to and builds the quality process that guides the day-to-day work. Our quality control approach is graphically illustrated below. We start by ensuring we have assembled the right team to deliver a high quality product and then we task the right person for each assignment. We then account for QC in the development of every deliverable schedule and make sure the QC review is assigned to a person with the appropriate technical expertise for the subject matter.

Lastly, we take our QC reviews very seriously, knowing the reputation of the Firm rests on the quality of our deliverables, whether those originate with Hazen staff or with a subconsultant. The result is that MWDOC will receive work of the highest quality each and every time. You have our assurance no submittal will be made without first successfully passing Hazen's rigorous quality control.

1014-043

Section 6

Professional Liability & Insurance



Section No. 6

Professional Liability & Insurance

Hazen does not have any current professional liability claims pending by any of its clients, including claims related to errors and omissions.

Hazen has provided a copy of the firm's current professional liability insurance in Appendix B.

HAZE&SA-01 KGODWIN

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 2/9/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Ames & Gough 8300 Greensboro Drive Suite 980 McLean, VA 22102	PHONE (A/C, No, Ext): (703) 827-2277	FAX (A/C, No): (703) 827-2279
	E-MAIL ADDRESS: admin@amesgough.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Hartford Fire Insurance Company A+ (XV)	19682
INSURED	INSURER B : Hartford Casualty Insurance Company A+ (XV)	29424
Hazen and Sawyer 498 Seventh Avenue New York, NY 10018	INSURER C : Twin City Fire Insurance Company A+ (XV)	29459
	INSURER D : Continental Casualty Company (CNA) A, XV	20443
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 1,000,000
	X Contractual Liab.			42UUNBH8062	3/29/2020	3/29/2021	MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$ 2,000,000
	X ANY AUTO			42UENBH7997	3/29/2020	3/29/2021	BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
							Comp./Coll. Ded	$ 1,000
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N	N / A		42WBAD0SYE	3/29/2020	3/29/2021	E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
D	Professional Liab.			AEH008231489	3/29/2020	3/29/2021	Per Claim/Aggregate	1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
RE: RFQ ENG. 2021 – IN-CALL TECHNICAL SERVICES TO SUPPORT RELIABILITY PLANNING, ENGINEERING & RESOURCE DEVELOPMENT

Municipal Water District of Orange County (MWDOC), its directors, officers, agents, employees, attorneys, consultants and authorized volunteers are included as additional insured with respect to General Liability and Automobile Liability when required by written contract. General Liability and Automobile Liability are primary and non-contributory over any existing insurance and limited to liability arising out of the operations of the named insured and when required by written contract. General Liability, Automobile Liability and Workers Compensation policies include a waiver of subrogation in favor of the additional insureds where permissible by state law and when required by written contract. 30-day Notice of Cancellation will be issued for the General Liability, Automobile
SEE ATTACHED ACORD 101

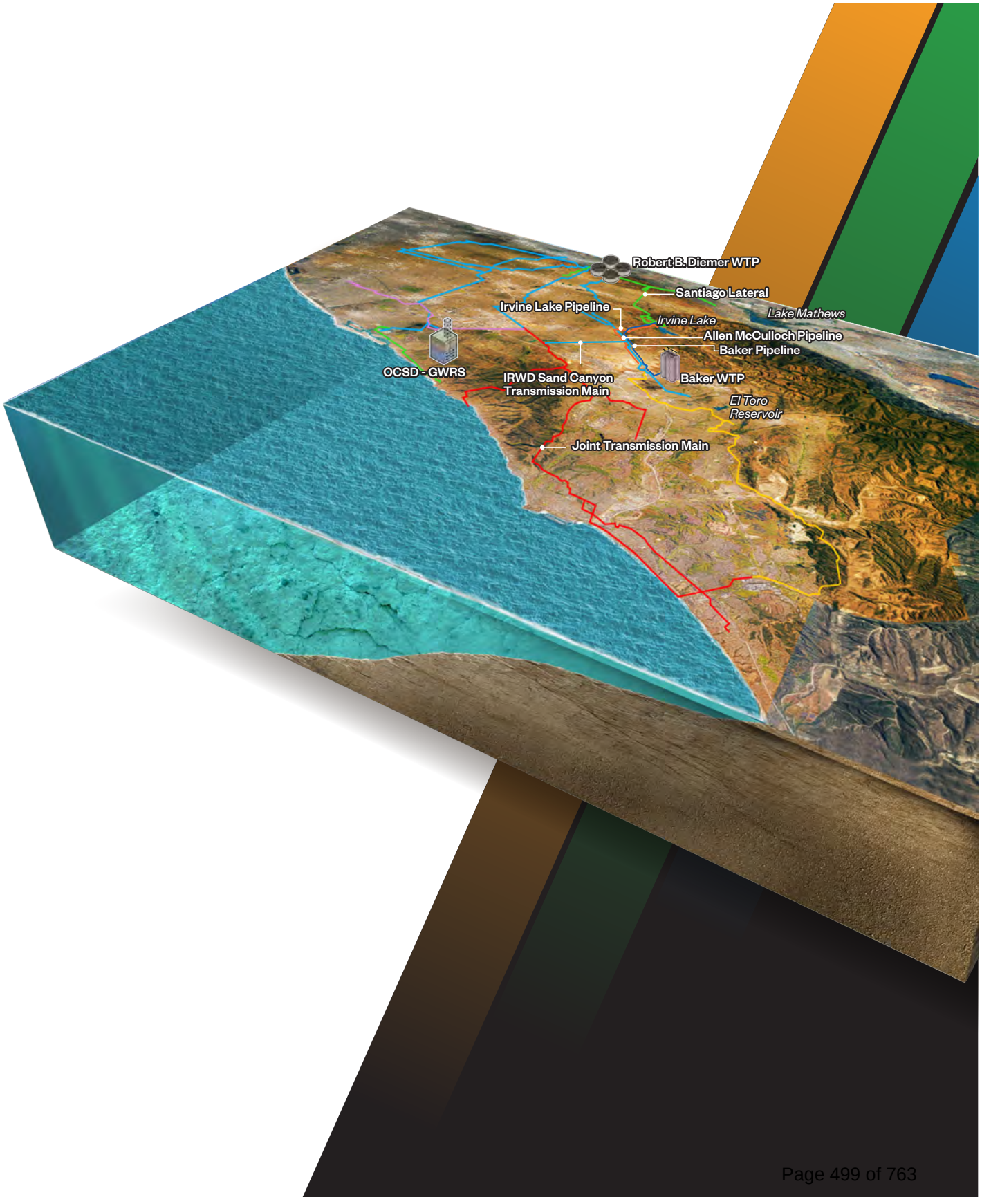
CERTIFICATE HOLDER	CANCELLATION
Municipal Water District of Orange County (MWDOC) PO Box 20895 18700 Ward Street Fountain Valley, CA 92708	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE

ACORD 25 (2016/03)

1014-043

Section 7

Firm Qualifications



Section No. 7

Firm Qualifications

MWDOC is planning the Water Supply Future for Orange County by integrating various new water supplies in an effort to provide reliability, resiliency and sustainability of water in the service area.

As a national firm with strong local ties in Orange County and throughout California whose sole focus is "**All Things Water**", Hazen is uniquely qualified to assist MWDOC in all three specialty areas; Engineering, Water Reliability Planning, and Water and Environmental Planning and Management.

Area of Focus No.1: Engineering: Hazen brings the following areas of expertise that will assist MWDOC with evaluation of integrating new supplies into the existing Orange County water supply system:

- **Hydraulic Modeling and GIS and Mapping Services:** Hazen's resources including a dedicated hydraulic modeling and analysis team consisting of over 35 specialists located across the country (including staff in Irvine and San Diego) and with expertise in all modeling platforms including Innovyze's Infowater. Over the last 10 years, we have modeled more than 100 distribution systems and 60 wastewater collection systems, and numerous water and wastewater master plans most of which included extensive GIS and water utility mapping.
- **Water Age Analyses:** As recommended in Hazen-prepared Doheny White Paper, examination of water age is an effective surrogate for multiple water quality parameters. Using InfoWater, Hazen's hydraulic modeling group has experience predicting water age based on extended period simulations. The simulations highlight areas where water age is excessive. Once the model is calibrated, extended period simulations can be run with new alternative water supply sources introduced into the model to see what effects the new sources may have on water quality, such as chlorine, pH, DBPs, as well as inorganics such as iron and manganese and/or nitrification parameters.
- **Water Quality Modeling Tools:** Hazen has a suite of tools for water supply planning (OASIS model), water quality and treatment (HazenPro, HazenGAC, HazenBAF), decision-making (HazenConverge), and data visualization (PowerBI dashboards, Data Analytics tools). We pride ourselves on working collaboratively with our clients, using the tools in a transparent way to arrive at recommendations. MWDOC can count on the Hazen team to leverage the appropriate tools when needed for efficiency and sound decision-making.
- **Water Conveyance Design and Operations:** The backbone of any water system is the network of pumps and pipes that transmit and distribute drinking water. Unfortunately, much of this aging infrastructure is reaching a point of dangerous deterioration and, in many cases, has limited or no additional capacity. Whether assessing and rehabilitating or repurposing existing assets or building new assets, **Hazen combines top technical know-how with innovative, informed, responsive service on conveyance projects of all scopes and size.** We specialize in a variety of construction methods, including HDD, microtunneling, jack and bore and other trenchless techniques. Hazen's extensive buried infrastructure capabilities are complemented by our award-winning pump station design and construction management solutions. Irvine office is staffed with conveyance experts, which includes pipeline and pump station experts, with experience all in Orange County, projects like the Baker Pipeline improvements and Baker Pump Stations. In addition, Hazen's staff includes operations professionals who have managed large water systems nationally and internationally.
- **Metropolitan (MWD) Engineering Planning and Design Experience:** Hazen is currently under contract with MWD to assist with conveyance planning and design, under an on-call services contract. Hazen has successfully completed several emergency projects, some of which included large-diameter conveyance facilities. As an ex-

ample, Hazen recently completed an emergency repair project for the Colorado River Aqueduct (CRA), in Cabazon, a 16-ft diameter buried arched aqueduct. This location includes an emergency relief structure that provides temporary storage when the CRA is drained for maintenance or in an emergency. Scott Foster modeled a surge event caused by seismic activity, and Hazen evaluated results to control the pressure and relieve the surge event. Hazen's efforts resulted in recommendations for improvements to the relief structure. Hazen then prepared final design plans and specifications for diversion gates replacement, all on an expedited schedule. Other MWD projects Hazen team members led outside of the on-call contract include meter upsizing of MWD Turnout OC-33 on the Santiago Lateral and improvements to the MWD-owned Santiago Lateral as part of the Baker WTP project.

- **Metropolitan (MWD) Water Quality Protocols and Procedures:** Through our work at West Basin, Hazen's Team, led by Nicole Blute, has had the opportunity to work closely with MWD staff to help address water quality concerns in the distribution system from West Basin's proposed ocean desalination project. This knowledge of MWD's water quality protocols and procedures, along with a deep understanding of MWD's testing requirements, will benefit MWDOC as projects proceed forward towards more in-depth feasibility evaluation.
- **MWD Hydraulics and Transients Experience:** Being part of Hazen's Team, Scott Foster Engineering, Inc. is optimally suited to perform hydraulics and surge analyses for MWD-owned facilities. Since 1991, Mr. Foster has worked closely with MWD personnel, performing hydraulic and pressure surge analyses on many parts of the MWD transmission system. His understanding of the requirements and policies of MWD as it relates to hydraulics and surges as well as the relationships he has built with MWD provides a clear understanding of the work required. This work has involved working with MWD to develop acceptable flow velocities, allowable HGLs under both steady state and pressure surge conditions, turnout operations, as well pump station operating parameters.
- **Desalination and Groundwater Treatment Design and Operations:** Hazen has continually been an innovator in water treatment process design. Hazen has impressive and ever-growing qualifications, both locally, nationally, and internationally relative to water treatment, including groundwater treatment, brackish desalination, and ocean desalination technologies. **Hazen's staff includes not only engineers, but operators who have real world experience in the operation of complex water treatment systems.** Recent Hazen experience in Southern California includes design of over ten 10 groundwater treatment systems for contaminants such as PFOS, PFOA, 1,2,3-TCP, TCE, nitrate, iron, manganese, arsenic, TDS, perchlorate, and COCs such as 1,4 dioxane, 1,2 DCA and DCE.

Area of Focus No. 2: Water Reliability Planning: Hazen is a leader in providing comprehensive water reliability planning services, from large utilities such as the City of New York, to small water districts like Trabuco Canyon Water District. Hazen has assisted MWDOC to advance its water reliability planning efforts for the Doheny Desal Project and is ready to assist with follow-on evaluations, as well as help advance the evaluation of other water supply projects. Because of the long-standing work performed for agencies in the Chino Basin, Hazen also has an in-depth understanding of water banking projects in the Chino Basin, including SARRCUP, that can potentially benefit Orange County. Hazen brings the following areas of expertise that will assist MWDOC with water reliability planning to evaluate new water supply projects and support updates to MWDOC's Orange County Water Reliability Study:

- **Water Demand Forecast Modeling:** The Hazen Team has extensive experience forecasting demand and developing customized demand modeling tools for our clients. Our national experience reflects many forecast elements, including application of land use information and demographic data as well as identification of long-term trends in consumption and other factors that influence demand. As an example, Hazen recently helped San Diego County Water Authority develop water demand models and forecasts in support of the Water Authority's Urban Water Management Plan, involving disaggregate sectoral forecasts for each of the 24 member retail agencies.
- **Climate Adaption:** Climate change presents important challenges to many fundamental paradigms of water resources management and supply planning. Rising sea levels, increasing storm intensities, longer drought periods,

and more frequent heat waves all affect the way in which we evaluate water supply reliability. With a growing number of extreme events already attributed to climate change, water managers must reassess the vulnerability of their physical and operational systems. Hazen are experts in distilling the continually evolving set of climate projections to a practical level and identifying their impacts on urban water demand to reservoir and pipeline operations and projects ranging from conceptualization to implementation. Hazen's capabilities include: climate data analysis and modeling; risk management and master planning; resiliency planning and extreme event preparedness; water resources projections and systems modeling; coastal zone impact assessment; and carbon footprint mitigation and accounting. Within the last two years, Hazen has prepared comprehensive climate resiliency studies for large water and wastewater agencies in Southern California, including, OCSD, L.A. County, and Simi Valley.

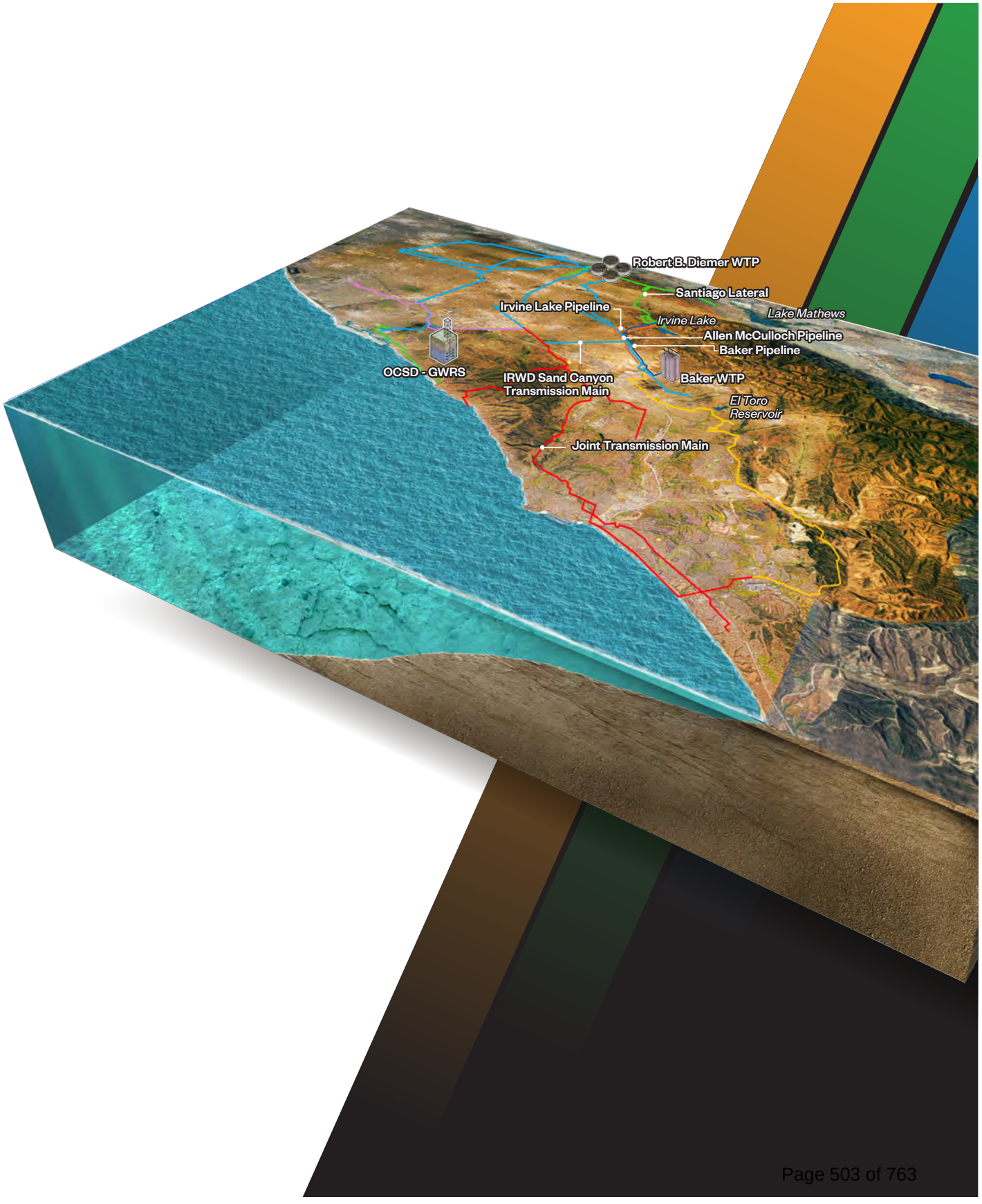
- **Economic Analyses of Water Reliability Projects:** Hazen's Economic and Financial Services Group offers analytic services to support the type of data-driven decision-making required by MWDOC. We are experts in econometric modeling, economic input-output analysis, statistical methods, financial modeling, market and non-market valuation of resources, and survey research. We regularly perform benefit-cost analyses, financial feasibility studies, and fiscal impact assessments. Our economists have national and international experience with small community water systems, large urban municipalities, state and federal government, and international organizations.

Area of Focus No. 3: Water and Environmental Planning / Management (Bay-Delta Activities): Hazen is currently working with several State Water Project (SWP) contractors and their customers to model the changing reliability of Delta water supplies. Our team has a strong understanding of SWP availability through this work, and is familiar with recent future projections (including climate change impacts) provided in the latest 2019 Delivery Capability Report. Hazen has also developed a regional supply model for the Bay Area Water Supply and Conservation Agency (BAWSCA) that represents the supplies of several SWP contractors. The model is being used to evaluate the reliability impacts of investment in regional infrastructure (e.g. Los Vaqueros Reservoir Expansion, Delta Conveyance, potable reuse) as well as changes in regulatory / environmental policy (e.g. the Bay-Delta plan).

- **Water Resources Management:** Hazen specializes in decision support for water management planning and provides holistic solutions to complex problems. Today's water management environmental requires innovation in dealing with the complex dynamics of physical, social, economic and information systems. Our water management approach rests on the principles of integrated water management, employing a multidisciplinary toolset that fosters a participatory environment and develops solutions that account for risk and uncertainty inherent in future regulatory, social, and climatic conditions. As indicated above, Hazen is providing these services to several SWP contractors related to the Delta.
- **Surface Water Quality:** At Hazen, we take a holistic, watershed approach to water quality, combining regulatory expertise with innovative source controls to offer a range of suitable management options. This approach has benefited utilities and municipalities facing tougher water, wastewater, and stormwater regulations. Hazen has led pioneering research in the field of managing source water quality. With funding from the Water Research Foundation (WRF) Hazen partnered with 41 agencies across the United States and Australia to identify and characterize water quality impacts of extreme weather. Water quality impacts evaluated included those stemming from floods, droughts, algal blooms, increased contaminant levels in source waters, and (DBP) precursors.
- **Climate Adaption:** See above
- **Energy Management and Greenhouse Gas Emissions:** As a pioneer in water and wastewater engineering since 1951, Hazen understands the important role energy management serves and how it benefits our clients. We provide a comprehensive suite of service ranging from simple lighting evaluations to complex process optimization projects. The Energy Management Group at Hazen, led by Bryan Lisk, has provided energy management services for clients across California, primarily to Hazen's wastewater clients.

Appendix A

Resumes



Kevin Alexander, PE

Principal in Charge

Mr. Alexander is Vice President and Hazen's Western Regional Manager. He has various facilities upgrades project experience as Project Director or Project Manager.

Education

BS, Civil Engineering, Missouri University of Science and Technology (Previously University of Missouri at Rolla)

Certification/License

Professional Engineer

Professional Activities

AWWA, AZWA, AMTA

CA-NV AWWA,

CA Water Reuse Assoc.

WateReuse Association

WEF

Technical Publications

Author of more than 30 technical presentations and publications.

Owners Agent-San Fernando Basin Groundwater Remediation, Los Angeles Department of Water and Power, Los Angeles, CA
Technical Advisor and Alternative Delivery Expert providing contract development and review services for the Progressive Design Build contract and RFP. Assisted in review of the technical documents for 3 treatment plant designs as part of the Project.

Seawater Desalination Demonstration Facility Decommissioning, West Basin Municipal Water District, Redondo Beach, CA
Project Manager: Hazen lead the project for decommissioning of the 110 GPM seawater desalination system. A major effort includes finding a buyer or research organization for purchasing the used equipment to maximize value to the Client. Responsible for project oversight through design and construction.

Design Build of the City of Lemoore Groundwater Treatment Facilities, City of Lemoore, CA
Project Director responsible for the support of the design of two groundwater treatment systems supplying 5 and 10 MGD respectively with Ion Exchange, Granular Activated Carbon. Responsible for the contract and QA/QC of the design of the project.

Design Build of the Central Groundwater Treatment Facility, City of Monterey Park, Monterey Park, CA
Design Project Manager as part of a Design Build Team responsible for the complete design of a 10 MGD UV Advanced Oxidation system and catalytic GAC system for treatment of a highly impaired groundwater in the City. Responsible for the complete process mechanical design as well as coordination of civil, electrical and structural designs including design of 0.5 miles of sliplined piping for raw well water. Responsible for leading the process for obtaining the permit from the California DDW.

Design Build of the Well No. 9 NF Treatment Plant, City of Signal Hill, CA
Design Project Manager responsible for the complete design of the well pump through the NF treatment system including the design of the electrical and control building. Responsible for coordination of mechanical, civil, electrical and structural designs for a 2 MGD high recovery NF treatment plant for color removal and a GAC system for Benzene removal.

Cindy Miller, PE

Project Manager

Ms. Miller is a hands-on Senior Project Manager, who also serves as Hazen's Irvine Office Manager. She has spent her entire career of over 26 years successfully delivering numerous drinking water projects for water districts and cities throughout Orange County and Southern California.

Education

B.S., Civil Engineering, University of California, Irvine

Certification/License

Professional Engineer

Areas of Expertise

- Pipeline Planning and Design
- Project Management
- Program Management
- Project Delivery
- Groundwater Supply
- Well Equipping Planning and Design
- Pump Station Planning and Design
- Reservoir Storage Planning and Design
- Drinking Water

Professional Activities

AWWA, ASCE, AMTA

CA-NV AWWA

CA Water Reuse Association

These projects have included both planning and design projects, including hydraulic modeling, master plans, pipelines, water storage reservoirs, pump stations, wells, hydraulic control and metering facilities, and groundwater and surface water treatment plants. Ms. Miller served as Project Manager and Engineer-of-Record for the Baker Water Treatment Plant, a regional 28 MGD microfiltration and UV treatment plant that is a critical local drinking water supply for five South County water agencies, in partnership with MWDOC. As Program Manager, Ms. Miller has delivered some of the largest regional drinking water supply projects in California, including most recently the $150 million Phase 3 Groundwater Expansion Project for the Chino Basin Desalter Authority (CDA), and the $30 million South Archibald Plume Cleanup Project for this same client.

Chino I Desalter VOC Treatment, Chino Basin Desalter Authority, CA
Project Manager. The project includes preliminary and final design of two (2) GAC treatment facilities (1.7 mgd and 3.4 mgd) at the Chino I Desalter Plant for the removal of TCE and 1,2,3-TCP, and evaluation of treatment requirements for 1,4-dioxanr, cis-1,2-DCE, 1,2-CDA, PFOA, and PFOS. The goal of this project is to provide groundwater treatment for all CDA bypass wells (CDA Wells I-1 through I-4), and several treated wells (CDA I-16 through 18), plus 10 new wells that will be installed by the County of San Bernardino as part of a Cleanup and Abatement Order issued by the Santa Ana Regional Water Quality Control Board (SARWQCB).

Water Quality Evaluation Study, Jurupa Community Services District, Jurupa Valley, CA
Project Manager for an analysis to evaluate design alternatives to address a range of water quality constituents, including TDS, nitrate, PFAS, VOCs, 1,2,3-TCP, 1,1-DCE, and perchlorate. This study included the development of short-term options to mitigate service risks resulting from out of service wells, as well as long-term design alternatives to address regulated contaminants, while allowing flexibility to comply with potential future regulations.

Nicole Blute, PhD, PE

Water Quality

Dr. Blute develops and leads a wide variety of drinking water system projects, notably including water system planning, groundwater contamination treatment projects including PFAS, technology testing for emerging inorganic and organic contaminants, distribution system water quality projects, and disinfection strategy evaluations.

Education

PhD, Environmental Engineering, Massachusetts Institute of Technology

BS, Environmental Science, University of Rochester, NY

BA, Chemistry, University of Rochester, NY

Certification/License

Professional Engineer

Areas of Expertise

- Project management
- Groundwater treatment
- Decision analysis
- Advanced treatment
- Source water integration
- Distribution system water
- quality
- Corrosion control and stabilization
- Bench, pilot, and demonstration testing

Professional Activities

American Water Works Association

- Research Division Trustee
- Inorganic Contaminants Committee Chair

Society of Women Engineers

California Nevada AWWA

Recycled Water Committee Secretary

Owner's Agent of the Groundwater Remediation in the San Fernando Basin, LADWP, Los Angeles, CA

Dr. Blute is the Project Manager and Technical Leader for the Los Angeles Department of Water and Power (LADWP) San Fernando Basin Groundwater Remediation. The San Fernando Basin Groundwater Remediation program is a cornerstone of the Sustainable City pLAn, decreasing reliance on imported water. As the Owner's Agent, the team led by Dr. Blute is providing support to LADWP in a $48.5M, 10-year project to select and implement remediation, which is projected to cost up to $600M for planning, design, and construction.

White Paper - Integration of Doheny Desalinated Water with MET Water, other Desalinated Supplies, and Local Groundwater, MWDOC, CA

Dr. Blute led the Hazen team's contributions on water quality integration of supplies, and worked with MWDOC and MWD to articulate concerns and treatment strategies.

Water Quality Integration Testing of Distribution System Materials, West Basin Municipal Water District, Redondo Beach, CA

Dr. Blute was the Project Manager for a project with West Basin Municipal Water District and Metropolitan Water District of Southern California to design, construct, and operate a demonstration facility for testing reverse osmosis-treated water impacts on distribution pipe materials. The project involved evaluating appropriate water quality targets to prevent corrosion of five pipe materials (concrete steel pipe, unlined cast iron pipe, copper pipe, lead solder, and brass meters) with multiple water sources: desalinated water, MWD water (Jensen and Weymouth blend), local groundwater from Manhattan Beach, and blends of these waters in a six month long pilot test.

Hampik Dekermanijan, PE, BCEE

Planning/Management Bay Delta Activities

Mr. Dekermenjian serves as Hazen's West Region Client Service Leader and Operations Manager for the Los Angeles office. He has 30 years of experience in water resources, drinking water, recycled water, wastewater and conveyance projects. He has spent the last 15 years specializing in water resources, specifically stormwater management and integrated resource planning throughout the state of California.

Education

M.B.A., University of Southern California, Los Angeles, CA

M.S., Environmental Engineering, University of Southern California, Los Angeles, CA

B.S., Engineering, California State University Northridge, Los Angeles, CA

Certification/License

Professional Engineer

Areas of Expertise

- Water Resources: Stormwater, Integrated Planning
- Stakeholder strategy and facilitation

Professional Activities

AWWA, WEF, NACWA, AMWA, ACWA, CA Reuse

An accomplished strategist, stakeholder facilitator and project director, he provides technical and management capabilities to work in collaborative settings involving complex projects and stakeholder interests. He has a wide variety of experience in large project executions, stakeholder collaboration and stormwater management strategies. He has managed a wide variety of projects from initial planning, through design, construction and operation.

One Water LA 2040 Plan for the City of Los Angeles, Bureau of Sanitation. Los Angeles, CA

Principal in Charge and Stakeholder Facilitator. For the City of Los Angeles, Bureau of Sanitation, Mr. Dekermenjian served as the principal in charge and stakeholder facilitator for the One Water LA 2040 Plan. In his role, Mr. Dekermenjian interacted regularly with the City of Los Angeles staff and all the stakeholders repersenting a diverse group of community, environmental, and business leaders and other regional government entities. The One Water LA 2040 Plan brought together all the water needs of Los Angeles under one overarching plan to address water, wastewater and stormwater needs.

Enhanced Watershed Management Plans for the City of Los Angeles, Bureau of Sanitation. Los Angeles, CA

Principal in Charge and Technical Reviewer. For the City of Los Angeles, Bureau of Sanitation, Mr. Dekermenjian served as the principal in charge and technical reviewer for multiple Enhanced Watershed Management Plans. In his role, Mr. Dekermenjian interacted regularly with the City of Los Angeles staff and multiple stakeholders including, the Regional Water Quality Control Board and other City Departments. The Enhanced Watershed management Plans, included detailed projects and activites to improve water quality and increase stormwater capture.

Jack C. Kiefer, PhD

Technical Advisor - Supply & Demand

Dr. Kiefer is an economist and geographer specializing in multiple consulting areas of water resource economics and planning, econometrics, and integrated water demand and supply planning and management.

Education

PhD, Geography, Southern Illinois University

MA, Monetary and Development Economics, Southern Illinois University

BA, Economics, Southern Illinois University

Areas of Expertise

- Econometric Analysis and Forecasting
- Water Supply Reliability Planning
- Impact and Process Evaluation
- Risk and Uncertainty Analysis
- Water Resources Planning
- Economic Analysis

Professional Activities

American Water Works Association

American Water Resources Association

Technical Publications and Presentations

"Creating a Typology of Water Demand Forecasting Methods: Nuances and Implications" Poster presented at American Water Works Association 2018 Annual Conference and Exposition, Las Vegas, NV, June 11-14, 2018.

"Information Needs for Water Demand Planning and Management." J. Kiefer and L. Krentz. 2018. Journal of the American Water Works Association, 110:3.

Water Demand Study 2050, East Bay Municipal Utilities District, CA
Technical Director. EBMUD is in the process of developing an econometric model for forecasting water demands in their service area out to the year 2050. The econometric model will explicitly account weather/climate conditions, anticipated land use changes, development trends, and socio-economic factors (e.g. water rates, jobs, population growth, income) which have been shown to impact water use. The forecasted demands will be a critical component of EBMUD's 2020 Urban Water Management Plan.

Long-term Water Demand Forecasts, San Diego County Water Authority, San Diego, CA
Project Manager of development of five consecutive water demand forecasts and forecast updates for the San Diego County Water Authority, in support of the Agency's periodic development of its Urban Water Management Plan. Original efforts involved the development of econometric models of M&I water demands, which were followed by development of predictive models for agricultural demands. More recent support to the Authority has included the analysis of climate change impacts on water demand and the development and application of risk-based simulation procedures to support long-term supply reliability and capital improvement planning.

Model Development and Long-Term Water Demand Forecasts for Metropolitan Water District of Southern California, CA
Project Manager. Dr. Kiefer has led several water demand analyses for the Metropolitan Water District of Southern California. These have included development of long-term water demand forecasts, procedures for generating confidence intervals around long-term forecasts, and evaluation of water conservation programs and best management practices (BMPs). He evaluated large-scale retrofit programs implemented in Pasadena and San Diego, and also developed statistical functions to map potential savings from plumbing retrofit depending on the characteristics of any particular Metropolitan service area.

Education
B.S., Civil Engineering,
Lehigh University, 1988

Experience
31 years

Professional Registrations
Professional Civil Engineer

CA	C50860
UT	5587955-2202
WA	38053
OR	67001PE
CO	45608
NV	17199
HI	10424
AZ	36737
TX	115203
GA	PE036044

Professional Memberships
ASCE
AWWA

R. Scott Foster, P.E.

Principal

Scott Foster is the Principal and Owner of Scott Foster Engineering, Inc. He has 31 years of experience performing hydraulic modeling and analysis of pipeline surges and transients for over 700 systems in both gravity and pressure pipeline systems, including water hammer and pipeline failure due to loss of power to pump stations, turbine units, valve operations, and pipeline breaks throughout the United States. He has extensive experience designing surge control devices such as surge tanks, standpipes, vacuum relief valves, surge relief and surge anticipator valves, and flywheels in addition to developing flow control, pump station, and turbine operation parameters to reduce the effects of pressure surges.

As a recognized expert in the field, Mr. Foster has performed forensic analyses and field testing of systems related to pipeline failures and operational issues to identify the causes and recommend measures to eliminate the problems. He has participated in multiple value engineering studies requiring the review of surge analyses performed by other consultants using commercially available computer programs and verifying these results using programs different from those employed in the analysis. He has served as an expert witness on water hammer issues and conducted numerous presentations to private and governmental agencies on water hammer and pressure surges.

Relevant Experience

Carlsbad Desalination Project Product Water Pump Station and Conveyance Pipeline

The Product Water Pump Station consists of eight pumps that delivers up to 57 mgd of desalinated water through the approximately 53,000 ft long, 54-inch Conveyance Pipeline to the San Diego County Water Authority's Second Aqueduct. Scott performed hydraulic and pressure surge analyses for the system under multiple head, friction, and flow conditions. The maximum and minimum allowable pressures in pre-constructed segments of the pipeline required surge protection prepared by others to be reevaluated. Scott determined that surge protection in the form of three 26,000 gallon pressurized surge tanks were required to protect the system. Field testing showed the predicted results to be within three percent or less of the field test results.

Lake Perris Bypass Facility Pump Station, Metropolitan Water District of Southern California

Starting in 1991, Scott has performed multiple hydraulic and pressure surge analyses for Lake Perris Bypass Facility Pump Station under many operating and supply conditions. The pump station has the capacity to deliver up to approximately 250 cfs to the Mills Filtration Plant and/or Lake Perris, depending on the source of flow. Flow can be provided to the pump station from Lake Perris, the Casa Loma/San Diego Canal, or Diamond Valley Lake. Pipelines required for the modeling effort included the Inland Feeder, Eastside Pipeline, Lakeview Pipeline, Lake Perris Bypass, Box Springs Feeder, and the Santa Ana Valley Pipeline. Due to maximum pressure limitations on both the upstream and downstream sides of the system, surge protection measures in the form of pressurized surge tanks have been recommended and installed at the pump station. Additionally, the Bernasconi Tunnel was fitted with three 10-inch vacuum relief valves to utilize the tunnel as a surge tank to prevent maximum pressures in the suction system from exceeding allowable values. Testing performed by MWD verified the results of the modeling.

Steve Malloy, PE

Infrastructure

Mr. Malloy is an experienced professional in water and sewage system planning and design. He brings a client's perspective to projects and applies his construction management experience in his QA/QC reviews.

Education

Engineering Management Certification, UC Irvine

M.S., Civil Engineering, Stanford University

B.S., Civil Engineering, Cal Poly, Pomona

Certification/License

Professional Engineer

Areas of Expertise

- Program Management
- Sewer Collection Systems
- Sewer Siphons and Air Jumpers
- Sewage Lift Stations and Force Mains
- Diversion Structures
- Metering
- Odor Assessment and Control

Professional Affiliations

Water Environment Federation

American Water Works Association

American Membrane Technology Association – Treasurer, 2010 - 2012

American Society of Civil Engineers – Life Member

Orange County Water Association – Life Member

Water Quality Evaluation Study, Jurupa Community Services District, Jurupa Valley, CA

QA/QC for an analysis to evaluate design alternatives to address a range of water quality constituents, including TDS, nitrate, PFAS, VOCs, 1,2,3-TCP, 1,1-DCE, and perchlorate. This study included the development of short-term options to mitigate service risks resulting from out of service wells, as well as long-term design alternatives to address regulated contaminants, while allowing flexibility to comply with potential future regulations.

Chino I Desalter VOC Treatment, Chino Basin Desalter Authority, CA

QA/QC. The project includes preliminary and final design of two (2) GAC treatment facilities (1.7 mgd and 3.4 mgd) at the Chino I Desalter Plant for the removal of TCE and 1,2,3-TCP, and evaluation of treatment requirements for 1,4-dioxanr, cis-1,2-DCE, 1,2-CDA, PFOA, and PFOS. The goal of this project is to provide groundwater treatment for all CDA bypass wells (CDA Wells I-1 through I-4), and several treated wells (CDA I-16 through 18), plus 10 new wells that will be installed by the County of San Bernardino as part of a Cleanup and Abatement Order issued by the Santa Ana Regional Water Quality Control Board (SARWQCB).

Michelson Water Recycling Plant Phase 2 Expansion Project, Irvine Ranch Water District, Irvine, CA

Project Manager on project to increase recycled water production capacity of existing plant from 18 mgd to 28 mgd. The project included new 48" to 60" influent sewers, headworks, primary sedimentation tanks, a 11 mgd membrane bioreactor, 22 mgd high rate clarifier, 15 mgd ultraviolet disinfection system, chemical systems, odor control, associated electrical and instrumentation systems, and a floodwall to provide 100-year flood protection. Duties included overseeing planning, design, construction management, permit compliance, and startup activities.

Luke C. Wang, PE

Supply & Demand

Mr. Wang specializes in water supply planning, operations, and demand forecasting. He is Hazen's Water Resource Management Leader for the West Region.

Education

MS, Earth and Environmental Engineering, Columbia University

BS, Earth and Environmental Engineering, Columbia University

Certification/License

Professional Engineer

Areas of Expertise

- Water supply operations management
- Source water quality
- Big data management and visualization
- Hydrology

Professional Activities

American Water Works Association (AWWA)

AWWA Information Management & Technology Research Committee - Chair

American Geophysical Union

Publications

Arnold, Roger, Luke Wang, Talle Lopez, Sophie James, and Nicole Blute. "Updating Lead and Copper Rule Sample Site Selection: Best Practices from an Innovate Pilot Program." Journal of the American Water Works Association, April 2020: 22-31.

Gong, Gavin, Lucien Wang, Laura Condon, Alastair Shearman, and Upmanu Lall. "A Simple Framework for Incorporating Seasonal Streamflow Forecasts Into Existing Water Resource Management Practices." Journal of the American Water Resources Association 46.3 (2010): 574-585.

Zone 7 Water Agency (Zone 7) Conjunctive Use Study and Water Supply Evaluation Update, Livermore, CA

Phase lead for development of Zone 7's Water Supply Evaluation (WSE) update. Managing a peer review of Zone 7's existing water supply risk model in coordination with updates to the Agency's water supply portfolio alternatives. The project will culminate in an updated WSE which informs Zone 7's CIP and long-term water supply strategy.

East Bay Municipal Utility District (EBMUD) 2050 Demand Study, EBMUD, Oakland, CA

Deputy Project Manager for EBMUD's 2050 Demand Study. EBMUD is in the process of developing an econometric model for forecasting water demands in their service area out to the year 2050. The econometric model will explicitly account weather/climate conditions, anticipated land use changes, development trends, and socioeconomic factors (e.g. water rates, jobs, population growth, income) which have been shown to impact water use. The forecasted demands will be a critical component of EBMUD's 2020 Urban Water Management Plan.

Water Quality Evaluation Study, Jurupa Community Services District, Jurupa Valley, CA

Water Supply & Demand for an analysis to evaluate design alternatives to address a range of water quality constituents, including TDS, nitrate, PFAS, VOCs, 1,2,3-TCP, 1,1-DCE, and perchlorate. This study included the development of short-term options to mitigate service risks resulting from out of service wells, as well as long-term design alternatives to address regulated contaminants, while allowing flexibility to comply with potential future regulations.

Bay Area Water Supply & Conservation Agency Regional Water Supply Reliability Model Development and Analysis Services, San Mateo, CA

Project Manager and lead systems modeler for BAWSCA's Regional Water Supply Reliability Model project. Designed a water supply system model for the Bay Area incorporating regional supply sources (e.g. San Francisco Regional Water System) with locally utilized supplies and detailed estimations of municipal demands. BAWSCA is using the model for long-term water reliability planning and alternatives analysis.

Michael Wang, PhD, PE, BCEE

Technical Advisor - Hydraulics & Modeling

Dr. Wang specializes in computer modeling and hydraulic design and analysis of water and wastewater treatment facilities. He performs GIS and hydraulic modeling on water distribution and wastewater collection systems, combining the most updated version of GIS with water distribution and sewer collection system simulation models, such as KYPIPE, WaterCAD, WaterWorks, MOUSE and InfoWorks.

Education

Ph.D., North Carolina State University

M.S.E., University of North Carolina at Charlotte

B.S., Rutgers University

Certification/License

Professional Engineer

Areas of Expertise

- Design of water and wastewater treatment processes and facilities
- Computerized modeling and mapping of water distribution and wastewater collection systems
- Hydraulic design and analysis of water and wastewater treatment facilities
- Specialized in blower/aeration systems and chemical storage and feed facilities

Professional Activities

American Academy of Environmental Engineers, (Diplomate of Environmental Engineer (DEE) or Board Certified Environmental Engineer (BCEE))

American Water Works Association

Water Environment Federation

Dr. Wang served as the program manager for Loudoun Water, Loudoun County, VA for its water and wastewater utility master planning. Dr. Wang has been serving on the Engineering Modeling Applications Committee for AWWA since 2010. He contributed to and was a technical peer reviewer of the entire AWWA Manual M32, "Computer Modeling of Water Distribution Systems", Third Edition 2012. Dr. Wang has performed, reviewed and directed numerous hydraulic surge analyses for more than 100 utilities and systems and is leading the Hydraulic Modeling Service Group of the firm.

Chromium 6 Removal Facilities, Coachella Valley Water District, Palm Desert, CA

Technical Adviser and Reviewer. Used hydraulic surge analysis incorporating hydraulic system model (InfoWater) for surge protection facility design for the groundwater treatment plants and transmission main pipeline and reviewed plant hydraulics for both SBA and WBA plants.

Dulles North Booster Pump Station, Loudoun Water, Loudoun County, VA

Technical Advisor and QA/QC. Surge analysis on the proposed 30-mgd Pump Station. This project was fast tracked and had to be operational within 14 months. Tasks included converting a hydraulic water model to KYPipe and simulating surge and power loss situations at the pump station and at the Fairfax WTP. Recommendations included adding air release vacuum valves along the dedicated transmission main from the Fairfax WTP to the pump station.

Water Distribution System Design, City of Zarqa, Hashimite Kingdom of Jordan

Lead Technical Reviewer. Water distribution system hydraulic modeling and design.

Greg Gates, PE

Technical Advisor - Water Resources

Mr. Gates serves as Hazen's Albuquerque Office Operations Manager and Corporate Water Resources Practice Lead. He brings over 25 years of experience in groundwater modeling, water supply, and integrated water resources planning.

Education

MS, Environmental Health Engineering, University of Texas

BS, Civil Engineering, University of Texas

Certification/License

Professional Engineer

Areas of Expertise

- Integrated resource planning
- Groundwater modeling
- Scenario planning

Professional Activities

AWWA

Zone 7 Water Agency (Zone 7) Conjunctive Use Study and Water Supply Evaluation Update, Livermore, CA
Principal-In-Charge for development of Zone 7's Water Supply Evaluation (WSE) update. Managing a peer review of Zone 7's existing water supply risk model in coordination with updates to the Agency's water supply portfolio alternatives. The project will culminate in an updated WSE which informs Zone 7's CIP and long-term water supply strategy.

Supply System Master Plan, Portland Water Bureau, Portland, OR
Project Manager. Provided support to the supply system master plan for the facilitation and development of a scenario planning process that would act as an overarching framework for plan development. This process entailed leading PWB leadership through structured workshops where decisions were made on appropriate scenarios to test future conditions. This task includes technical support for and review of the SSMP plan.

Central Arizona Project, Climate Adaptation Plan, AZ
Project Manager. Worked with a wide variety of internal stakeholders from all CAP functions (operations, engineering, CAGRD, finance, etc.), including board members through a step-wise workshop process. The process was used to develop scenarios, evaluate tools, and construct portfolios to address the future implications of climate change.

Denver Water, Integrated Resource Plan (IRP), Denver, CO
Plan Development and Oversight. Provided oversight, development, and review of final Integrated Resource Plan (IRP). The IRP was developed in a holistic manner examining all aspects of Denver Water's system from climate impacts to supply and demand to detailed hydraulic modeling of distribution and storage. Potential future conditions were quantified and modeled to assets gaps. Gaps were filled through development of alternatives and ultimately portfolios. The plan culminated in development of a continuous planning process that helped bring long-term thinking into the CIP process and overall decision making. A structured decision making process was developed to facilitate agency wide adoption.

Alex Gorzalski, PhD, PE, PO

Supply & Demand

Mr. Gorzalski is a professional engineer experienced in process engineering, utility operations, and emergency response. His experience includes serving as the chief of a 120 MGD water treatment plant.

Education

Ph.D. Environmental Engineering, University of North Carolina at Chapel Hill

M.S. Environmental Engineering, University of North Carolina at Chapel Hill

B.S. Civil Engineering, University of Wisconsin-Madison

Certification/License

Professional Engineer

Professional Operator – Water Treatment

FEMA ICS-100, IS-700, IS-800

Areas of Expertise

- Utility operations
- Physical/chemical processes
- Water chemistry
- Water utility data analytics

Refereed Journal Publications

- Gorzalski, A.S., G.W. Harrington, O. Coronell. 2020. Impact of Model Selection on Predicted Contaminant Degradation in Water Treatment. AWWA Water Science: 1, 4: e1154.
- Gorzalski, A.S., G.W. Harrington, O. Coronell. 2019. Assessing flow segregation and mixing by modeling residual disinfectant conversion. AWWA Water Science: 1, 4: e1154
- Gorzalski, A.S., G.W. Harrington, O. Coronell. 2018. Modeling water treatment reactor hydraulics using reactor networks. J. AWWA: 110, 8: 13-29.

East Bay Municipal Utility District 2050 Demand Study, Oakland, CA
Developer. The District is in the process of developing an econometric model for forecasting water demands in their service area out to the year 2050. The econometric model will explicitly account weather/climate conditions, anticipated land use changes, development trends, and socioeconomic factors (e.g., water rates, jobs, population growth, and income) which have been shown to impact water use. The forecast demands will be a critical component of the District's 2020 Urban Water Management Plan.

Water Quality Evaluation Study, Jurupa Community Services District, Jurupa Valley, CA
Process Engineer for an analysis to evaluate design alternatives to address a range of water quality constituents, including TDS, nitrate, PFAS, VOCs, 1,2,3-TCP, 1,1-DCE, and perchlorate. This study included the development of short-term options to mitigate service risks resulting from out of service wells, as well as long-term design alternatives to address regulated contaminants, while allowing flexibility to comply with potential future regulations.

Regional Water Supply Reliability Model Development and Analysis Services, Bay Area Water Supply & Conservation Agency, San Mateo, CA
Project Engineer. Incorporated Bay Area supply sources along with locally utilized supplies and detailed estimations of municipal demands using the RiverWare modeling platform. Modeled the addition of potential new water supply sources, including IPR and storage. Developed infrastructure outage scenarios and evaluated impact of outages on system resilience and reliability.

Riverbend Intake Alternatives Analysis, Cherokee County Water and Sewer Authority, Canton, GA
Project Engineer for the evaluation of alternatives to address sediment impingement at the Authority's Riverbend Intake on the Etowah River. Proposed operational changes and a range of capital improvements to reduce the accumulation of sediment.

Steven Conner, PE

Infrastructure

Mr. Conner is Hazen's West Region Pump Station Practice Lead, with over 26 years of experience planning and designing water, recycled water, stormwater and sewage pump stations.

Education

B.S., Civil Engineering/Water Resources, University of California, Irvine

Certification/License

Professional Engineer

Transportation Worker Identification Credential (TWIC), California

Areas of Expertise

- Pump station design
- In-depth evaluation of system requirements for proposed new facilities as well as for rehabilitation, upgrade, or replacement of existing pump stations
- Pipeline Design
- Trenchless Pipeline Rehabilitation and Installation
- Planning and design of major waterand wastewater facilities

Professional Activities

North American Society for Trenchless Technology, Member

Hydraulic Institute – Effective Pump Intake Design and Troubleshooting Problem Intakes

AWWA

Steel Tank Institute – AWWA D100 Water Storage Tank Seminar

Mr. Conner has been the lead pump station engineer for numerous potable water pump station projects, including the Sterling Pump Station for Western Municipal Water District that is getting ready to be commissioned, the Mojave Water Agency R3 Pump Station, and most recently the Ridgeline Booster Pump Station Retrofit project for Trabuco Canyon Water District. Mr. Conner has expertise in vertical turbine as well as horizontal centrifugal pump design, is well versed in Hydraulic Institute design standards, and has designed many pump stations that have been outfitted with electric motors, natural gas driven engines, VFDs (including watercooled VFDs), and backup generators. Mr. Conner has in-depth technical expertise in pump station hydraulic analyses, system curves development, pump selection evaluation, and surge analyses. Mr. Conner coordinates the technical project aspects of all engineering support disciplines (civil, architectural, structure, chemical process, mechanical, electrical, and I&C) during project planning, design and construction phases.

La Brea Subarea Groundwater Supply Project – Wells, Transmission Main, And Treatment Facilities, City of Beverly Hills, CA

Mr. Conner is the Design Lead for the City of Beverly Hills La Brea Subarea Groundwater Supply Project. This is a $50 M project the City is implementing to expand their local water supply by developing groundwater in the La Brea Subarea of the Central Groundwater Basin. The project includes three (3) groundwater wells to be drilled and equipped, 4-miles of raw water transmission main through the City of Los Angeles and Beverly Hills, and upgrade of the City's existing reverse osmosis treatment plant. The first phase of the project which Hazen is leading is the drilling and equipping of the first groundwater well, and construction of the 4-mile transmission main.

Plant 30 Wellhead Treatment Design, Montclair, CA

Well pump analysis, QA/QC, and construction support for the planning, design, and construction of a 4,000 gpm wellhead treatment system for Monte Vista Water District. Treatment includes GAC for 1,2,3-TCP and regenerable ion exchange for nitrate and perchlorate. The design includes site civil design and treatment of three wells and off-site pipelines from two wells to the third well site.

Tori Yokoyama, PE

Hydraulics & Modeling

Mr. Yokoyama is experienced in management and design of various types of civil improvements associated with water, wastewater, and stormwater facilities, including piping, grading, paving, drainage, and miscellaneous site civil improvements. His background includes both the design of new facility improvements, as well as rehabilitation of existing facilities. Mr. Yokoyama is a detailed, hands-on engineer that understands how to efficiently move a project forward from start to finish.

Education

B.S. Civil Engineering, Cal Poly San Luis Obispo

Certification/License

Professional Engineer

Areas of Expertise

- Master Plans
- Hydraulic Modeling
- Pipelines
- Pump Stations
- Reservoirs
- Civil Design

Professional Activities

CA-NV AWWA

OCWA

ASCE

Los Angeles Department of Water and Power, Treatment for San Fernando Groundwater Basin, Los Angeles, CA

Civil Design Lead. The project is a large-scale groundwater remediation which may require advanced treatment. Role includes leading civil design for multiple water treatment plants. Civil design included trunkline piping, yard piping, off-site piping, grading, paving, drainage, and miscellaneous site improvements. Coordination with other disciplines including mechanical, electrical, instrumentation, architectural, and structural.

Chino I Desalter VOC Treatment, Chino Basin Desalter Authority, CA

Civil Design Lead. The project includes preliminary and final design of two (2) GAC treatment facilities (1.7 mgd and 3.4 mgd) at the Chino I Desalter Plant for the removal of TCE and 1,2,3-TCP, and evaluation of treatment requirements for 1,4-dioxanr, cis-1,2-DCE, 1,2-CDA, PFOA, and PFOS. The goal of this project is to provide groundwater treatment for all CDA bypass wells (CDA Wells I-1 through I-4), and several treated wells (CDA I-16 through 18), plus 10 new wells that will be installed by the County of San Bernardino as part of a Cleanup and Abatement Order issued by the Santa Ana Regional Water Quality Control Board (SARWQCB).

Plant 30 Wellhead Treatment Design, Montclair, CA

Mr. Yokoyama is the Civil and Pipeline Design Lead for the planning and design of a 4,000 gpm treatment system for Monte Vista Water District. Treatment includes GAC for 1,2,3-TCP and regenerable ion exchange for nitrate and perchlorate. The design includes site civil design and treatment of three wells and off-site pipelines from two wells to the third well site.

Peace Maari, EIT

Hydraulics & Modeling

Ms. Maari serves as an Assistant Engineer in the Irvine office. She has experience in sewer rehabilitation, pump replacement design, asset management, and flow modeling related to sewer systems.

Education

B.S. Environmental Engineering
University of Notre Dame
South Bend, Indiana

Areas of Expertise

- Pipeline and Manhole Rehabilitation
- Sewer Flow Modeling
- Pump Replacement Design
- Surge Modeling
- Drinking Water
- Wastewater

Professional Activities

AWWA, ASCE

Her assignments have included pump station design, updating collection system asset register, pipeline design, and surge modeling. She is proficient in Google SketchUp, InfoMaster, GIS, HEC-HMS, InfoMaster, InfoSewer, InfoWater and KYPipe.

Ms. Maari has 2 years of experience working on asset management projects. Her projects have included using CCTV data to prioritize pipe replacement, developing asset registers, GIS mapping, creek condition assessment and creation of electronic field forms.

Treatment for San Fernando Basin Groundwater Basin, Los Angeles Department of Water and Power, Los Angeles, CA
Ms. Maari served as an Assistant Engineer to the Civil Design Lead. This project is a large-scale groundwater remediation. Civil design included trunkline piping, yard piping, off-site piping, grading, paving, drainage, and miscellaneous site improvements. Coordination with other disciplines including mechanical, electrical, instrumentation, architectural, and structural.

Cordon RD Pump Station Force Main, City of Salem, Salem, OR
Ms. Maari served as the modeling assistant in this project. She performed the surge evaluation for the Cordon Road Pump Station capacity increase evaluation for the City of Salem, OR. The station current-ly conveys flow through two existing 12-inch PVC force main pipes. Tasks included developing a surge model in Kypipe SURGE using data provided by city and calibrating to existing system SCADA. Phase 1 evaluation included the addition of a parallel 20-inch pipe bringing flow from 4.6 mgd to 7 mgd. Phase 2 evaluation looked at new pumps bringing flow up to 15.5 mgd. Power loss and normal shutdown anal-ysis was performed for each Phase. Recommendations to mitigate transients for each phase were provided in a technical memorandum.

Bryan R. Lisk, PE, CEM

Energy

Mr. Lisk is the firm's Energy Management lead with 20 years of water and wastewater energy management and design experience. Mr. Lisk has been involved in nearly all of Hazen's water and wastewater energy management projects.

Education

B.S. Electrical Engineer, North Carolina State University

Certification/License

Professional Engineer

Certified Energy Manager (CEM) – Association of Energy Engineers

Areas of Expertise

- Water and Wastewater Energy Management
- Water and Wastewater Electrical Engineering and Design

Professional Activities

Water Environment Federation

Association of Energy Engineers

Mr. Lisk's energy management experience includes biogas fueled combined heat and power (CHP) system evaluation and design, biogas to pipeline and vehicle fueling, biogas utilization modeling, interconnection and billing negotiations with natural gas and electric utilities, energy monitoring system, and energy management master planning. Mr. Lisk also has extensive experience with low- and medium-voltage power distribution systems, motor control systems, combined heat and power systems, standby power generation and peak shaving systems, lighting design, and variable frequency drive systems. Bryan is a Certified Energy Manager with the Association of Energy Engineers.

Biosolids and Energy Phase I: Preliminary Design, Goleta Sanitary District (GSD), Goleta, CA

CHP Lead. This project is developing a Preliminary Design Report that includes preliminary design of a new digester and CHP facility, develop cost estimate for these facilities, conduct regulatory and environmental assessment, and provide conceptual layout of all expected facilities for construction.

Biogas Utilization Studies for the Goleta Sanitation District, Santa Barbara, CA

Lead Engineer. Provided preliminary biogas utilization studies for the Goleta Sanitation District (GSD) to identify feasible biogas utilization strategies that warranted further evaluations. This study included energy balance modeling to evaluate multiple long term biogas utilization strategies including CHP and RNG pipeline injection. Mr. Lisk is currently serving as the energy management technical lead on a detailed Energy and Biosolids Strategic Master Plan for the GSD.

Biogas Utilization Master Planning for the Eastern Municipal Water District (EMWD), CA

Mr. Lisk served as the project manager for a biogas utilization master plan for EMWD's four (4) water reclamation facilities. This project includes plant energy balance modeling to evaluate multiple long term biogas utilization strategies including CHP, RNG pipeline injection, fuel cells, and biogas fueled blowers. This projected included a detailed assessment of current and future air emission regulations and renewable energy market assessments.

Silvana Ghiu, PhD, PE

Water Quality

Dr. Ghiu has extensive experience in water quality characterization, field testing, and design of water treatment plants. She has worked extensively within California on projects involving both primary and secondary disinfection systems; from strategic alternative evaluations at the feasibility level to conceptual and detailed design.

Education

PhD, Environmental Engineering, University of South Florida

MS, Environmental Science and Policy, Central European University

MS, Atmospheric Physics, University of Bucharest

BS, Engineering Physics, University of Bucharest

Certification/License

Professional Engineer

Areas of Expertise

- Groundwater treatment
- Raw water characterization
- Membrane system design and operation

Technical Publications

Gatza, D, F. Fuchs, M. Serna, S. Ghiu and G. Filteau: "Comprehensive Results of West Basin Municipal Water District's Multi-Year Ocean Water Desalination Demonstration Project". Proceedings of the AMTA/AWWA Annual Conference. Las Vegas, NV. March 2014.

Ghiu, S, G. Filteau, and D. McKinney: "Seawater Desalination Energy Consumption Modeling". Proceedings of the AMTA/AWWA Annual Conference. Las Vegas, NV. March 2014.

Ghiu, S, G. Filteau, and D. McKinney: "Seawater Desalination Energy Consumption Modeling". Proceedings of the WateReuse California Annual Conference.

Groundwater Treatment for San Fernando Basin, Los Angeles Department of Water And Power, CA

Task Leader. The project may require but not be limited to services to provide advice and recommendations regarding optimal project scheduling options, budgeting and cost estimating, design drawings, facility layouts, specifications, and project meetings. Services may include Civil, Traffic, Structural, Mechanical, Electrical, Water Quality and Treatment Engineering.

Ocean Water Desalination Demonstration Project, West Basin Municipal Water District, Redondo Beach, CA

Lead Engineer. Performed oversight, data analysis and performance troubleshooting of 0.5 MGD Ocean Water Desalination Demonstration Project. Developed test plans and evaluated performance over a large array of operating conditions for individual components of treatment system (Arkal filters, submerged UF and two RO passes), led weekly staff meetings, prepared quarterly and final reports.

Ocean Water Quality Integration Study, West Basin Municipal Water District, Redondo Beach, CA

Lead Engineer. Responsible to provide customized SWRO permeate water quality to a pilot study for corrosion analysis of SWRO as a new source of water supply in the region. The study targeted SWRO permeate with different Boron and Bromide concentrations and blending with the local water that was run though a controlled loop of pipelines of various materials and age.

Troy Walker, MIE(Aust)

Desalination Operations & Membranes

Mr. Walker is the Water Reuse Practice Leader and Membrane Technology Leader for Hazen. He has over 25 years of experience with advanced water treatment operation and engineering to maximize production of recycled water.

Project Role

Optimizing Water Reuse Lead

Education

BE, Chemical Engineering, University of New South Wales, Australia

Certification/License

MIE(Aust)

Areas of Expertise

Water Reuse

Water Reuse Design

Water Reuse Hazard Analysis and Water Quality

Water Reuse Plant Operation

Seawater Desalination

Microfiltration

Professional Activities

Water Reuse Foundation

American Membrane Technology Association

South West Membrane Operators Association

Awards

Best Paper Award – Environmental Category International Desalination Association Conference, San Diego 2015

Best Paper Award – American Membrane Technology 2016

Biological and Advanced Treatment at Joint Water Pollution Control Plant, Los Angeles County Sanitation Districts, CA
Recycled Water Leader for the technical analysis and preliminary design of wastewater treatment upgrades for the 150-mgd Regional Recycled Water Program, a partnership between Los Angeles County Sanitation Districts and the Metropolitan Water District to increase local water supplies. One of the largest pure oxygen plants in the world, the Joint Water Pollution Control Plant will require nutrient removal and advanced water pretreatment prior to groundwater recharge or direct potable reuse.

Sustainable Water Initiative For Tomorrow (SWIFT), Hampton Road Sanitation District, Virginia Beach, VA
Supported Hazard Analysis and Critical Control Point review including critical control point and monitoring selection study as part of the District's SWIFT demonstration project. This project includes ozone/BAC and other non-membrane processes for potable reuse.

Direct Potable Reuse Operational Audit and Troubleshooting - CRMWD, Big Spring, TX
Provided a plant audit and troubleshooting support to the 2 MGD direct potable reuse facility in Big Spring, Texas. The project included a review of membrane filtration, reverse osmosis and UV disinfection with a particular focus on chlorine dosing control on the plant outlet. The client was provided with recommendations and training support to improve operational reliability and throughput

Operations Support Project, West Basin Municipal Water District, CA
Principle-in-Charge for an operations support project for the District's advanced recycling. This included support developing operational dashboard and performance reporting and development of readiness for direct potable reuse. A key focus of this system is the impact of varying secondary effluent quality on membrane treatment performance.

Alan Karnovitz, MPP

Economics & Financial Services

Mr. Karnovitz leads Hazen's Economic and Financial Services Group. He has 38 years of experience performing economic impact, regional economic, financial, and cost-benefit analyses and environmental assessments.

Education

MPP, Natural Resource Policy and Economics, Wharton School - University of Pennsylvania

BS, Biology and Natural Resources, University of California at Berkeley

Areas of Expertise

- Economic impact analyses
- Feasibility studies
- Regulatory impact studies
- Environmental assessments

Professional Activities

American Water Works Association

Master Planning for Broad Run Water Reclamation Facility, Loudoun Water, VA

Senior Economist. Evaluated alternative approaches to expanding the Broad Run Water Reclamation Facility. Supported the development of a financial model, assessing future regulatory scenarios, and will evaluate affordability aspects of technology options for shifting the facility into a fully sustainable production facility.

Methodology for a Comprehensive Analysis (Triple Bottom Line) of Alternative Water Supply Projects Compared to Direct Potable Reuse, WateReuse Foundation, DC

Senior Economist. Developed a new tool for assessing alternative water supply sources based on an extended Input-Output Analysis model that generated environmental and social impacts in addition to standard economic impacts. The project was supported by both the WateReuse and Water Research Foundation.

AMI Cost Benefit Analysis, Anne Arundel County, MD

Performing a cost benefit analysis of proposed program to install advanced metering infrastructure (AMI) for the County's Water Meter Services Department. Evaluating the alternative hardware and software systems being offered by the major AMI vendors and estimating life cycle costs and benefits of each alternative to support the County's decision on whether to proceed with the AMI program.

Appomattox River Water Authority, VA

Performed the economic and financial evaluation of Authority's proposed 10-year Capital Program Plan (CPP)to estimate impacts on wholesale water prices and on distribution of the financial burden on the five jurisdictions comprising the Authority's service base. Evaluated alternative infrastructure configurations and financing and cost allocation options for optimizing CPP investments.

Mary Hambel, PE

Economics

Ms. Hambel is a registered professional civil engineer with 20 years of experience, actively involved in multiple phases and facets of pipeline, pumping, storage, and treatment facilities for water, wastewater, and recycled water projects, including lead investigation, proposal preparation, planning and preliminary design, field work and pilot investigations, detailed design, regulatory coordination and permitting, bidding and construction support, and operations and maintenance support.

Education

MS, Civil and Environmental Engineering, University of California, Berkeley

BS, Civil Engineering, Loyola Marymount University

Certification/License

Professional Engineer

Areas of Expertise

- Technical Writing
- Alternatives Analysis
- Pipelines
- Pump Stations/Wells
- Reservoirs
- Water Treatment/Reclamation
- Chemical System Design
- Regulatory Agency Coordination

Phase 3 Expansion Project, Chino Basin Desalter Authority (CDA), Chino, CA

Serving as Assistant Program Manager for the Chino Basin Desalter Authority (CDA) for their Phase 3 Expansion Project. Once completed, the Phase 3 Expansion will increase production capacity of the CDA's groundwater desalter Facilities to over 35,000 acre-ft per year of potable water capacity. The project includes construction of new groundwater wells, pipelines, treatment facility to recover desalter concentrate (i.e. concentrate reduction facility), product water pump station expansion and new product water pump stations. The construction cost of the Phase 3 expansion is estimated at $150 million and construction is expected to be completed in 2018.

Arlington Desalter Enhancements Project, Santa Ana Watershed Project Authority, Riverside County, CA

Served as Project Engineer for the Santa Ana Watershed Project Authority's (SAWPA) Arlington Desalter Enhancements Project. Enhancements included retrofit of R.O. trains, R.O. feed pump replacement, added chloramination system, caustic soda system, cast-in-place trapezoidal clearwell, finished water pump station, and over five miles of 30-inch diameter CML&C steel transmission main, including three turnout facilities. Key issues included timely California Environmental Quality Act (CEQA) compliance to obtain state funding, a Santa Ana River crossing, and sensitive coastal sage habitat.

Christopher Portner, PE, CEP, ENV SP

Economics & Financial Services

Mr. Portner has provided cost estimating services for a wide-range of infrastructure related projects, including, but not limited to: water treatment and distribution, wastewater treatment and distribution, CSO reduction, recycled water treatment and distribution and roadway reconstruction. Mr. Portner is in AACE Certified Estimating Professional.

Education

MS, Environmental Engineering, University of California at Berkeley

BS, Civil and Environmental Engineering, University of California at Berkeley

Certification/License

Professional Engineer

Certified Estimating Professional (CEP)

Areas of Expertise

- Cost Estimating
- Wastewater Treatment Plant Design
- Wastewater Process Engineering
- Construction Management
- Scheduling
- Change Order Preparation and Negotiation
- Design Services During Construction

Professional Activities

Water Environment Federation (WEF)

American Association of Cost Engineers (AACEi)

California Water Environment Association (CWEA)

Los Angeles Department of Water and Power, Treatment for San Fernando Groundwater Basin, Los Angeles, CA
Cost Engineer. The project is a large-scale groundwater remediation which may require advanced treatment. Role includes leading civil design for multiple water treatment plants. Civil design included trunkline piping, yard piping, off-site piping, grading, paving, drainage, and miscellaneous site improvements. Coordination with other disciplines including mechanical, electrical, instrumentation, architectural, and structural.

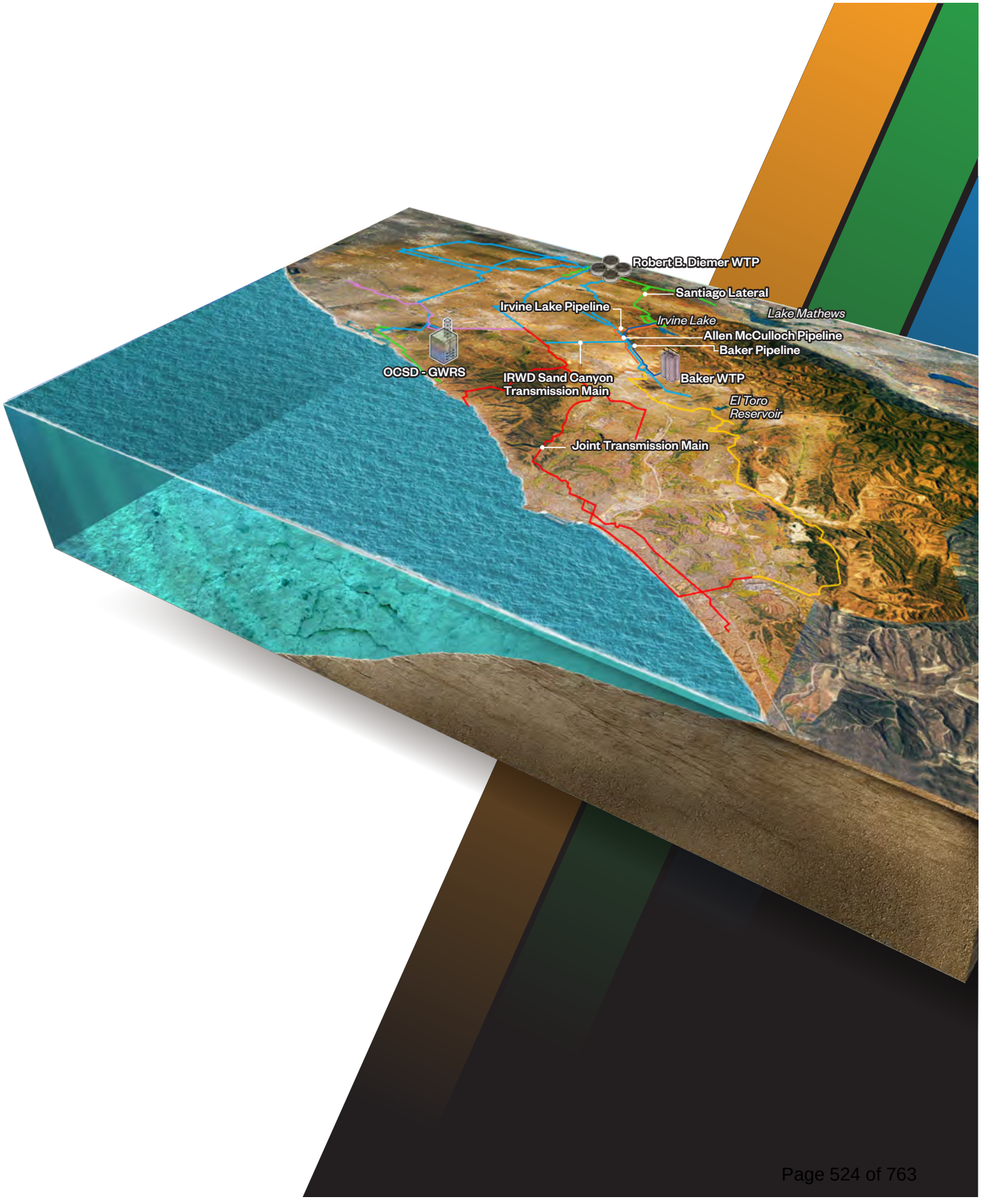
Ocean Water Desalination Demonstration Decommissioning Project, West Basin Municipal Water District, Redondo Beach, CA
Cost Engineer for the decommissioning of a desalination pilot project. Project scope included demolition/abandonment of ocean intake pipe and pump station, including associated mechanical, electrical, structural and instrumentation appurtenances.

Water Quality Evaluation Study, Jurupa Community Services District, Jurupa Valley, CA
Cost Estimator for an analysis to evaluate design alternatives to address a range of water quality constituents, including TDS, nitrate, PFAS, VOCs, 1,2,3-TCP, 1,1-DCE, and perchlorate. This study included the development of short-term options to mitigate service risks resulting from out of service wells, as well as long-term design alternatives to address regulated contaminants, while allowing flexibility to comply with potential future regulations

Eastside Water Treatment Facility Expansion Project, Chino, CA
Cost Engineer for design of a 3,500 gpm treatment expansion for the City of Chino at the Eastside Facility. Treatment includes GAC for 1,2,3-TCP and ion exchange for nitrate. The design includes treatment of three wells, with potential for a forth, pipelines, buildings and control systems. This design requires careful integration of the new equipment with existing treatment on site.

Appendix B

Insurance Certificate



HAZE&SA-01 KGODWIN

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 2/9/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Ames & Gough 8300 Greensboro Drive Suite 980 McLean, VA 22102	PHONE (A/C, No, Ext): (703) 827-2277	FAX (A/C, No): (703) 827-2279
	E-MAIL ADDRESS: admin@amesgough.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Hartford Fire Insurance Company A+ (XV)	19682
INSURED	INSURER B : Hartford Casualty Insurance Company A+ (XV)	29424
Hazen and Sawyer 498 Seventh Avenue New York, NY 10018	INSURER C : Twin City Fire Insurance Company A+ (XV)	29459
	INSURER D : Continental Casualty Company (CNA) A, XV	20443
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			42UUNBH8062	3/29/2020	3/29/2021	EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 1,000,000
	X Contractual Liab.						MED EXP (Any one person)	$ 10,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
B	AUTOMOBILE LIABILITY			42UENBH7997	3/29/2020	3/29/2021	COMBINED SINGLE LIMIT (Ea accident)	$ 2,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
							Comp./Coll. Ded	$ 1,000
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	N / A		42WBAD0SYE	3/29/2020	3/29/2021	X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N						E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
D	Professional Liab.			AEH008231489	3/29/2020	3/29/2021	Per Claim/Aggregate	1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE: RFQ ENG. 2021 – IN-CALL TECHNICAL SERVICES TO SUPPORT RELIABILITY PLANNING, ENGINEERING & RESOURCE DEVELOPMENT

Municipal Water District of Orange County (MWDOC), its directors, officers, agents, employees, attorneys, consultants and authorized volunteers are included as additional insured with respect to General Liability and Automobile Liability when required by written contract. General Liability and Automobile Liability are primary and non-contributory over any existing insurance and limited to liability arising out of the operations of the named insured and when required by written contract. General Liability, Automobile Liability and Workers Compensation policies include a waiver of subrogation in favor of the additional insureds where permissible by state law and when required by written contract. 30-day Notice of Cancellation will be issued for the General Liability, Automobile
SEE ATTACHED ACORD 101

CERTIFICATE HOLDER

Municipal Water District of Orange County (MWDOC)
PO Box 20895
18700 Ward Street
Fountain Valley, CA 92708

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

AGENCY CUSTOMER ID: HAZE&SA-01 KGODWIN

LOC #: 0

ADDITIONAL REMARKS SCHEDULE

AGENCY		NAMED INSURED
Ames & Gough		Hazen and Sawyer 498 Seventh Avenue New York, NY 10018
POLICY NUMBER		
SEE PAGE 1		
CARRIER	NAIC CODE	EFFECTIVE DATE: SEE PAGE 1
SEE PAGE 1	SEE P 1	

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: ACORD 25 FORM TITLE: Certificate of Liability Insurance

Description of Operations/Locations/Vehicles:
Liability, Workers Compensation and Professional Liability policies in accordance with policy terms and conditions.
Pollution Liability coverage is provided and included within the Professional Liability policy noted above. It shares the limits of the Professional Liability policy.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - DESIGNATED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):
ANY PERSON OR ORGANIZATION THAT YOU HAVE AGREED TO NAME AS AN ADDITIONAL INSURED IN A WRITTEN CONTRACT OR AGREEMENT PROVIDED THAT THE INJURY OR DAMAGE OCCURS SUBSEQUENT TO THE EXECUTION OF THE CONTRACT OR AGREEMENT. A PERSON OR ORGANIZATION IS INCLUDED AS AN ADDITIONAL INSURED UNDER THIS ENDORSEMENT ONLY FOR THAT TIME PERIOD REQUIRED BY THE CONTRACT OR AGREEMENT.
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:

1. In the performance of your ongoing operations; or

2. In connection with your premises owned by or rented to you.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and

2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or

2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

PRIMARY AND NON - CONTRIBUTORY TO OTHER INSURANCE
WHEN REQUIRED BY WRITTEN CONTRACT

COMMERCIAL GENERAL LIABILITY COVERAGE PART

IF YOU HAVE AGREED IN A WRITTEN CONTRACT, WRITTEN AGREEMENT OR PERMIT THAT THIS INSURANCE IS PRIMARY AND NON - CONTRIBUTORY WITH THE ADDITIONAL INSUREDS OWN INSURANCE THIS INSURANCE IS PRIMARY AND WE WILL NOT SEEK CONTRIBUTION FROM THAT OTHER INSURANCE.

WAIVER OF TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Person Or Organization:
ANY PERSON OR ORGANIZATION FROM WHOM YOU ARE REQUIRED BY WRITTEN CONTRACT OR AGREEMENT TO OBTAIN THIS WAIVER OF RIGHTS FROM US.
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

The following is added to Paragraph **8. Transfer Of Rights Of Recovery Against Others To Us** of **Section IV – Conditions:**

We waive any right of recovery we may have against the person or organization shown in the Schedule above because of payments we make for injury or damage arising out of your ongoing operations or "your work" done under a contract with that person or organization and included in the "products-completed operations hazard". This waiver applies only to the person or organization shown in the Schedule above.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED AND RIGHTS OF RECOVERY AGAINST OTHERS

This endorsement modifies insurance provided under the following:

BUSINESS AUTO COVERAGE FORM

A. Any person or organization whom you are required by contract to name as additional insured is an "insured" for LIABILITY COVERAGE but only to the extent that person or organization qualifies as an "insured" under the WHO IS AN INSURED provision of Section II - LIABILITY COVERAGE.

B. For any person or organization for whom you are required by contract to provide a waiver of subrogation, the Loss Condition - TRANSFER OF RIGHTS OF RECOVERY AGAINST OTHERS TO US is applicable.

Form HA 99 13 01 87 Printed in U.S.A.

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

WAIVER OF OUR RIGHT TO RECOVER FROM OTHERS ENDORSEMENT - CALIFORNIA

Policy Number: 42 WB AD0SYE **Endorsement Number:**
Effective Date: 03/29/2020 Effective hour is the same as stated on the Information Page of the policy.
Named Insured and Address: HAZEN AND SAWYER, D.P.C.
498 FASHION AVE FL 11
NEW YORK NY 10018

We have the right to recover our payments from anyone liable for an injury covered by this policy. We will not enforce our right against the person or organization named in the Schedule. (This agreement applies only to the extent that you perform work under a written contract that requires you to obtain this agreement from us.)

You must maintain payroll records accurately segregating the remuneration of your employees while engaged in the work described in the Schedule.

The additional premium for this endorsement shall be 2 % of the California workers' compensation premium otherwise due on such remuneration.

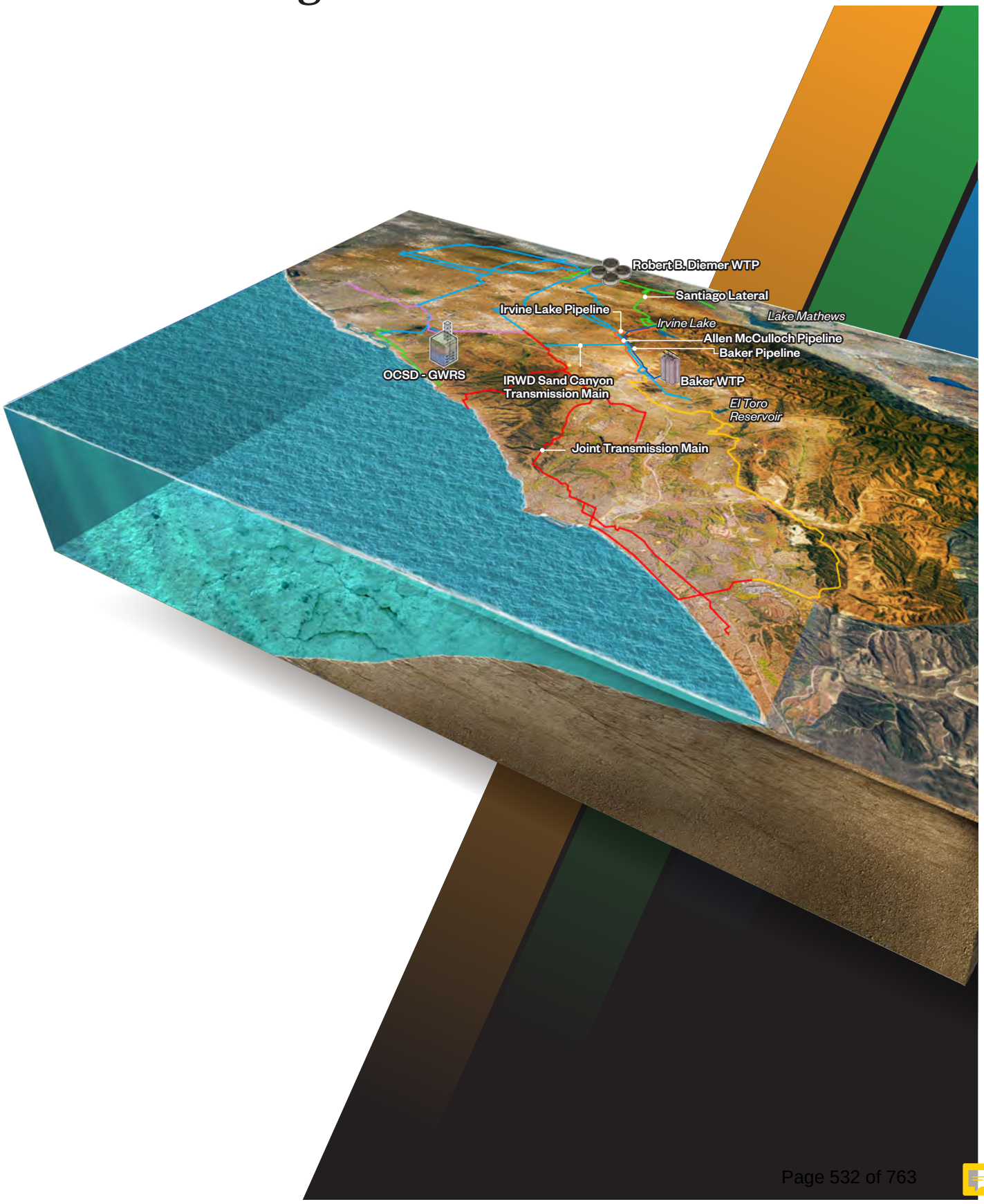
SCHEDULE

Person or Organization	**Job Description**
Any person or organization from whom you are required by written contract or agreement to obtain this waiver of rights from us	

Countersigned by Allison Bancroft
Authorized Representative

Appendix C

Standard Billing Rates



Appendix C

Standard Billing Rates

Hazen and Sawyer
2021-2023 Billing Rates

Labor Classifications	Hourly Rates ($)
Vice President	$300
Senior Associate II	$262
Senior Associate I	$242
Associate II	$225
Associate I	$212
Senior Principal Engineering II	$202
Senior Principal Engineer I	$196
Principal Engineer II	$185
Principal Engineer I	$168
Engineer	$156
Assistant Engineer	$145
Senior Technician	$145
Technician	$128
Administration	$128

*Note: Billing rates within classifications can vary +/- 5%

Hazen

Hazen and Sawyer
7700 Irvine Center Drive • Suite 200 • Irvine, CA 92618

means
consulting, LLC
Ed Means
2100 Serrano Avenue
Newport Beach, CA 92661
edmeans@roadrunner.com
(949) 439-9120

February 3, 2021

Charles Busslinger, PE
Principal Engineer
Municipal Water District of Orange County

Subject: Letter Proposal in Response to REQUEST FOR QUALIFICATIONS(RFQ) for Professional Services for On-call Technical Services to Support Reliability Planning, Engineering & Resource Development - RFQ ENG.2021

Dear Mr. Busslinger,

Means Consulting, LLC is pleased to submit this proposal to provide professional services for Municipal Water District of Orange County. Edward G. Means III, the proposed staff person, formed Means Consulting LLC in 2012 after a 32-year career in the public water utility and environmental consulting services industries. Mr. Means brings 18 years of experience with the Metropolitan Water District of Southern California, including positions of Director of Water Quality, Director of Resources, Chief of Operations, Deputy General Manager/Chief Operating Officer and Acting General Manager. He managed a 2000-person organization with a $4B capital improvement program. Between 1992 and 1997, he represented the National Water Resources Association (NWRA), and then the American Water Works Association (AWWA) negotiating the Stage 1 Disinfectants/Disinfection By-Products Rule. He has received several awards including the AWWA George Warren Fuller Award, the Association of Metropolitan Water Agencies (AMWA) President's Award, and the NWRA President's Award. From 1999 to 2009, he had partner responsibilities at McGuire Environmental Consultants, Inc. and Malcolm Pirnie. He joined Arcadis in 2009. Mr. Means has had responsibility for national seawater desalination business development. Mr. Means has expertise in utility strategic and water resource planning, communications, regulatory development and compliance implementation, and water quality studies in source waters, treatment plants and distribution systems. He is a skilled facilitator on technical topics. If you have any questions regarding this letter proposal, I can be reached at (949) 439-9120.

Best regards,

Ed Means
President, Means Consulting LLC

Section 1: Firm Identity

Means Consulting LLC
2100 Serrano Avenue
Newport Beach
(949) 439-9120
Contact Person: Ed Means

Section 2: Organization

The proposal is for the services of a single person. It is envisioned that Mr. Means can aid in the following areas:

- Water and Environmental Planning/Management: Bay-Delta Activities
- Impacts of Future Base-Loaded Water Supply Projects on the OC Water System
- Economic Analysis of Regional Projects in Development
- Updates to Orange County Water Reliability Study
- Implications of Local Projects on the Imported Water System

Section 3: Description of Firm

Mr. Means' areas of expertise and work history/areas of expertise are detailed in the attached resume. Means Consulting LLC has a proven history of effective service provision and contract administration with MWDOC.

Section 4: Firm Capacity

Mr. Means is currently booked approximately 40% of his time and thus has 50% plus availability.

Section 5: QA/QC

As a one-person shop, Mr. Means provides all QA/QC on work products. Mr. Means will occasionally use a technical editor when warranted.

Section 6: Professional Liability

Means Consulting LLC professional liability policy is depicted below.

MEANCON-01 PBARNETT

DATE (MM/DD/YYYY) 12/18/2020

CERTIFICATE OF LIABILITY INSURANCE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

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PRODUCER
Clarke Marine Insurance Services
245 Fischer Avenue
Suite D-8
Costa Mesa, CA 92626

CONTACT NAME:
PHONE (A/C, No, Ext): (714) 444-2679 FAX (A/C, No): (714) 444-0176
E-MAIL ADDRESS: info@cmgis.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Landmark American Insurance Company	33138
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Means Consulting, LLC
2100 Serrano Avenue
Newport Beach, CA 92661

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR			LHC841852	12/13/2020	12/13/2021	DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 50,000
							MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY X PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$ Included
	OTHER:							$
	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$
	DED RETENTION $							$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N						PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) N/A						E.L. EACH ACCIDENT	$
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$
A	Professional Liab			LHC841852	12/13/2020	12/13/2021	Each Claim	1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
Certificate holder is additional insured as their interest may appear if required by written contract with the Named Insured.

CERTIFICATE HOLDER

Municipal Water District of Orange County
Attn: Robert Hunter
18700 Ward Street
Fountain Valley, CA 92708

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Allstate.
You're in good hands.

CI CW A02 10 11

CERTIFICATE OF INSURANCE

This certificate is issued for informational purposes only. It certifies that the policies listed in this document have been issued to the Named Insured. It does not grant any rights to any party nor can it be used, in any way, to modify coverage provided by such policies. Alteration of this certificate does not change the terms, exclusions or conditions of such policies. Coverage is subject to the provisions of the policies, including any exclusions or conditions, regardless of the provisions of any other contract, such as between the certificate holder and the Named Insured. The limits shown below are the limits provided at the policy inception. Subsequent paid claims may reduce these limits.

Certificate Holder:	Named Insured:
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY 18700 WARD ST FOUNTAIN VALLEY, CA USA 927086930	MEANS CONSULTING, LLC 2100 SERRANO AVE NEWPORT BEACH CA 92661-1526

Automobile Liability

Insurer Name: Allstate Insurance Company

Policy Number: 648110840

	1 -- Any Auto		2 – Owned Autos Only		3 – Owned Priv. Pass. Autos Only
	4 -- Owned Autos Other Than Priv. Pass. Autos Only		5 – Owned Autos Subject to No Fault		6 – Owned Autos Subject to a Compulsory UM Law
X	7 -- Specifically Described Autos	X	8 – Hired Autos Only	X	9 – Nonowned Autos Only

Policy Effective Date : 12-19-2020 **Policy Expiration Date:** 12-19-2021

Limits of Insurance:	$1,000,000	Combined Single Limit (each accident)	
	BI Per Person	BI Per Accident	PD Per Accident

Description of Operations/Locations/Vehicles/Endorsements/Special Provisions

Interested Party Type: Additional Insured - Project Owner

THIS CERTIFICATE DOES NOT GRANT ANY COVERAGE OR RIGHTS TO THE CERTIFICATE HOLDER.

IF THIS CERTIFICATE INDICATES THAT THE CERTIFICATE HOLDER IS AN ADDITIONAL INSURED, THE POLICY(IES) MUST EITHER BE ENDORSED OR CONTAIN SPECIFIC LANGUAGE PROVIDING THE CERTIFICATE HOLDER WITH ADDITIONAL INSURED STATUS. THE CERTIFICATE HOLDER IS AN ADDITIONAL INSURED ONLY TO THE EXTENT INDICATED IN SUCH POLICY LANGUAGE OR ENDORSEMENT.

Producer: CHERYL J. BINNS	
Authorized Representative:	**Date:** 10-05-20

Section 7: Unique Qualifications

Means Consulting is uniquely qualified considering the following:

- Deep expertise, work history, and relationships with Metropolitan Water District of Southern California

- Deep expertise in water quality issues
- Project history in ocean desalination including at Carlsbad, Doheny, Huntington Beach, and West Basin.
- Providing facilitation services to NWRI on the two large cutting edge indirect potable reuse projects in Southern California (MWD's Carson project and San Diego's Pure Water project)
- Strategic Planning expertise having led development of over 20 strategic documents.
- Familiarity with many Orange County Water Utilities. Mr. Means has worked for La Habra, Mesa Consolidated, Irvine Ranch Water District, San Clemente, Newport Beach, East Orange County Water District, El Toro Water District, Orange County Water District, and others.

Resume

Edward G. Means III formed Means Consulting LLC in 2012 after a 32-year career in the public water utility and environmental consulting services industries. Mr. Means brings 18 years of experience with the Metropolitan Water District of Southern California, including positions of Director of Water Quality, Director of Resources, Chief of Operations, Deputy General Manager/Chief Operating Officer and Acting General Manager. He managed a 2000-person organization with a $4B capital improvement program. Between 1992 and 1997, he represented the National Water Resources Association (NWRA), and then the American Water Works Association (AWWA), on the Federal Advisory Committee negotiating the Disinfectants/Disinfection By-Products Rule. He has received several awards for his contributions to the drinking water industry, including the AWWA George Warren Fuller Award, the Association of Metropolitan Water Agencies (AMWA) President's Award, and the NWRA President's Award. In 1999, he joined McGuire Environmental Consultants, Inc. (MEC) as a partner. As Sr. Vice President he assisted in growing the firm from nine employees to almost forty in six years prior to its sale in 2005 to privately held Malcolm Pirnie. Mr. Means served as a partner/Vice President at Malcolm Pirie prior to its 2009 sale to ARCADIS, a large Dutch public engineering firm. Mr. Means has had project, client and business development responsibility. He had responsibility for national seawater desalination business development. Mr. Means has expertise in utility strategic and water resource planning, communications, regulatory development and compliance implementation, and water quality studies in source waters, treatment plants and distribution systems. He is a skilled facilitator on technical topics.

Edward G. Means III

Title/Firm:

President
Means Consulting LLC
2100 Serrano Avenue
Newport Beach, CA 92661
(949) 439-9120
edmeans@roadrunner.com

Years of Experience

40

Education

B.A., Environmental Analysis, Social Ecology, University of California, Irvine
Irvine, California (Honors 1977)

M.A., Environmental Analysis, Social Ecology, University of California, Irvine (1980)

Professional Management Program, Graduate School of Business Administration, University of Southern California (1987)

Employment History

Means Consulting LLC 2012 - President
Malcolm Pirnie/ARCADIS 2009 to 2012 – Sr. Consultant
Malcolm Pirnie, Inc. 2005 to 2009 – Vice President/Partner
McGuire Environmental Consultants, Inc. 1999 to 2005 – Sr. Vice President/Partner
Metropolitan Water District of Southern California 1980 to 1999 – Acting General Manager, Chief Operating Officer, Chief of Operations, Director of Resources, Director of Water Quality, Laboratory Manager
University of California Irvine 1978 to 1980 – Research Assistant

DETAILED EXPERIENCE

Means Consulting LLC – President, since 2012

Mr. Means established his independent consulting firm and provides service to select public and private utilities in strategic planning, water quality regulatory compliance and water resources consulting. He also provides technical facilitation services.

Malcolm Pirnie/ARCADIS – Sr. Consultant, January 2009 to 2011

Malcolm Pirnie was sold to ARCADIS in 2009. Mr. Means was a Vice President at ARCADIS and transition to a Sr. Consultant in the new firm in their Irvine, CA office. He assisted in business development and provided project management and direction on selected projects for key clients.

Malcolm Pirnie, Inc. – Vice President, April 2005 to 2009

Mr. Means was Vice President with Malcolm Pirnie in their Orange County, CA office. In this position Mr. Means was responsible for developing and overseeing ~$5M in annual contracts as well as managing client relationships in California. He developed successful grant applications for 5 desalination (ocean and brackish water) projects. He had responsibility for the Western Water Resources practice of Malcolm Pirnie and was point for municipal water/wastewater activities for the Malcolm Pirnie/Sinclair Knight Merz global alliance. He developed and managed Malcolm Pirnie's national desalination practice, leading or staffing successful pursuit teams on the Rosarito Beach desalination feasibility study project and Coquina Coast project. He was instrumental in winning owners agent contracts for the South Orange County Coastal Desalination in Dana Point, CA.

McGuire Environmental Consultants, Inc.- Vice President, January 1999 to 2002, Sr. Vice President 2002 to April 2005

Mr. Means was Sr. Vice President of McGuire Environmental Consultants, Inc. (MEC). Joining the firm in 1999, Mr. Means has played a critical role in building the firm from about 6 employees at the time to nearly 40 today. He manages the activities of the firm's Newport Beach office and has driven the opening of offices in Sacramento, the City of San Diego and the City of Arcadia, California. His contacts in the water utility community have resulted in significant contributions to the MEC client base.

In Mr. Means' various capacities at the Metropolitan Water District of Southern California, he had responsibility for business aspects of the largest water wholesaler in the U.S. including capital programs, operating budgets, water resources planning, physical facility operations and state of the art laboratory and treatment process facilities. He is expert in water utility operations and management.

Accordingly, he has provided numerous clients with consulting expertise in the development and implementation of long-range utility water resource, quality and management strategies/plans. He also provides services to water utilities in the area of regulatory compliance including compliance with the Microbial/Disinfection By-Products (M/DBP) rule cluster, the Arsenic rule, the Radon rule, and the Groundwater rule. He assisted in developing and conducting nationwide training on the M/DBP rule for the American Water Works Association. He was recently project manager for the American Water Works Research Foundation's (AwwaRF's) project entitled "A Strategic Assessment of the Future of Water Utilities" and is currently updating that study for AwwaRF. MEC's client list includes over 70 public and private water utilities, numerous law firms, private and non-profit corporations.

Metropolitan Water District of Southern California (MWDSC) - Acting General Manager, January 1999 to April 1999

Provided general management services under contract to MEC, Inc. while Metropolitan conducted a search for the General Manager replacement.

350 S. Grand, Suite 2008
Box 54153
Los Angeles, California 90054

MWDSC- Deputy General Manager/Chief Operating Officer, April 1996 to January 1999

As a Board-approved officer of Metropolitan, I was responsible for the day to day district operations, strategic planning, cost containment, labor relations, member agency relations and budget for an $800 million annual revenue water utility with a $4 billion capital program. Total 1998-99 budget was $1.5 billion (including debt service). Metropolitan's capital program included an 800,000 acre-foot storage reservoir currently under construction. Manage through others the activities of approximately 2000 employees. Major involvement in medium- and long-range strategic planning and assisting 51 member Board of Directors in an examination of board governance. Responsible for compliance with environmental regulations. Guided Metropolitan through 14% staff reduction and 20% efficiency improvements through technology initiatives including a maintenance management program, automated meter reading, PeopleSoft applications and a new Oracle-based chart of accounts. Over three years these initiatives have collectively saved nearly $150 million. Represented AWWA in negotiated rulemaking for disinfectants/disinfection by-products regulation. Acting manager at Metropolitan for 4 months prior to departure.

MWDSC- Chief of Operations July 1994 - April 1996

Managed the district's operation and maintenance of the Colorado River Aqueduct, 5 filtration plants, 8 reservoirs, 15 small hydroelectric plants and the distribution system that delivers water from both the Colorado River and the California State Water Project to Metropolitan's 27 member agencies. District emergency preparedness activities are also administered through the Operations Division. Supervised a staff of 986 employees and manage a $155.6 million operating budget. Completed a 20-year staffing plan, requiring a staff reduction from 1007 to 822 positions while simultaneously beginning the operation of $4 billion in new capital facilities. Cost and staff savings occurred as a result of optimizing operator shift schedules, implementing cross-training initiatives, and installing modern maintenance management, water billing and control systems. These systems were installed at a cost of about $40 million. Represented Management in Union labor negotiations, helping to secure a 5-year contract with significant cost savings to the District.

MWDSC- Director of Resources, January 1993 to July 1994

Managed the activities of the Resources Division including general budget and personnel functions, oversight of Metropolitan's water management programs (including ground water, reclaimed water and certain aspects of desalination), Colorado River power/water supplies and programs. Managed a review of Metropolitan's financial structure and agricultural water pricing and implemented major changes through the Board of Directors. The Resources Division develops and oversees the contractual arrangements for Metropolitan's water management programs. Our activities routinely involve legal, technical and political considerations. The Division consists of 39 engineers, scientists and administrative employees.

MWDSC- Director of Water Quality, November 1990 to January 1993

Responsible for directing the activities of the Water Quality Division including the activities of the Water Quality Laboratory and the Water Purification group. Oversee legislative and regulatory activities involving water quality issues including delivering testimony before governmental bodies. Interface with the Board of Directors to convey and influence the water quality policies of the District. Responsible for meeting all State and Federal Drinking water regulations, conducting research, compliance with NPDES discharge regulations and assisting other MWDSC divisions and assisting member agencies with water quality problems. Manage budget of $8.2 million. Additional information is given below.

MWDSC- Associate Director of Water Quality, July 1988 to November 1990

Responsible for assisting the Director of Water Quality in managing the activities of the Water Quality Division. This position is responsible for interfacing with the Operations Division, overseeing development of the $7.5 million annual operating budget (capital budget of approximately $20 million) including one and five-year plans, review impacts of legislation/regulations, interface with State and Federal regulatory agencies, interface with MWDSC member agencies and sub-agencies, represent MWDSC at professional meetings and in sensitive negotiations and provide project management expertise. Responsible for developing Metropolitan's Lake Mathews Drainage Water Quality Management Plan working with developers, the County of Riverside and design engineers. The Cajalco Creek Dam and Detention Basin (the centerpiece of the plan) received the ASCE San Bernardino and Riverside County Branch award to

Outstanding Civil Engineering Project of the Year award in 2001-2002. Oversee the day-to-day activities of 82 engineers and scientists and 14 temporary positions, including the staff of the Water Quality Laboratory (WQL). Act for the Director of Water Quality in his absence.

MWDSC- Water Quality Laboratory Manager, July 1986 to July 1988

Responsible for managing the activities of the WQL. The WQL conducts compliance monitoring for all State and Federal regulations in addition to managing the quality of MWDSC source and finished water reservoirs. Constructed in 1985, the state-of-the-art facility is nationally renown for the progressive research and method development activities in taste and odor, disinfection by-products and disinfection conducted there. The Laboratory Manager conducts planning, prepares the budget, provides technical assistance to member agencies, reviews regulations and legislation, prepares and presents technical papers and oversees the quality assurance program.

MWDSC- Principal Microbiologist, July 1985 to July 1986

Responsible for advanced planning, budgeting and supervision of the activities of the microbiology, field monitoring/reservoir management and laboratory support group in the WQL. Supervise 14 professionals.

MWDSC- Supervising Chemist,July 1984 to July 1985

Responsible for advanced planning, budgeting and supervision of the activities of the microbiology, field monitoring/reservoir management and laboratory support group in the WQL. Supervise 14 professionals.

MWDSC- Senior Microbiologist, November 1981 to July 1984

Responsible for the day-to-day operation of a microbiology laboratory engaged in water analysis. Supervised two microbiologists and two lab technicians. Responsible for implementing research programs in such areas as bacterial colonization of granular activated carbon, disinfection kinetics, alternative disinfectants, biofilm formation in distribution pipelines, taste and odor compound production by algae in lakes and identification methods for bacteria.

Metropolitan Water District of Southern California- Microbiologist, November 1980 to November 1981

Monitored the bacteriological status of raw and finished water serving the Southern California area. Enumerated and identified bacterial growing on granular activated carbon. Performed scanning electron microscopy. Set up analytical procedures for monitoring adenosine triphosphate levels in water. Gained familiarity with algaecides and their application, algal culturing, plankton counts, etc. Expert in recovery of indicator bacteria in water.

University of California, Irvine- Research Assistant, Environmental Analysis Program in Social Ecology, June 1978 to June 1980

Responsible for developing sampling regime and implementing techniques for sample collection for USEPA-funded research project designed to assess the phenomenon of bacterial regrowth in water distribution systems. Performed microbiological analyses on water samples. Obtained Masters Degree with research on the recovery of heterotrophic bacteria from water distribution systems using a variety of media, incubation temperatures and incubation times. Research included typing of bacteriocins specific for coliform bacteria and investigating the role of such compounds in the suppression of coliform bacteria in standard tests.

PROJECT EXPERIENCE

Examples of projects Mr. Means has been or is currently involved in include:

- Provide business model evaluation services to Western Municipal Water District (2021)

- Lead facilitator for City of San Diego's Pure Water San Diego project under subcontract to NWRI (2021)
- Co-Principal investigator on 2nd phase of Water Research Foundation project WRF 18-02 - Leading Water Utility Innovation (2019-2021)
- Provide strategic planning services to California State Water Contractors (2020, 2021)
- Provide strategic facilitation services to Coachella Valley Water District (2020)
- Provide strategic planning services to California Urban Water Agencies (2020)
- Prepare 2020 Strategic Plan for Alameda Zone 7 Water Agency (2020)
- Prepare Strategic Plan for El Toro Water Agency (2020)
- Conduct scenario planning for water supply development for City of Scottsdale, AZ (2020)
- Conduct scenario planning for water supply development for City of Glendale, AZ (2020)
- Provide facilitation and strategic support for development of $385M Chino Basin Program (environmental water bank, 2019)
- Prepare 2019 strategic plan for Santa Clarita Valley Water Agency, Santa Clarita, CA (2019)
- Prepare 2019 strategic plan and General Manager evaluation for East Orange County Water District, Tustin, CA (2019)
- Prepare strategic plan for Marin Municipal Water District, Corte Madera, CA (2018)
- Senior Utility Planner leading a major scenario planning element for the King County Clean Water Plan development as a sub-contractor to Brown and Caldwell. This is an $8M planning effort for a large storm water/wastewater master plan for the Puget Sound/Seattle area (2019)
- Participate on a project team to enhance the innovation program at Metropolitan Water District of Southern California (2019)
- Prepare a water resources assessment for Rancho California Water District (2019)
- Lead facilitator under contract to National Water Research Institute for an expert panel on Metropolitan Water District of Southern California's "Potential Regional Recycled Water Supply Program" involving technical input on a proposed 150MGD indirect potable reuse project (2018-19)
- Principal facilitator in development of a large water bank in the Chino Basin, sub-contractor to Arcadis (2017-19)
- Conducting analysis of water supply options for City of Ontario, CA (2018)
- Co-Principal Investigator on WRF 4642, *Fostering Innovation Within Water Utilities*, Guidance Manual published (2017)
- Wholesale water rate support services for Western Municipal Water District (2017-18)
- Work with East Orange County Water District Board of Directors to conduct General Manager's evaluation (2017)
- Prepare evaluation of California Water Services' Oroville District (2017)
- Prepare strategic plan for West Basin Municipal Water District (2017)
- Prepare strategic plan for Castaic Lake Water Agency (2017)
- Present seminar on Innovation to Hydranex technology company (2017)
- Facilitate development of the Southeast Water Coalition's Strategic Plan and grant pursuit strategy (2016-18)
- Project Manager for "Collaborative Resource Strategy Development for Four Santa Cruz County Water Utilities". Facilitating regional water resource program development and communications strategy discussions (2016)
- Program Manager West Basin Municipal Water District Recycled Water Workgroup facilitating 5 workshops of elected officials and water professionals to review and provide input on West Basin's recycled water opportunities and challenges (2017)
- Member, Expert Panel on Metropolitan Water District of Southern California's "Potential Regional Recycled Water Supply Program" involving technical input on a proposed 150MGD indirect potable reuse project (2016-18)
- Water utility review and operations evaluator for North Miami Beach, FL water and wastewater utility (subconsultant to the Eisenhardt Group, 2015-16)
- Developed a strategic plan for the Antelope Valley-East Kern Water Agency (2015)
- Integrated Resources Planning advisor to Denver Water (subcontract to MWH, 2015-16)
- Water utility reviewer and strategic plan consultant to the City of Grants Pass, OR (subconsultant to the Eisenhardt Group, 2015)
- Assisted in development of a strategic plan for the Fairfax County Water Authority, Falls Church, VA. Provided board governance assessment (subconsultant to ARCADIS, 2015)
- Provide water resources consulting advice to Pomona (2015-17)
- Strategic plan consultant to the East Orange County Water District, CA (2015)
- Strategic plan consultant to the Central Basin Municipal Water District in central Los Angeles County (2015)

- Provided facilitation, strategic and outreach guidance planning services to the City of San Diego in their "Pure Water" initiative to combine the indirect potable reuse project into re-permitting the Point Loma Waste Water Treatment Plant ocean outfall to achieve significant cost savings. Managed the activities of a stakeholder Pure Water Working Group consisting of community opinion leaders (2013-15)
- Provided strategic water system evaluation and benchmarking services to the water utility serving Rio Rancho, NM in the potential rebid of an operations contract with OMI, International (a subsidiary of CH2M-Hill) (2014)
- Provided contract re-negotiation services to Rio Rancho, NM water and wastewater utility (2015)
- Provide facilitation and water resource expertise to Psomas Engineers in the development of the City of Beverly Hills' 10 Year Master Plan (2014-15)
- Strategic consultant to the Municipal Water District of Orange County staff and Board of Directors on California water resources and policy issues (2010-2015)
- Provided water resource strategy services to Western Municipal Water District. Facilitated the renegotiations of a wheeling agreement between WMWD and Riverside Public Utilities (2013-15).
- Provide consulting services to Lennar Properties in assessment of lead and copper compliance strategies for base redevelopment housing stock in the San Francisco Bay area (2015)
- Provided consulting services to the Boulder Springs development in the Lake Mathews Watershed (Riverside County, CA) for stormwater permit amendments to ensure protection of Lake Mathews. Provide technical interface between consultants, Boulder Springs staff and stakeholders (2014-2105)
- Provided strategic planning review services to Marin Municipal Water District (2013-15)
- Provided strategic market consulting to OpTerra Energy Services in the offering of energy development and conservation services to municipal water and wastewater utilities in the Southern California market (2014-17)
- Participate as Project Advisory Committee member for Water Research Foundation/AWWA sponsored project "State of the Science - Disinfection Byproduct Risk and Risk Management" with the objective "to organize an expert meeting to conduct a critical review of DBP epidemiology studies published since the final Stage 2 DBPR (January, 2006) and, identify information gaps that need to be addressed to facilitate risk management decisions driven by concern for putative DBP-related bladder cancer risk or other potential risks associated with brominated DBPs" (2014)
- Conducted scenario planning for power generation options for the Central Arizona Project Board of Directors (2014)
- Provided facilitation services, outreach planning, and technical input into Coachella Valley Water Districts comprehensive assessment of water supply options in the context of the chromium 6 proposed MCL as a subconsultant to Hazen & Sawyer (2013-15)
- Provided consultant selection review panel support services for a water quality/distribution system modeling project for the California Water District (2012-15)
- Analyzed total dissolved solids impacts of shifting from blended State Project water and Colorado River supplies to 100% Colorado River supplies at a potential new water treatment plant being considered by the East Orange County Water District (2014)
- Provided facilitation and water resource services to 5 large utilities representing major water users on the Santa Ana River to develop a Watershed Scale Conjunctive Use Program (2013-15)
- Provided facilitation and analysis services to City Fort Collins, Fort Collins – Loveland Water District, North Weld County Water District, and East Larimer County Water District, to examine opportunities to consolidate operations at two adjacent water treatment plants in Colorado to improve efficiency and service delivery to the region (2013-14)
- Facilitated Board and sr. management development of the Strategic Plan update for Rancho California Water District including development of performance metrics (2012-14)
- Water quality consultant to Foothill Municipal Water District on disinfection by-product compliance (2012-14)
- Principal lead on the PG&E Whole House Water Replacement project in Hinkley, CA (2011-13)
- Provide assistance to PG&E on permitting for Hinkley School water system replacement (2013-14)
- Strategic facilitation services to Poseidon Resources on development of the Huntington Beach desalination plant (2012)
- Department of Energy facilitator for federal agency (Oakridge National Lab, Pacific Northwest National Lab and others) development of document "Scientific Opportunities for Monitoring of Environmental Remediation Sites" (2011)
- Project director for West Basin MWD Ocean Desalination Program Master Plan (2011)

- Scenario Planning Facilitator for Spartanburg Sanitary Sewer District Asset Management Plan development (2011)
- Facilitator for cooperative workgroup Rancho California Water District Strategic Plan Review facilitation (2011)
- Irvine Ranch Water District nitrification control support (2011)
- City of La Verne, CA nitrification control support and control plan (2011)
- Municipal Water District of Orange County Desalination Alternative Delivery Evaluation project director (2011)
- Poseidon Resources Huntington Beach, CA desalination plant integration support (2011)
- Washoe County, Nevada Climate Change Adaptation workshop. Conducted full day workshop for Reno region utilities and stakeholders examining climate change effects on water resources and potential adaptation strategies (2010)
- Palm Beach County Water Utilities District. Strategic planning services. Facilitator for Executive management team developing strategic business plan. Conducted two multi-day workshops and assisted in developing goals, strategies and objectives (2010)
- Lee County Utilities, Strategic Planning Workshop facilitator (2010)
- Team Member, Delta Stewardship Council, Third Party Review support contract (2010)
- Municipal Water District of Orange County Strategic planning services. Facilitator for Board workshop on development of strategic plan goals (2010). Follow on strategic consulting services included conduct of multiple board, staff, and member agency manager trend/planning workshops and assistance in preparation of 5 year strategic business review (plan)
- American Water Services. Guest strategic planning keynote speaker for the executive management team on water trends (2010)
- City of Calgary Utilities and Environmental Protection Division Strategic Business Plan. Organized and conducted three day strategic planning session and provided future trends consulting (2010)
- Washington Aqueduct (WA) "Future Treatment Alternatives Study". Lead facilitator for large stakeholder process to select the long-term water treatment strategy for WA's Dalecarlia and McMillan water treatment plants. Led branding workshops for the WA (2009-10)
- Municipal Water District of Orange County. Strategic consultant to management and Directors regarding Metropolitan Water District of Southern California policy actions. Participate in monthly Director strategy sessions (2010)
- Western Municipal Water District. Strategic consultant to management and Directors regarding Metropolitan Water District of Southern California policy actions. Participate in monthly Director strategy sessions (2010)
- Sixteen Agency Working Group. Strategic consultant to a working of group of approximately 20 Metropolitan member agency managers related to Metropolitan Water District of Southern California policy actions. Members include City of Los Angeles, West Basin Municipal Water District and Municipal Water District of Orange County. Organize and participate in monthly strategy sessions (2010)
- Rosarito Beach Seawater Desalination Feasibility Study. Led pursuit team and was Project Director for a feasibility study for a binational 25 or 50 MGD desalination plant at Rosarito Beach in Baja California, MX including power, process, conveyance and water demand assessments and includes pilot testing and preliminary design in future phases (2009-11). Phase II is planned to start in 2011
- Town of Castle Rock. Review of indirect potable reuse issues and experiences in other communities as part of strategy development for an IPR project (2009-10)
- Denver Water. Assistance in development of scenario planning for the Integrated Resources Plan for Denver Water (2009-10)
- Coquina Coast Seawater Desalination Feasibility Study. Project technical review for a site and feasibility study for a desalination plant on the eastern coast of Florida. The study evaluated ship and land based options and includes pilot testing and preliminary design in future phases (2009-10)
- Co-Principal Investigator WateReuse "Evaluating Long and Short Term Planning under Climate Change Scenarios to Better Assess the Role of Water Reuse. This study is evaluating the role and impacts to water reuse associated with climate change. Case studies of coastal- and mountain-located utilities and development of a framework for considering climate change in water reuse plans were developed (2010)
- PRASA Climate Change Impacts Analysis. Project Team Member conducting a high level review of climate change imp;acts on Puerto Rico water and waste water facilities (2009)
- Ohio River Sanitary Commission. Conducted scenario planning for ORSANCO to create a long term vision for the organization (2009)

- Water Research Foundation: Bay Area Collaborative: Model for Regional Utility Cooperation. Principal Investigator/Facilitator for a study studying inter-utility cooperation approaches. The project examined opportunities for collaboration on emergency preparedness, water quality, asset management, and workforce development (2009).
- AWWA Water Utility Council Climate Change Strategy Development (2009). Facilitated WUC legislative committee development of a federal legislative strategy to position the drinking water utility industry on climate change issues
- "Water Utility Climate Alliance "Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning". Mr. Means was project manager for the Water Utility Climate Alliance project assessing decision support models for considering effects of climate change on water utilities. This study was one of the first to examine the use of such models and providing guidance to utilities in selection of the approaches (2009)
- Broward County Water Master Plan. Conducted scenario planning for development of the water master plan (2009)
- Principal Investigator for WRF "Evaluating Effects of Climate Change on Water Utility Planning Criteria and Design Standards". The project is identifying the appropriate water utility adaptation responses for climate change (2009)
- Facilitator for AWWA Water Utility Council Strategic Plan (2008)
- Principal Investigator for AwwaRF "Communicating the Value of Water". The project examined the best methods for developing public appreciation for water (2008)
- Co-Principal Investigator for WERF "Communication Principles and Practices, Public Perception and Message Effectiveness Related to Health and Environmental Risks with a Focus on Trace Organic Compounds" (2008)
- Madison Metropolitan Sewerage District Master Plan. Project Team member for scenario planning exercise (2008)
- Beaufort Jasper Water Supply Authority Integrated Resources Plan. Project Team member for scenario planning exercise. Developed IRP model for project implementation (2008)
- Coachella Brackish Water Reverse Osmosis – Project Officer for $1.2M pilot testing/full scale feasibility study of RO/Solar distillation technologies for brackish water RO. Brine disposal options are also being explored (2008)
- Weymouth Water Treatment Plant Long Term Water Treatment Strategy, Metropolitan Water District of Southern California. Facilitator of expert panel to develop a long term water treatment strategy for existing and new plants. Developed scenario analysis (2007-10)
- Los Angeles Department of Water and Power On-Line Water Quality Monitoring – Mr. Means was the Project Manager for an evaluation of state of the art on-line monitoring capability for operational support and contaminant warning for the City of Los Angeles. (2006-07)
- Project Manager for WRF Tailored Collaboration Project "Water Quality Implications of Large-Scale Application of Seawater Desalination" (2002-10)
- Los Angeles Integrated Regional Water Management Plan. Area Manager and key consultant team member for development of the integrated water resources plan for a 10M person planning area examining opportunities to meld stormwater management, water supply development, habitat restoration, and recreational value creation in a bold vision for future LA County water management. Provided expert facilitation for development of governance and water supply targets for the entire plan (2005-2010).
- UC Santa Cruz Desalination Policy – Team member examining water resource and environmental trade-offs with ocean desalination development in the State of California through a Prop 50 grant (2007-08).
- West Basin Municipal Water District "Strategic Business Plan". Managed development of the strategic business plan for the Board of Directors (2007-10)
- West Basin Municipal Water District Integrated Resources Plan. Project director for study assessing all local resource options and evaluating the technical, economic, environmental and social attributes of each option (2009)
- Facilitator for AWWA Water Utility Council Strategic Plan (2008)
- Principal Investigator for WRF "Communicating the Value of Water: An Introductory Guide for Water Utilities". The project examined the best methods for developing public appreciation for water (2008-09)
- Co-Principal Investigator for WERF "Communication Principles and Practices, Public Perception and Message Effectiveness Related to Health and Environmental Risks with a Focus on Trace Organic Compounds" (2008)
- AWWA Water Utility Council Strategic Plan. Facilitated the councils development of their strategic plan for legislative and regulatory activities in Washington, D.C. (2008)

- Long Term Water Treatment Strategy, Metropolitan Water District of Southern California (2007-08). Member of expert panel to develop a long-term water treatment strategy for existing and new plants. Led the conduct of scenario planning.
- Camp Pendleton Seawater RO Integration Study for the San Diego County Water Authority – Team member responsible for examination of institutional issues associated with development of a 100MGD desalination facility and appurtenant piping (2007-08)
- Prepared proposal and was project director for California Department of Public Health Infrastructure Needs Survey for the USEPA nationwide survey (2007)
- Los Angeles Department of Water and Power On-Line Water Quality Monitoring – Mr. Means is the Project Manager for an evaluation of state of the art on-line monitoring capability for operational support and contaminant warning for the City of Los Angeles. (2006-07)
- Metropolitan Water District of Southern California. Conducted future trends workshop for operations staff (2006)
- Project team member for "The Value of Water: Concepts, Estimates, and Applications for Water Managers". Awwa Research Foundation (2005)
- Principal Investigator for AwwaRF 2604, "A Strategic Assessment of the Future of Water Utilities". Published book entitled "Watercourse: Charting Your Utility's Future" (2005)
- Project Manager for client assisting Poseidon Resources Group in the development of California Department of Health Services permits for oceanwater desalination (2005)
- Project Manager for the San Diego County Water Authority Desalination Flavor Profile Analysis project (2004)
- Principal-in-charge for an Upper San Gabriel Municipal Water District project examining additional treatment needs for the San Jose Creek Water Reclamation Plant effluent to support increased use of recycled water from that facility (2003)
- Project Manager/Facilitator for WRF/California Energy Commission workshop to develop an Energy Research Needs Roadmap to support an anticipated joint research funding program (2003)
- Project Manager for water treatment plant regulatory assessments including
  - City of Redlands
    - Horace Hinckley WTP, Henry Tate WTP
  - Cucamonga County Water District
    - Lloyd Michael WTP, Royer-Nesbit WTP
    - Arthur H. Bridge WTP
  - West San Bernardino County Water District
  - Oliver P. Roemer WTP Fontana Water Company
    - Sandhill WTP, New West WTP
  - Covina Irrigating Company
    - Temple WTP
- Project Manager for Science and Technology Assessment, American Assembly, and Stakeholder Involvement tasks associated with re-visit of the City of San Diego's North City Water Reclamation Plant indirect reuse project, (2004)
- Principal in Charge of the San Bernardino Central Feeder Pumpback Water Quality Evaluation project under subcontract to Black & Veatch (2004)
- Project Manager managing technical assistance to Orange County Water District on control strategies for NDMA in recycled water (2004)
- Principal in Charge for the Santiago Reservoir Sanitary Survey, (2004)
- Expert Panel Member for Review of Riconada Plant Process Selection, Santa Clara Valley Water District (2004, 2007)
- Principal in Charge for the Encina Power Plant Desalination Site Sanitary Survey, (2004)
- Project Manager for City of Chandler Arizona Municipal Utilities Department strategic planning effort, (2004)

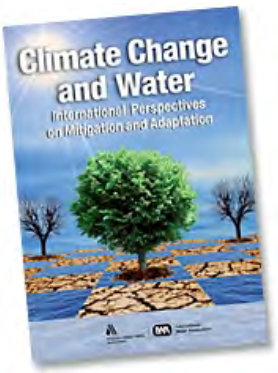
- Project Team member "Managerial Assessment of Water Quality and System Reliability". Water Research Foundation / American Water Works Association, 1997.
- Project Manager under subcontract to Carollo Engineers for the Delta Water Quality and Treatment study under an AwwaRF Tailored Collaboration with Contra Costa Water District (2004)
- Principal in Charge of the California Urban Water Agency McGuire Environmental Consultants' contract management agreement (2002-2005)
- Principal water resources and quality consultant to the California Avocado Commission (1999-2013)
- Developed Central Elmore Water and Sewer Authority's (Alabama) Strategic Plan (2004)
- Principal Investigator for AwwaRF 2816, "Water Quality Management: How to Structure it in a Utility" (2004)
- Project Manager providing regulatory and issue support to the Arizona Water Utility Council of the Arizona Water Pollution Control Association (2004)
- Project Manager for the WRF Strategic Assessment 2 project assessing strategic trends affecting the U.S. water utility community (2004)
- Principal-in-charge of chlorine dioxide/nitrification control full-scale test program for the City of Carlsbad (2003-04)
- Project Manager for the Denver South Metro Water Agency Study of Regionalization Opportunities (2004)
- Project Team member on WRF Characterizing Salinity Contributions in Sewer Collection and Reclaimed Water Distribution Systems to Develop Salinity Management Strategies (2003-04)
- Project Team member on WRF The Value of Water in a Changing Economy (2003-04)
- Project Team member on water resource and water quality strategies for the City of San Diego Strategic Business Plan development project (2003)
- Project Manager for WRF Tailored Collaboration Project "Water Quality Implications of Large-Scale Application of Seawater Desalination" (2002-07)
- UC Santa Cruz Desalination Policy – Team member examining water resource and environmental trade-offs with ocean desalination development in the State of California through a Prop 50 grant (2007-08)
- Principal-in-charge for an Upper San Gabriel Municipal Water District project examining additional treatment needs for the San Jose Creek Water Reclamation Plant effluent to support increased use of recycled water from that facility (2003)
- Project Manager/Facilitator for WRF/California Energy Commission workshop to develop an Energy Research Needs Roadmap to support an anticipated joint research funding program (2003)
- Project Team member on WRF The Value of Water in a Changing Economy (2003-04)
- Project Team member on water resource and water quality strategies for the City of San Diego Strategic Business Plan development project (2003)
- Invited speaker to East Bay Municipal Utilities District management team on future trends (2003)
- Principal-in-charge for the City of Escondido Water Quality Laboratory Resources Evaluation (2002-03)
- Principal-in-charge of chlorine dioxide/nitrification control full-scale test program for the City of Carlsbad (2003-03)
- Provided American Water Works Services Company strategic planning assistance
- Greater Cincinnati Water Works. Provided strategic planning assistance
- Duke Energy. Provided guidance to a power generator regarding availability of cooling water supplies in the San Diego area
- Invited speaker on water utility management and strategic issues for numerous public and private water utilities
- City of Santa Barbara. Developed water quality strategic plan for the Cater Water Treatment Plant under contract to Carollo Engineers (2001)
- Managed the conduct of bromate control strategy assessment for Mesa Consolidated Water District, Costa Mesa, California. Principal in Charge for a pilot scale ozone/magnetic ion exchange resin investigation of bromate control strategies (2002-05)
- Principal-in-charge for the City of Escondido Water Quality Laboratory Resources Evaluation (2002-03)
- Project Manager managing technical assistance to West Basin Municipal Water District on obtaining Department of Health Services permits for injection of 100% recycled water into the West Basin. Project involves work on endocrine disruptors and NDMA (2002)

- Expert reviewer, Spanish National Hydrologic Plan. Participated with a delegation of water experts (Dr. Alex Horne, Dr. John Dracup of University of California Berkeley, and Dr. Jose Iturbio Rodriquez of Princeton and others to conduct a week long tour and technical review of the Ebro River Water transfer plan for the Spanish Government (2002)
- Managed Ambassador Neighborhoods Program assessing blends of Colorado River Water and Local Groundwater in four neighborhoods in Tucson, Arizona including water quality communication strategies. Prepared successful EMPACT grant application (2000-02)
- Conducted SDWA compliance audits of City of Fullerton (2000)
- Provided Seattle Public Utilities strategic planning assistance
- Developed and conducted workshop to develop a water quality strategic plan for East Bay Municipal Utilities District
- Invited speaker to East Bay Municipal Utilities District management team on future trends (2003)
- Developed draft radon compliance strategy for Tucson, AZ (2002)
- Conducted water quality regulation compliance audit for Contra Costa Water District, Contra Costa, CA (2000)
- Project Manager on assessment of marketing opportunities for excess water quality laboratory capacity for Irvine Ranch Water District (2000)
- Conducted nationwide Disinfectants/Disinfection By-Product Rule training for AWWA (1999)

MEMBERSHIP, AFFILIATIONS, AND AWARDS

- Invited participant, Consortium for High Technology Investigations on Water on Waternd Wastewater Concentrate Management Research Needs Workshop, March 16, 2010
- American Society of Microbiology, Member 1980-1990
- North American Lake Management Society, Member 1988
- American Water Works Association, Member since 1980 -awarded Honorary Membership in 1999
- Member AWWA Organisms in Water Committee 1987 Vice-Chair, 1990
- AWWA Microbial Problems Committee 1987
- AWWA Bacteriological Sampling Committee 1985
- Project Manager, AWWA Disinfectants/Disinfection By-Products (D/DBP) Technical Advisory Workgroup (TAW, 1990, 1991, 1992) - The TAW is charged by the AWWA Water Utility Council (WUC) with the conduct of technical reviews of the D/DBP regulation to formulate positions. Metropolitan has held the management contract since inception of the TAW.
- Member Advisory Board, Puresense, Inc. 2005
- Co-Chairman, Association of Metropolitan Water Agencies Water Quality Committee 1992
- Association of Metropolitan Water Agencies, Member 1990-1997
- NWRA representative to the AWWA WUC 1992
- NWRA representative to the Water Industry Coordinating Council 1992
- Peer Reviewer for Journal AWWA
- Recipient of 2011 AWWA Water Resources Sustainability Division best paper award for paper entitled "Impacts of Climate Change on Infrastructure Planning and Design: Paste Practices and Future Needs"
- Reviewer for Journal of Water Resources Planning and Management
- Project Advisory Committee member, AWWA/CDC Preparing for Climate Change: Building Public Health-Based Models for Water Resource Adaptive Management through Water Utility Case Studies (2009-2010), A Collaboration Between the Centers for Disease Control and Prevention (CDC) and the American Water Works Association
- Chairman of AWWARF Pathogen Detection Workshop, Park City, Utah, July 1992
- Association of California Groundwater Agencies Groundwater Committee 1994

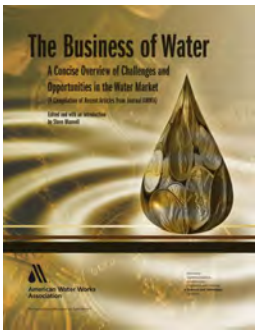
- Recipient of 1993 National Water Resources Association (NWRA) Presidents Award for representation of the association during the negotiated rulemaking on DBPs
- Co-Chairman of the NWRA Safe Drinking Water Act Reauthorization Task Force 1992, 1993
- Reviewer, Case Study on "Trihalomethanes and Other By-Products Formed by Chlorination of Drinking Water" by Dr. Phil Singer for "Keeping Pace with Science and Engineering: Case Studies in Environmental Regulation, National Academy of Engineering, National Academy Press, Myron F. Uman, ed., 1993.
- Invited Participant, AWWA Research Foundation Microbial/DBP Workshop, Miami, Florida, November 3-5, 1993
- Invited Participant to "Information Collection Rule: An Opportunity for Utility-Community Dialogue," workshop sponsored by AWWA, March 9-10, 1994.
- Recipient of 1995 AWWA Water Resources Division best paper award for paper entitled "Implications of Discharging Potable Water in Southern California"
- Recipient of special recognition plaque from the California Emergency Utilities Association (during their semi-annual meeting) for participating in activities related to emergency preparedness in California 1996
- Established a cooperative program with the American Red Cross to provide professional staff to the Red Cross during emergencies 1996
- Represented AWWA in Stakeholder Meetings with USEPA on the D/DBP rule cluster 1996
- Appointed to a 3-year term on the Water Utility Council (WUC) of the AWWA 1996
- Participant on Water Industry Peer Review Panel for San Francisco Public Utilities Commission 1996
- Chairman of the Regulatory Committee of the WUC of AWWA 1998
- California Utilities Emergency Association
    - Chairman, Board of Control 1994
    - Vice-Chairman, Executive Committee 1995-96
    - Chairman, Executive Committee 1996-97
    - Board Director 1998
- Board Director, National Water Research Institute 1998
    - Vice-Chairman 1998
- Board Directors, Newport Elementary School Beacons, 1998
- Scientific Planning Committee for 1999 ILSI Safety of Water Disinfection Conference
- 1998 California-Nevada Section AWWA George Warren Fuller Awardee
- 2000 California-Nevada Section Trustee



- Member, AWWA Climate Change Technical Advisory Workgroup 2009-10
- Project Advisory Committee member for WRF/AWWA project “State of the Science - Disinfection Byproduct Risk and Risk Management” project to examine strength of evidence of cancer outcomes for chlorinated disinfection by-products (2014)
- Cal/Nev AWWA, member of Water Quality Committee and the Safe Drinking Water Subcommittee, 2012
- American Society of Civil Engineers, Member 2000-13
- Board Member, Urban Water Institute, 2010 - 2019

PUBLICATIONS

Books



1. "Watercourse: Navigating Your Utilities Future", published by Water Research Foundation, December 2001.
2. "Excellence *in Action: Water Utility Management in the 21st Century".* Contributing Author. Chapter 28, "How to Best Position Your Utility for the Future", AWWA 2001.
3. "A Strategic Assessment of the Future of Water Utilities", Water Research Foundation, 2006.
4. "The Business of Water", Contributing Author. published by the American Water Works Association (AWWA), 2008.
5. "Climate Change and Water", Contributing Author, published by IWA/AWWA, 2009.
6. "Water 2050: Attributes of Sustainable Water Supply Development", Contributing Author, published by Environmental & Water Resources Institute, 2010.
7. "Fostering Innovation Within Water Utilities", Project #4642, Contributing Author, Water Research Foundation, 2017.

Journal and Proceedings Articles

8. Carter, J., J. Brunner, S. Sriboonlue, and E. Means. "The Leading Role: Utilities as Primary Drivers for Water Sector Innovation", Utilitiy Management Conference, Anaheim, CA. February 25-28, 2020.
9. Means, E. and J.T. Carter. "Partnerships as Innovation Catalysts", Proceedings of WEFTEC 2018, New Orleans, LA, October 2018.
10. Means, E. and J.T. Carter. "Partnerships as Innovation Catalysts", Leading Water Utility Innovation Session, Proceedings of the AWWA ACE, Las Vegas, NV, June 14, 2018.

11. Carter, J.T., Foresman, J., Brown, T., Darr, M., Means, E., Owen, D., & Jones, T.M., IV, 2017. Fostering Innovation Within Water Utilities. Water Research Foundation Report #4642, Denver.
12. Carter, J.T., Means, E., Owen, D., and S. Jones. "Fostering Utility Innovation: Making the Case Globally (Part 1)", Submitted to JAWWA, 2017.
13. Carter, J.T., J. Foresman, E. Means, D. Owen and T.M. Jones IV. A Framework for Driving Innovation in Your Water and Wastewater Utility, JAWWA. 109:12:32-39.
14. Raucher, R. S., Raucher, K. S., Smith, J.B., Vogel, J., Means, E., and K. Porter. "Evaluating Long- and Short-Term Planning Under Climate Change Scenarios to Better Assess the Role of Water Reuse", WaterReuse Research Foundation, 2013.
15. Blute, N., Pedersen, D.W., Wu, X., and E. Means. "Demonstration Testing of Nitrification Control Using Chlorite in Irvine, CA." JAWWA, April 2013.
16. Alspach, B., Teitz, W., Harding, R., and E. Means. "Integrating Desalinated Seawater into Existing Systems: Strategic Practices and Lessons Learned", AWWA Journal IDA, October 2012.

17. Alspach, B., Teitz, W., Means, E., and R. Harding. "Strategic Practices and Lessons Learned for Integrating Desalinated Seawater into Existing Systems", AMTA 2012 Membrane Technology Conference, Glendale AZ, Feb 27 – Mar 1, 2012.

18. Deeb, R., Hawley, E., and E. Means. " Building a National Utility Network to Address EC/PPCP Issues", AWWA Annual Conference and Exposition, Washington, D.C., June 14, 2011.

19. Alspach, B., Means, E.G. III, Burch, R., and C. Hill, "The Role of Desalination in a Diversified Water Resources Portfolio: Lessons Learned", Proceedings of the IWA World Water Congress, Montreal, CA, September 19-24, 2010.

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20. Means, E.G., Laugier, M., Daw, J., and D. Owen, "Impacts of Climate Change on Infrastructure Planning and Design", JAWWA 102:6, pp 1-14, June, 2010.

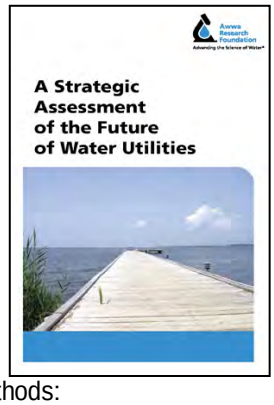
21. Yep, R., Wallis, M., Brown, J., Briggs, D., Means, E., and S. Cline. "Findings of a Regional Collaboration Study in the San Francisco Bay Area", Proceedings of the AWWA ACE, Chicago, IL, June 20-24, 2010.

22. Yep, R., and E. Means. "Bay Area Water Utilities Operations Collaborative: Model for Inter-Regional Utility Cooperation", Proceedings of the AWWA/WEF Utility Management Conference, San Francisco, CA, February 21-24, 2010.

23. Cline, S. and E. Means. "Industry Trends and Benefits of Regional Collaboration", Proceedings of the AWWA/WEF Utility Management Conference, San Francisco, CA, February 21-24, 2010.

24. Means, E. G. III, Hunt, A., Mortada, M. and G. De La O. "Regional Water Management in Southern California: Lessons for Sustainability". Proceedings of the WSTA 9th Gulf Water Conference, Muscat, Sultanate of Oman, March 22-25, 2010.

25. Alspach, B., Means, E.G. III, Burch, R., and C. Hill. "The Role of Desalination in a Diversified Water Resources Portfolio: Lessons Learned". Submitted to IWA conference, Montreal, Canada, Sept. 19-24, 2010.



26. Means, E. III, Laugier, M., Daw, J., Kaatz, L., and M. Waage. "Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning", Water Utility Climate Alliance, 2010. http://www.wucaonline.org/assets/pdf/actions_whitepaper_012110.pdf, Jan. 2010

27. Means, E., Laugier, M., Daw, J., and M. Hurley. "Evaluating Effects of Climate Change on Water Utility Planning Criteria and Design Standards". Water Research Foundation Project #4154. In Press

28. Deeb, R., Hawley, E., and E. Means. "Microconstituents: Communication in the Face of Uncertainty". 24th Annual WateReuse Symposium, Seattle, Washington, September 13-16, 2009.

29. Means, E. G. "Water quality implications of climate change for water utility operations", Proceedings of the 2009 AWWA Water Quality Technology Conference, Seattle Washington, November 15-19, 2009.

30. Deeb, R. A., Hawley, E., Kavanaugh, M., Means, E., and D. Sedlak. "Emerging Contaminants: A U.S. Perspective". Proceedings of the 2009 OZWATER conference, Melbourne, Australia, March 16-18, 2009.

31. Means, E., Chowdhury, Z., Westerhoff, G., Passantino, L. and J. Ruettan. Communicating the Value of Water: An Introductory Guide for Water Utilities. Water Research Foundation, 2008.

32. Nygaard, J., Loveland, J, Means, E. Lauri, P., Shoenberger, P, Valencia, R, and M. Tirtadidjaja. "Permeate Stabilization and Corrosion Control for Desalinated Seawater: Metals Release from Simulated Household Piping", AWWA ACE, Atlanta, GA, June 8-12, 2008.

33. Briggs D, Weddle W, Flores A, Baribeau H, Garvey E, Crozes G, Patten T, Hofmannc. R, Mowat K, Paradis N, Templeton M, Andrews R, Means III E, Loveland J, Leserman J, McGuire M, Amy G, Schwer P., Chauret C., Andrews S, Musser J. "Advanced water treatment of estuarine water supplies." Water Research Foundation (WRF) Report 91183. ISBN: 9781843398097, 2008.

34. Bostad, D; Garrett, M., Means. E. , Everest, B., Hunt, A. and M. Hurley. Identification of Purchase Quantity of Desalinated Seawater: Sweetwater Authority. AWWA Sustainable Water Sources Conference, Reno, NV, February 10—13, 2008.

35. Steirer, M.A., Means, E.G. III., and L.S. Robin. "Stakeholders, speakers, supporters and more! Keys to public outreach success". WEF/AWWA Joint Management Conference, Portland, OR, February 25-28, 2007.

36. Parekh, P., Trachtman, G., Manoukian, R., & E. Means. "Demonstration Testing Program for Remote On-line Real-Time Water Quality Monitoring at Los Angeles Department of Water and Power", AWWA Distribution System Symposium, Cleveland, OH, September 23-26, 2007.

37. Ansley, J.H., Laugier, M., Means, E.G., "Greenhouse Gases Emissions and Impacts on Groundwater Management in California", presented at the 26th Biennial Groundwater Conference and 16th Annual Meeting of the Groundwater Resources Association of California (GRA), Sacramento CA, September 18-19, 2007.

38. Passantino, L.B., Means III, E.G., Chowdhury, Z.K., Westerhoff, G.P., "Tools for Communicating the Value of Water", *Proceedings*, Annual Conference and Exposition of the American Water Works Association (AWWA), Toronto ON, June 24-28, 2007.

39. Means, E., Chowdhury, Z, and A Ghosh,. "Endocrine Disruptor Compounds and Pharmaceuticals and Personal Care Products: Real Risk or "Contaminant of the Month?", AWPCA Newsletter, Vol. 24, No. 5, 2007.

40. McGuire M.J., Loveland J., *, Means E.G., and J. Garvey, "Use of flavor profile and consumer panels to determine differences between local water supplies and desalinated seawater", *Water Science and Technology*, *Water Sci Technol*. 55 (5):275-82, 2007.

41. Parekh, P., Manoukian, R., Trachtman G. B. and E. G. Means III, "Remote On-Line Water Quality Monitoring System for Los Angeles Department of Water & Power: Ready for Prime Time?", 2006 American Water Works Association 4th Water Security Congress, Washington DC, September 11, 2006.

42. Steirer M. A., Means, E. and L. Robin, "Supporting Public Outreach with a Stakeholder Group" California WateReuse Conference, March 12-14, 2006, San Francisco, CA.

43. Jazmadarian, N. and E. Means, "Cost of Free water", *Proceedings of AWWA Sources Conference*, Albuquerque, NM, February 5-8, 2006.

44. Loveland, J., Means, E., Diamond, S., and B. Alspach. "Pursuing Sustainable Local Supplies in Southern California: Issues in Treatment of Marginal Supplies", Proceedings of AWWA Sources Conference, Albuquerque, NM, February 5-8, 2006.

45. Means, E.G., Patrick, R., Ospina, L.S., West, N.J., "Scenario Planning: A Tool to Manage Future Water Utility Uncertainty," *JAWWA*, *Vol. 97,* No. 10, pp. 68-75, October 2005.

46. Raucher, R., R. Linsky, E. Means, B. Hurd, J. Goldstein, A. Huber-Lee, M. Renwick et al. 2005. *The Value of Water: Concepts, Estimates, and Applications for Water Managers*. Awwa Research Foundation, Denver, CO.

47. Means, E.G., West, N.J., Patrick, R., "Population Growth and Climate Change Will Pose Tough Challenges for Water Utilities," *JAWWA*, Vol. 97, No. 8, pp. 40-46, August 2005.

48. Means, E.G., Ospina, L.S., Patrick, R., "Ten Primary Trends and Their Implications for Water Utilities," *JAWWA, Vol. 97, No. 7, pp. 64-77, July 2005.*

49. *Means*, E.G., J. Strayer "Applying the American Assembly Process to Water Reuse," presented at the Third Annual California WateReuse Conference (California Section of the WateReuse Association), February 27 - March 1, 2005, San Diego, California.

50. Patrick, R. and E. G. Means III. "Meeting customer expectations in a fluid environment," *JAWWA* 97:9, 2005.

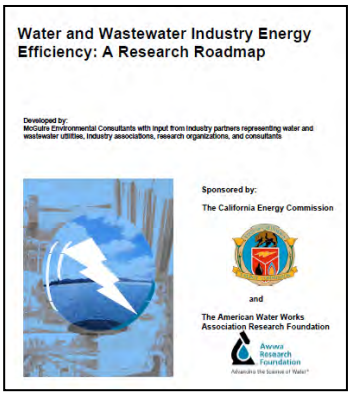
51. Means E. G. III, N. West, and R. Patrick, "The Regulatory Horizon: Implications for Water Utilities," *JAWWA*, 97:11, 2005.

52. Means E. G. III, J. Bernosky, R. Patrick., "Technology Trends and Their Implications for Water Utilities," *JAWWA*, In Press.

53. Loveland, J.P., Means E.G. III, and R. Nagel, "Key Water Quality Parameters for Large-Scale Integration of Single-Pass Reverse Osmosis Desalinated Pacific Ocean Seawater", *Proceedings of the 2004 Water Quality Technology Conference*, San Antonio, TX, November 14-18, 2004.

54. Loveland, J., Reich, K., Means, E.G., Voutchkov, N., McKinley, J., "Disinfection of Reverse Osmosis (RO) Desalinated Seawater Using Free Chlorine and Chloramines: Implications for Disinfection Byproduct Formation and Disinfectant Residual Stability," Poster at the American Water Resources Association Annual Meeting, San Diego, CA, November 3, 2003.

55. Loveland, J., Reich, K., Voutchkov, N., McKinley, J., Means, E.G., "Disinfection of Reverse Osmosis (RO) Desalinated Seawater Using Free Chlorine and Chloramines: Implications for Disinfection Byproduct Formation and Disinfectant Residual Stability," Presented at the Cal/Nev Section American Water Works Association Fall Meeting, San Diego, CA, October 8, 2003.



56. Loveland, J., and E. G. Means, "Development of a Water Quality Based Model for UV Treatment of NDMA and Other Trace Organics," presented at the Annual WateReuse Research Conference, South San Francisco CA, June 2-3, 2003.

57. Pearthree, M. S., Davis, S. E., Means, E. G.,"Tucson's Successful Re-Introduction of a Renewable Water Supply," *Proceedings*, Annual Conference of the American Water Works Association, New Orleans LA, June 19, 2002.

58. Brueck, T., Manning, A., Means, E.G., L Dixon, J. Miles, Patrick, R., "Facing the Workforce Reality: Making More Out of Less," Manager to Manager Series, *Journal of the American Water Works Association*, Vol. 94, No. 6, pp. 34-39. June 2002.

59. Patrick, R., Dixon, L.; Brueck, T., Means, E.G., "Alternative Service Delivery Models," Manager to Manager Series, JAWWA, Vol. 94, No. 4, pp. 44-48. April 2002.

60. Means, E.G., Brueck, T.; Manning, A.; Dixon, L.; J. Miles;, Patrick, R. "The Coming Crisis: Water Institutions and Infrastructure," Manager to Manager Series, *JAWWA* 94:1 pp 34-38, Feb. 2002.

61. Means, E.G., Brueck, T.; Manning, A.; Dixon, L.; J. Miles; Patrick, R., "Drinking Water Quality in the New Millenium: The Risk of Underestimating Public Perception," Manager to Manager Series, *JAWWA* 94:8, 2002.

62. Means, E.G., *"Watercourse: Navigating Your Utilities Future,"* published by American Water Works Association Research Foundation, December 2001.

63. J. Miles, Means, E.G., Dixon, L., Brueck, T.; Manning, A.; Patrick, R., "Planning for the Effects of Climate Change", Manager to Manager Series, *JAWWA* 93:10 pp. 34-38, Oct. 2001.

64. Dixon, L., A. Bower, Brueck, T.; Manning, A.; Means, E.G.; J. Miles; Patrick, R., "The Challenges of a Changing Customer Base," Manager to Manager Series, *JAWWA* 93:9 pp. 46-49, Sept. 2001.

65. Means, E.G., "Meeting the Future Head On," Manager to Manager Series, *JAWWA* 93:7 pp. 36-48, July 2001

66. Means, E.G.; Brueck, T.; J. Miles; Patrick, R.; Lloyd Dixon, "A Strategic Assessment of the Future of Water Utilities," of the AWWA/WEF Joint Management Conference, Portland, Oregon, February 4-7, 2001.

67. Lauer, W. (ed.) "*Excellence in Action: Water Utility Management in the 21st Century*. Contributing Author, Chapter 28, How to Best Position Your Utility for the Future", published 2001 by AWWA.

68. Owen, D. M.; Dyksen, J. E.; Cromwell, J. E., Means, E. G., "Managing for Water Quality and System Reliability," *Proceedings*, Annual Conference of the American Water Works Association, Atlanta GA, June 15-19, 1997.

69. Cromwell, J.; D. Owen; J. Dyksen, Means, E.G., "Managerial Assessment of Water Quality and System Reliability," Final Report to the American Water Works Association Research Foundation, 1997.

70. Cromwell, J.; Means, E.G., "Managerial Assessment of Water Quality and System Reliability," of the 1996 AWWA Annual Conference, Toronto, Canada, June 23-27, 1996.

71. Means, E.G., "Organisms in Water Committee Report: Problem Organisms in Water: Identification and Treatment," AWWA Manual M7 of Water Supply Practices, 1995.

72. T. Hartley, M. Austin, J. Birkhoff, C. Chess, J. Conklin, M. F. McDaniel, E. Means, M. McGuire and C. J. Wiant. "Framework for Public Perception and Participation in Non-Potable and Potable Water Reuse Initiatives: Guidance on Establishing and Maintaining Public Confidence", WateReuse, WERF and AwwaRF, July 2002.

73. T. Hartley, M. Austin, J. Birkhoff, C. Chess, J. Conklin, M. F. McDaniel, Means, E.G., M. McGuire, C. J. Wiant, "Framework for Public Perception and Participation in Non-Potable and Potable Water Reuse Initiatives: Guidance on Establishing and Maintaining Public Confidence," Submitted to the 1994 AWWA Annual Conference, New York, New York, June 19-23, 1994.

74. Lie, J., Means, E.G., "Alternative Funding Programs for Water Reuse Projects - The Key to Southern California's Success," The Water Reuse Symposium, American Water Works Association, Dallas, Texas, February 27, March 2, 1994.

75. Means, E.G., "Case Study 2: Disinfection By-Products, Presentation. Invited participant for Symposium, The Worth of Science in Regulatory Decisions," Annual Meeting of the Society for Risk Analysis, Savannah, Georgia, December 6-9, 1993.

76. Krasner, S.W., M.J. Sclimenti, Means, E.G., "Water Quality Degradation in the San Francisco Bay/Sacramento-San Joaquin River Delta: Implications for Disinfection By-product Control," *Proceedings*, Water Quality Technology Conference, AWWA, Miami, Florida, November 7-10, 1993 (pp. 387-415).

77. Lie, J., Means, E.G., "Recycled Water - An Important Component of Metropolitan's Current and Future Water Supply," Presented at the Water Reuse Association of California Annual Symposium, San Diego, California, October 13-15, 1993.

78. Lieu, Nancy I.;Wolfe, Roy L.;Means, Edward G. III. "Optimizing Chloramine Disinfection for the Control of Nitrification". *JAWWA*, Vol. 85:2, February 1993, pp. 84-90.

79. Owen, D. M., Chowdhury, Z. K., Krasner, S. W., Means, E.G., "Integrating Source Control and Treatment Through Modeling," presented at the Annual Conference of the American Water Works Association, San Antonio TX, June 6-10, 1993.

80. Krasner, S.W., M.J. Sclimenti, Means, E.G., "Water Quality Degradation in the San Francisco Bay/Sacramento-San Joaquin River Delta: Implications for Disinfection By-product Control," Proceedings of the Annual Conference AWWA, San Antonio, Texas, June 1993.

81. Krasner, S. W., Means, E. G., "Predicting THM Formation in Bromide-Rich Waters," *Proceedings*, Water Quality Technology Conference of the American Water Works Association, Toronto, Ontario, Canada, November 15-19, 1992.

82. Owen, D. M., Chowdhury, Z. K., Krasner, S. W., Means, E. G., "Predicting THM Formation in Bromide-Rich Waters," *Proceedings*, Water Quality Technology Conference of the American Water Works Association, Toronto ON, November 15-19, 1992.

83. Means, E.G., "Assessing Contaminants: The State Water Project Sanitary Survey," *Proceedings* of the Conference on Protecting Drinking Water Quality at the Source, California Water Resources Center, University of California, October, 1991.

84. R. L. Wolfe, N. I. Lieu, Izaguirre, G., Means, E.G., "Ammonia-Oxidizing Bacteria in a Chloraminated Distribution System: Seasonal Occurrence, Distribution, and Disinfection Resistance," *Applied Environmental Microbiology*, 56:2:451. 1990.

85. N. R. Ike, R. L. Wolfe, Means, E.G., "Nitrifying Bacteria in a Chloraminated Drinking Water System," Water Science & Technology, 20:11/12:441, 1988.

86. N. R. Ike, R. L. Wolfe, Means, E.G., "An Assessment of the Bacteriological Activity on Granular Activated Carbon Particles," Abstracts, 88th Annual Meeting, American Society for Microbiology, May 8-13, 1988, Miami, Florida.

87. *R*. L. Wolfe, M. Stewart, Izaguirre, G., Means, E.G., "Disinfection of Granular Activated Carbon Effluent in a Drinking Water Pilot Plant," Abstracts, 88th Annual Meeting, American Society for Microbiology, May 8-13, 1988, Miami, Florida.

88. Wolfe, R. L.; Means, E. G. III; Davis, M. K.; and S. E. Barrett. "Biological Nitrification in Covered Reservoirs Containing Chloraminated Water " *JAWWA*, Vol. 80:9, September 1988, pp. 109-114.

89. R. L. Wolfe, N. R. Ike, Means, E.G., "The Significance of Ammonia-Oxidizing Bacteria in Chloraminated Drinking Water Supplies," Abstracts, 87th Annual Meeting, American Society for Microbiology, Atlanta, Georgia, March 1-6, 1987.

90. S. E. Krasner, Means, E.G., "Returning Recently Covered Reservoirs to Service: Health and Aesthetic Considerations", *JAWWA* 78:3:94, 1986.

91. Means, E.G., K. N. Scott, M. L. Lee, R. L. Wolfe, "Bacteriological Impact of a Changeover from Chlorine to Chloramine Disinfection in a Water Distribution System," *Proceedings*, 1986 Annual Conference, American Water Works Association, Denver, Colorado, 1986.

92. Means, E.G., "Committee Report: Current Practice in Bacteriological Sampling," AWWA Committee on Bacteriological Sampling Frequency in Distribution Systems; *JAWWA* 77:9:75, 1985.

93. Means, E.G., A. E. Preston, McGuire, M.J., "Scuba Diving as a Cost-Effective Tool for Managing Water Quality Problems," presented at the Fall Conference, California-Nevada Section, American Water Works Association, Anaheim, California, October 19-21, 1983 (32 pp.).

94. Means, E.G., A. E. Preston, and M. J. McGuire, "Scuba Diving: A Tool for Managing Water Quality," *JAWWA* 76:10:86-92, 1984.

95. Means, E.G., L. Hanami, G.F. Ridgway, Olson, B.H., "Evaluating Mediums and Plating Techniques for Enumerating Bacteria in Water Distribution Systems," *JAWWA* 73:11:585, 1981.

96. Means, E.G., Olson, B.H., "Coliform Inhibition by Bacteriocin-Like Substances in Drinking Water Distribution Systems," *Applied Environmental Microbiology*, 42:3:506, 1981.

97. N. R. Ward, R. L. Wolfe, Means, E.G., Olson, B.H., "The Inactivation of Total Count and Selected Gram-Negative Bacteria by Inorganic Monochloramines and Dichloramines," *Proceedings*, 19th Annual AWWA Water Quality Technology Conference, Nashville, Tenn., December 5-8, 1982 (pp. 281-294).

98. S. E. Krasner, Means, E.G., "Returning a Newly Hypalon-Covered Finished-Water Reservoir to Service: Health and Aesthetic Considerations," *Proceedings*, 1985 Annual Conference, American Water Works Association, Washington, D.C., June 23-27, 1985 (pp. 371-394).

99. Izaguirre, G., Wolfe, R.L., Means, E.G., "Degradation of 2-Methylisoborneol by Aquatic Bacteria. Appl. Envir. Microbiol., 54:2424.,"

100. Izaguirre, G., Wolfe, R.L., Means, E.G., "Bacterial Degradation of 2-Methyisoborneol," Water Science Technology, 20:8/9:205.

101. J. T. Gramith, B. M. Coffey, Krasner, S.W., C. Kuo, Means, E.G., "Demonstration-Scale Evaluation of Bromate Formation and Control Strategies," *Proceedings* (Water Quality) of the 1993 Annual AWWA Conference, San Antonio, Texas, June 6-10, 1993. (pp. 857-875)

102. J. T. Gramith, S.K. Krasner, J. G. Jacangelo, Means, E.G., "Development and Use of a Nationwide D/DBP Database for the Negotiated Regulation," *Proceedings* of the 1993 AWWA Water Quality Technology Conference, Miami, Florida, November 7-11, 1993. (pp. 677-693).

103. K. J. Richardson, M. H . Stewart, R. L. Wolfe, Means, E.G., "Utilization of Assimilable Organic Carbon by Autochthonous Organisms," Submitted to Abstracts, 91st Annual Meeting, American Society for Microbiology, 1991, Miami, Florida.

104. Krasner, S.W., Gramith, J.T., Means, E.G., Patania, N.L., Najm, I.N., Aieta, E.M., "Formation and Control of Brominated Ozone By-products," *Proceedings*, AWWA 1991 Annual Conference, June 23-27, 1991, Philadelphia, Pennsylvania.

105. Gramith, J.T., Ferguson, D.W., Means, E.G., "Ozone and PEROXONE for Control of Disinfection By-products: Metropolitan's Experience," *Proceedings*, AWWA 1991 Annual Conference, June 23-27, 1991, Philadelphia, Pennsylvania.

106. N. I. Lieu, R. L. Wolfe, Means, E.G., "Chloramine Inactivation of Ammonia-Oxidizing Bacteria," Proceedings, AWWA 1991 Annual Conference, June 23-27, 1991, Philadelphia, Pennsylvania.

107. K. J. Richardson, M. H . Stewart, R. L. Wolfe, Means, E.G., "Comparison of Gene Probe and Conventional Methods for Detection of Enteric Viruses and Giardia in Water," *Proceedings*, AWWA WQTC, November 10-14, 1991, Orlando, Florida.

108. P. A. Hacker, C. Pasko-Kolva, M. H . Stewart, R. L. Wolfe, Means, E.G., "Evaluation of Filter Media and Filter Flow Rates on AOC Reduction," Abstracts, 92nd Annual Meeting, American Society for Microbiology, 1992, New Orleans, Louisiana.

109. Krasner, S.W., M. J. Sclimenti, Means, E.G., J. M. Symons, L. Simms, "The Impact of Chlorine Dose, Residual Chlorine, Bromide and Organic Carbon on Trihalomethane Speciation," *Proceedings* AWWA WQTC, November 15-19, 1992, Toronto, Ontario, Canada.

110. M. D. Beuhler, Means, E.G., "Implications of Discharging Potable Drinking Water in Southern California", Proceedings of the AWWA WQTC, November 15-19, 1992, Toronto, Ontario, Canada.

111. Means, E.G., Krasner, S.W., "D/DBP Regulation: Issues and Ramifications," *JAWWA* 85:2, February 1993 (pp. 68-73).

112. N. I. Lieu, R. L. Wolfe, Means, E.G., "Optimization of Chloramine Disinfection for Controlling *Nitrification*," *JAWWA* 85:2, February 1993 (pp. 84-90).

113. M. D. Beuhler, Means, E.G., "Implications of Discharging Potable Water in Southern California," *Journal of the American Water Works Association* 86:4, April 1994 (pp. 205-213).

114. Krasner, S.W., M. J. Sclimenti, Means, E.G., "Quality Degradation: Implications for DBP Formation," *JAWWA* 86:6, June 1994 (pp. 34-47).

115. S.W. Krasner, K. M. Gramith, Means, E.G., "D/DBP Occurrence: Past, Present, and the Future," Submitted to the 1994 AWWA Annual Conference, New York, New York, June 19-23, 1994.

116. P. A. Hacker, C. Pasko-Kolva, M. H. Stewart, R. L. Wolfe, Means, E.G., "Production and Removal of Assimilable Organic Carbon Under Pilot-Plant Conditions Through the Use of Ozone and PEROXONE", Ozone Sci*ence & Engineering, Vol. 16, No. 3, June 1994 (pp. 197-212).*

117. M. B. Young, Means, E.G., "Earthquake Lessons Pay Off in Southern California," *Journal of the American Water Works Association* 87:5, May 1995 (pp. 59-64).

118. Means, E.G., "AWWA Roundtable discussion on the Safe Drinking Water Act," AWWA Annual Conference, Dallas, Texas, June 22, 1998, published in March 1999 *Journal of the American Water Works Association.*

119. D. Van DeHei, S. Tramposch, J. Mosher, T. Schaeffer, J. Rosen, J. Gordon, Means, E.G., "Requirements for a Water Utility Information Sharing and Analysis Center (ISAC)," Submitted to November 2002 WQTC, Seattle, Washington.

120. T. Tseng, Means, E.G., D. Leach, "Evaluation of Various Bromate Control Strategies When Ozonating Colored Groundwater," *Proceedings* of the 2001 International Ozone Association Annual Pan American Group Conference.

121. Loveland, J., et al., "Advanced Techniques for Bromate Reduction: Pilot Testing Chlorine Dioxide, Chloramination, and MIEX Treatment with Ozonation," 2004 AWWA Water Quality Technology Conference.

122. Loveland, J., et al., "Key Water Quality Parameters for Integration of Single-Pass Reverse Osmosis Desalinated Pacific Ocean Seawater," 2004 AWWA Water Quality Technology Conference, San Antonio, TX.

123. E. G. Means, G. Izaguirre, C. J. Hwang, S. W. Krasner, and M. J. McGuire, "Biodegradation of the Taste and Odor Compound 2-Methylisoborneol in a Potable Water Supply" *Abstracts*, 83rd Annual Meeting of the American Society for Microbiology, New Orleans, La., March, 1983.

124. E. G. Means, T. S. Tanaka, D. J. Otsuka, and M. J. McGuire, "Impact of Chlorine and Ammonia Application Points on Bactericidal Efficiency of Free Chlorine and Chloramines in Pilot-Plant Studies," *Proceedings, 1983 Annual AWWA Conference*, Las Vegas, Nevada, June 5-9, 1983 (pp. 941-960).

125. E. G. Means, T. S. Tanaka, D. J. Otsuka, and M. J. McGuire, "Effects of Chlorine and Ammonia Application Points on Bactericidal Efficiency," JAWWA 78:1:62, 1986

126. M. J. McGuire, R. M. Jones, E. G. Means, G. Izaguirre, and A. E.Preston, "Controlling Attached Blue-Green Algae with Copper Sulfate", *JAWWA* 76:5:60-65, 1984.

127. E. G. Means and M. J. McGuire, "Experiences with Metropolitan's Early Warning System for Taste and Odor Control," *Proceedings*, 12th Annual AWWA Water Quality Technology Conference, Denver, Colorado, December 2-5, 1984 (pp. 655-676).

128. E. G. Means and M. J. McGuire, "An Early Warning System for Taste and Odor Control," JAWWA 78:3:77-88, 1986.

129. E. G. Means, M. J. McGuire, M. K. Davis, S. E. Barrett and S. W. Krasner, "History of Converting from Chlorine to Chloramines in Southern California," Invited Paper, *Proceedings*, 12th Federal Convention of the Australian Water and Wastewater Association, March 23-27, 1987, Adelaide, S. Australia.

KEYNOTE ADDRESSES

Keynote Address, "Water Quality – 21sth Century Goals", North American Lake Management Society Annual Meeting, Reno, Nevada, December 2, 1999.

Keynote Address, "A Strategic Assessment of the Future of Water Utilities" at the 2001 Australian Water Association meeting in Canberra, Australia, April 2, 2001.

Keynote Address, "A Strategic Assessment of the Future of Water Utilities" at WWEMA annual meeting in La Quinta, CA, November 15, 2002.

Keynote Address, "The 21st Century Water Utility: Trends and Strategies"; New York Section AWWA Meeting, September 29-October 1, 2003, Verona, New York.

Keynote Address, Alaska Section AWWA Spring Meeting April 13, 2004, Anchorage, Alaska.

Keynote Address, "Water Resources in the 21st Century: Challenges and Opportunities". AWWA Sources Conference, Albuquerque, NM, February 5-9, 2006.

Keynote Address, "Future Trends", CA/NV Section AWWA Fall Conference, Long Beach, CA, October 3, 2006.

Keynote Address, "Water Trends". Water and Wastewater Equipment Manufacturers Association Annual Conference, San Diego, CA, November 10-11, 2006.

Keynote Address, "A Strategic Assessment of the Future of Water Utilities", Florida Section AWWA Conference, Orlando, FL April 15-17, 2007.

Keynote Address, "Future Trends: Strategic Implications for Our Customers", Basin Water Annual Corporate Meeting, Rancho Cucamonga, CA, March 26, 2007.

Keynote Address, "Future Trends: Strategic Implications for Our Customers", Aqua Aerobic Systems, Inc. Corporate Meeting. Rockford, IL, April 24, 2007.

Keynote Speaker on water "Future Trends", AWPCA Annual Conference, Mesa, AZ, April 30-May 3, 2007.

Keynote Address on "Water Trends", Global Initiative Imperative session, American Chemical Society, April 6, 2008, New Orleans, LA.

Keynote Address on "Megatrends Revisited", George Warren Fuller Breakfast, AWWA ACE, June 17, 2009.

Keynote Address on "Trends and Strategic Implications", American Water Services annual strategic retreat kickoff dinner, Galloway, NJ, May 18, 2010.

Keynote Address on "Communicating the Value of Water", Association of California Water Agencies Fall Conference, Anaheim, CA, November 30, 2011.

Conference Keynote Address Invited, tentative title "Managing water quality in a changing water quantity world", AWWA Water Quality Technology Conference, November 4, 2013, Long Beach, CA.

Keynote Address on "Delivering Water Supply in the 21st Century: Water Utility Trends and Challenges", California State University Water Resources and Policy Initiatives, 6th Annual Conference, June 16-17, 2014, San Francisco, CA.

PRESENTATIONS

Ed Means has presented numerous technical presentations including presentations at the Annual AWWA Conference, the Water Quality Technology Conference, the annual American Society for Microbiology Conference, the California Lake Management Society, the California Water Resources Association, and the California/Nevada Section AWWA. Selected presentations are listed below:

Testimony before the State Water Resources Control Board during the Water Quality Phase of the Bay Delta Hearings.

Invited participant to USEPA-sponsored public symposium "The Risks to Clean Water," February 22-23, 1991 in East Lansing, Michigan, during which Clean Water Act Reauthorization issues were identified.

Testimony before the California Assembly Environmental Safety and Toxic Materials Committee on the Sanitary Survey of the State Water Project, February 25, 1992.

Welcome address to the AWWARF Technology Transfer Conference on Disinfectants/Disinfection By-Products in Anaheim, California, February 24, 1992

Presentation on Clean Water Act Drinking Water Quality Issues before the California Water Resources Association, March 6, 1992, Oakland, CA.

Presentation before the International Ozone Association meeting on March 10, 1992 in Pasadena, California entitled Status of Disinfectants/Disinfection By-Products Regulation.

Presentation at 1992 AWWA Annual Conference and Exposition, Vancouver, Canada, entitled "Can We Rescue Primacy? Do We Want to? A Utility's Perspective."

Speaker, AWWA Satellite Teleconference "Disinfectants and Disinfection By-Products: Understanding the Proposed D-DBP Rule". Title of talk: "Utility Impact of the D-DBP Rule", October 15, 1993.

E. G. Means, Introduction/DBP Negotiated Rulemaking Implications, Moderator of Sunday Seminar on Enhanced Coagulation. 1993 AWWA Water Quality Technology Conference, Miami, Florida, November 7-11, 1993.

Invited Participant, National Water Resources Regulation - Where is the Pendulum Now?, Washington, D.C., January 31-February 1, 1994.

Invited Participant by Environmental Protection Agency, AWWA Research Foundation Disinfection/Disinfection By-Products Regulations Workshop in Osaka, Japan, October, 1994.

Conducted thirty-two "Improvement Summits" with 30-60 employees each to identify potential areas for improvement at Metropolitan (March-April 1997).

Presentation "What should utilities be doing on the M/DBP rule cluster?" AWWA video teleconference, Denver, Colorado, July 31, 1997.

Invited Speaker: Impacts of the Safe Drinking Water Act/How Do We Comply? AWWA South Carolina Section Meeting, Greenville South Carolina, January 30, 1998.

Presentation "The Microbial/Disinfection By-Product Rule Package: Filtering the Bureaucratese", AWWA Annual Conference, Dallas, Texas, June 22, 1998.

Drinking Water Quality in the Year 2020, AWWA WQTC, November 4, 1998, San Diego, California.

"Safe Drinking Water Act Regulatory Update", Presented to Carollo Engineers, Inc., Phoenix, Arizona, September 25, 1999.

Conducted 1999 WQTC Sunday Seminar Training on D/DBP and Interim Enhanced Surface Water Treatment Rule in Tampa, Florida, October 31, 1999.

Participant on AWWA Disinfection By-Products Rule Compliance Teleconference, November 9, 1999, Denver, Colorado.

Keynote Speech to North American Lake Management Society Annual Meeting "Water Quality – 21sth Century Goals", Reno, Nevada, December 2, 1999.

Participated on Panel Discussion on "Deregulation Impacts and Opportunities" at AWWA Annual Conference and Exposition, Denver, Colorado June 14, 2000.

Participated in Sunday Seminar "Working With Your Customers: Strategies for Addressing Conflicts With the Public", AWWA Annual Conference and Exposition, Denver, Colorado, June 11, 2000.

Facilitated AWWARF workshop to identify management research needs, Newport Beach, CA, July 12/13, 2000.

Facilitated AWWARF 2604 2-day "Futures Workshop" at AWWA Annual Conference and Exposition, Denver, Colorado, June 15-16, 2000.

Facilitated AWWARF 2604 2-day American Assembly on "A Strategic Assessment of the Future of Water Utilities" with industry leaders, Orlando, Florida, September 20-21, 2000.

Invited Panel Member on "Strategies for the Future", Environmental Financial Advisory Board's Cost-Effective Environmental Management Workgroup meeting, March 5, 2001, Washington, D.C.

Presented Keynote Address entitled "A Strategic Assessment of the Future of Water Utilities" at the 2001 Australian Water Association meeting in Canberra, Australia, April 2, 2001.

Presented "A Strategic Assessment of the Future of Water Utilities", Association of California Water Agencies Spring Conference, South Lake Tahoe, CA May 7-10, 2001.

Presented "Watercourse: Navigating Your Utilities Future", at the AwwaRF Technology Transfer Conference in Long Beach, California, September 13, 2001.

Presented "Security Issues in Public Drinking Water Systems", Presented to the Central/West Basin Water Quality Workshop, February 26, 2002, Carson, California.

Presented "Water Utility Trends and their Implications for POU/POE". Bottled Water Association Annual Meeting, March 5-9, 2002, New Orleans, LS.

Presented "Water Information Sharing and Analysis Center (ISAC) Development Project – Phase I Status Report", presented at the Association of Metropolitan Water Agencies annual meeting, March 17-20, 2002, Washington, D.C.

Invited Participant on Orange County Sanitation District's Expert Panel on Outfall Hypochlorite Disinfection Strategy Review, Fountain Valley, CA, March 28, 2002.

Presented "Watercourse: Navigating Your Utility's Future", at the New England Water Works Association Leadership Institute, April 28-30, 2002, Cape Cod, MS.

Presented "Watercourse: Navigating Your Utility's Future", at the Arizona Water and Pollution Control Association annual meeting, May 3, Phoenix, AZ.

Presented Zitkus, T; Bourke, M; and E. Means. "Use of a magnetic ion exchange resin to allow compliance with future EPA disinfection by-product rules in California". Cal-Nev AWWA Fall Conference, October 14-17, 2002, Reno, NV.

Presented "Water Trends" at Cal-Nev AWWA Fall Conference, October 14-17, 2002, Reno, NV.

Participated on Panel Discussion "Groundwater & Perchlorate: A Toxic Cocktail?" California Water Policy 12, conference October 9-10, 2002, Los Angeles, CA.

Presented keynote address on "A Strategic Assessment of the Future of Water Utilities" at WWEMA annual meeting in La Quinta, CA, November 15, 2002.

Participated in National Public Radio (KPCC, Pasadena, CA) "Airtalk" program as invited expert on water treatment technologies and California water utilities.

Invited Speaker, "A Strategic Assessment of the Future of Water Utilities", WRF and Kiwa Manager's Conference, Manhattan Beach, CA, March 3, 2003.

Invited participant in 2004 Australian Water Association "Ozwater" conference in Perth Australia, April 2003.

Speaker on "Future Trends" at East Bay Municipal Utilities District management workshop, April 17, 2003, Oakland, CA.

Speaker on "The Growing Cost of Water Quality" Three Valleys Municipal Water Districts Spring 2003 Leadership Breakfast, May 16, 2003, Pomona, CA.

Keynote speaker "The 21st Century Water Utility: Trends and Strategies", New York Section AWWA Meeting, September 29-October 1, 2003, Verona, New York.

Distinguished Lecturer, University of Alberta Centre for Applied Business Research in Energy and the Environment, School of Business, on "Global water issues". October 2, 2003.

Speaker on "21st Century Water Utilities: Trends and Strategies"; Southern California Water Utility Association meeting, Monrovia California; November 20, 2003.

"New Trends and Their Implications for Water Utilities", Vail Water Management Institute, Vail Colorado, January 25, 2004.

Participant in AwwaRF-sponsored "Workshop on climate change and water utilities", National Center for Atmospheric Research, Boulder CO, March 15 & 16, 2004.

Keynote Speaker, Alaska Section AWWA Spring Meeting April 13, 2004, Anchorage, Alaska.

Richard Nagel and Ed Means, "Research Needs for Seawater Desalination" Cal/Nev Section AWWA Spring Meeting, Las Vegas, Nevada, April 16, 2004.

2004 AWWA ACE Perchlorate Workshop: "The California Utility Story", June 16, 2004, Orlando, Florida.

Invited speaker, San Diego Farm Bureau discussion of current topics. "Water Supply and Agriculture in Southern California", San Diego California, November 18, 2004.

Invited speaker, "Update on the Strategic Assessment of the Future of Water Utilities" AwwaRF Board of Directors Meeting in San Diego, California, January 15, 2005.

Edward G. Means III and Roger Patrick, "A Strategic Assessment of the Future of Water Utilities: An AwwaRF Update", AWWA/WEF Joint Management Conference, Atlanta, Georgia, March 2, 2005

Invited Speaker "Update on the Strategic Assessment of the Future of Water Utilities", "Knowledge Management", AwwaRF Technology Transfer Conference, Cleveland, OH, Apr. 27, 2005.

Invited Speaker "Update on the Strategic Assessment of the Future of Water Utilities", AwwaRF Technology Transfer Conference, St. Louis, MO, Sept. 27, 2005.

Invited Speaker "Update on the Strategic Assessment of the Future of Water Utilities", AwwaRF Technology Transfer Conference, Detroit, MI, Oct. 21, 2005.

Public Officials Breakfast Speaker, "Boards and General Managers) Under Fire: Managing Water in the 21st Century", AWWA Annual Conference, San Francisco, CA, June 15, 2005.

Guest Speaker, "Water Trends & Their Strategic Implications for Regionalization", Denver Museum of Natural History, August 23, 2005.

Keynote Speaker, "Water Resources in the 21st Century: Challenges and Opportunities". AWWA Sources Conference, Albuquerque, NM, February 5-9, 2006.

Participant, "The Tucson Water Story: From Failure to Excellence", 2006 AWWA ACE, Sunday Seminar, San Antonio, TX, June 11, 2006.

Moderator, "Water Quality Management: How to Structure it in a Utility", 2006 AWWA ACE, Sunday Seminar, San Antonio, TX, June 11, 2006.

J. Loveland, E. Means, P. Shoenberger, P. Lauri, G. Oelker, B. Jones, D. C. A. Schnetzer, I. Cetinic, R. Schaffner, and B Stauffer, "Marine Phytoplankton and Domoic Acid Occurrence and Removal for the Seawater Reverse Osmosis Treatment Process", Spring 2005 Monitoring Data for El Segundo, CA. Western Regional Meeting of the American Chemical Society, 2006.

Guest Speaker, "Water Trends: Preparing for the Future", Three Valleys Municipal Water District Leadership Breakfast, Pomono, California, February 16, 2006.

Organized Sunday Seminar: "Water Quality Management: How to Structure it in a Utility". 2006 AWWA ACE, San Antonio, TX, June 14, 2006.

Moderator International Session: "Alternatives Water Resources", 2006 AWWA ACE, San Antonio, TX, June 14, 2006.

Invited Participant: AwwaRF Risk Management Workshop, Banff, Canada, December 12-13, 2007.

Speaker, "Communicating the Value of Water", Malcolm Pirnie breakfast workshop, Joint Management Conference, Portland, OR, February 27, 2007.

Means, E. G. III, "How Do We Make Good Decisions". Public Officials Forum, AWWA ACE, Toronto, Canada, June 26, 2007.

Ansley, J., Means, E. and M. Laugier. "Greenhouse Gas Emissions Opportunities for U.S. Water and Wastewater Utilities". Poster session, 2007 AWWA ACE, Toronto, CA, June 23-28, 2007.

Means, E., "Tools for Communicating the Value of Water", 2007 AWWA Annual Conference and Exposition, Toronto, Canada, June 26, 2007.

Means, E. G. III, "Considering Effects of Climate Change on Water Resources Planning", Water Management Institute, Vail, Colorado, January 21-25, 2008.

Passantino, L; Means, E.; Chowdhury, Z. and G. Westerhoff. "Integrating Communications in Strategic Planning: Helping Utilities Communicate the Value of Water", AWWA/WEF Utility Management Conference, Tampa, FL, February 24-27, 2008.

Means, E., "Sustainable Water Management: By Crisis or Consensus", AWWA Sources Conference, Reno, NV, February 10-13, 2008.

Means, E., "Total Water Management Strategies", AWWA/WEF Utility Management Conference, Tampa, FL, February 24-27, 2008.

AWWA Webcast Speaker, "Road Ahead: Regulatory, EPA and Global Trends", April 2, 2008.

Means E., "Effect of Climate Change on Planning and Design Standards", CA/NV section AWWA Spring Meeting, Hollywood, CA, April 22, 2008.

Means E., "Communicating the Value of Water", CA/NV section AWWA Spring Meeting, Hollywood, CA, April 23, 2008.

Means, E., "Evaluating Effects of Climate Change on Water Quality Planning Criteria and Design Standards", AWWA ACE, Atlanta, GA, June 10, 2008.

Means, E., "Climate Change and Adaptation in the Western U.S.", AWWA ACE, Atlanta, GA, June 11, 2008.

Hawley, E. , Deeb, R, and E. Means. "Communication Principles and Practices for Municipalities Regarding Trace Organic Compounds in Water Supplies", 2009 AWWA Research Symposium, Austin Texas, February 12-13, 2009.

Means, E., "Can Environmental Constraints for Implementing Water Projects be Processed and Resolved Quicker?" Urban Water Institute: Streamlining the Permit Process for Water & Wastewater Projects Workshop, Irvine California, June 3, 2009.

Means, E., "Impacts of Climate Change on Planning and Design Standards", 2009 AWWA ACE, San Diego, CA, June 15, 2009.

Means, E. Fuller Breakfast Presentation on "Future Trends: Revisited", 2009 AWWA ACE, San Diego, CA, June 17, 2009.

Means, E., "Drought Overview", 2009 AWWA ACE, San Diego, CA, June 18, 2009.

Invited Participant, U.S. Speaker Program on Water Management, U.S. State Department , Mexico City, Estado de Mexico & Queretaro, July 12-16, 2010.

Panel member, *USEPA Drinking Water Strategy Web Dialogue: A New Framework for Addressing Contaminants as Group(s)* web dialogue. July 28-29, 2010.

Conference Presentation "Emerging Trends in Technology and the Water Market" Annual meeting of the Water and Wastewater Equipment Manufacturers Association, Tucson, AZ, November 11-13, 2010.

Means, E. Orange County Water Summit invited speaker, "Why isn't Water Valued as an Invaluable Resource?", Anaheim, CA, May 20, 2011.

Means, E., "Water 2050: Attributes of Sustainable Water Supply Development", 2011 World Environmental & Water Resources Congress, Palm Springs, CA, May 24-27, 2011

Means, E., Moderator for panel discussion on "Forecasting the Future of Water Utilities", invited moderator for AWWA Annual Conference and Exposition panel discussion on water trends, June 15, 2011.

Means, E., "Communicating the Value of Water", California Utility Executive Management Foundation Annual Meeting, Monterey, CA, September 6, 2012.

Hawley, E., Deeb, R., Hesse, J., Means, E. and I. Venner. The National Utility Network: Learn and Share Knowledge on EDCs and PPCPs, Poster presented at the WEFTEC, 2012, New Orleans, LA, September 29 – October 3, 2012.

Means, E. "The Power of Creativity: Shared Services to Maximize Efficiency", Panel Moderator, Urban Water Institute Spring Water Conference, February 21, 2013.

Means, E. "Can We Impact The Cost Of Water?" Urban Water Institute panel discussion, Palm Springs, February 22, 2013.

Means, E. Moderator for Panel Entitled "Navigating Troubled Waters: Fixing the Bay-Delta", Urban Water Institute, San Diego, CA, August 15, 2013.

Means, E. Moderator, Los Angeles Water Summit, October 17, 2014

Means, E. "Complying with the Proposed Chromium MCL: Challenges for the Water Community", Groundwater Resources Association's Emerging Contaminants Symposium, Concord, CA, February 4-5, 2014.

Means, E. "The Legacy of Flint", Urban Water Institute 23rd Annual Water Conference, August 24-26, 2016.

Means, E., Carter, J., Owen, D. and S. Jones, "Innovating your way to Success – Lessons from Recent Research on Fostering Research and Innovation within Water Utilities", Urban Water Institute Fall Conference, Palm Springs, CA, February 8-10, 2017.

Means, E. "The Innovation Imperative", WEFTEC Workshop- "Fostering Innovation within Water Utilities", Chicago, IL,
October 1, 2017.

Means, E. "Utility Innovation Imperative and Challenges" Leading Water Utility Innovation Workshop WEF/AWWA Utility Management Conference, San Antonio, TX, February 2018.

Means, E. Brill, K. Thornton, J. R.,C athcart, J, and S. Sriboonlue. ”Consideration s in Development of a Chino Vasin Water Bank”, AGWA-AGWT Annual Conference, Ontario, CA, February 13, 2018.

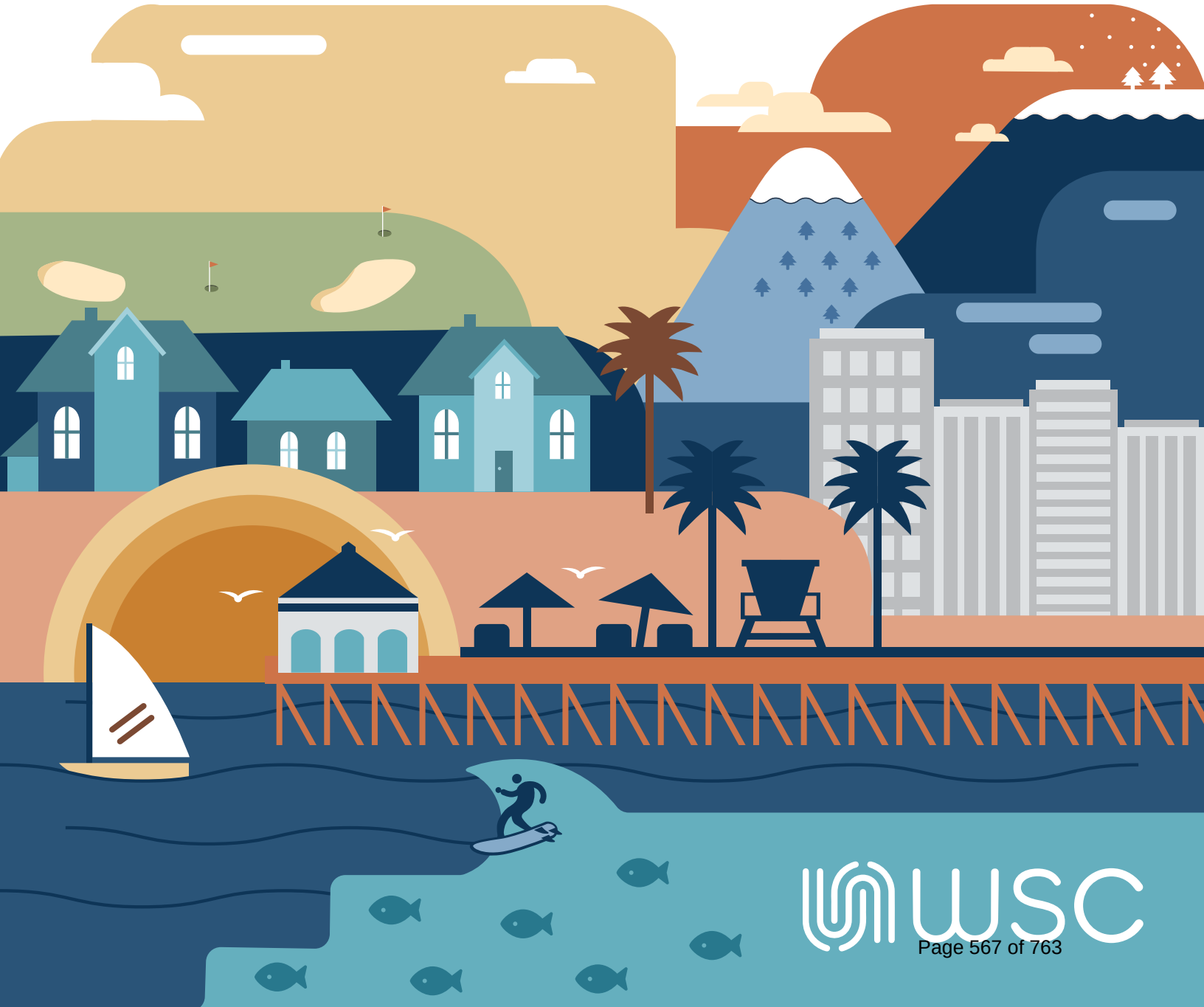
Means, E. Brill, K. Thornton, J. R.,C athcart, J, and S. Sriboonlue. ”Consideration s in Development of a Chino Vasin Water Bank”, AGWA-AGWT Annual Conference, Ontario, CA, February 13, 2018.

Means, E., J. Carter, and D. Updayeh. “Unleashing Innovation in Your Utility” panel discussion. Urban Water Institute Conference, Palm Springs, CA, February 20, 2020.

ON-CALL TECHNICAL SERVICES TO SUPPORT

Reliability Planning, Engineering & Resource Development

RFQ ENG. 2021



Mr. Charles Busslinger

Director of Engineering/
District Engineer
Municipal Water District of
Orange County
18700 Ward Street
Fountain Valley CA 92708

WSC Orange County

23232 Peralta Drive
Suite 215
Laguna Hills, CA 92653

P: 949.528.0960

WSC's Project Principal

Jeff Szytel PE, MS, MBA

(805) 457-8833, ext. 101

jszytel@wsc-inc.com

Dear Mr. Busslinger,

The Municipal Water District of Orange County (MWDOC) is seeking a panel of reliable, qualified, and committed consultants to deliver as-needed services on diverse projects. As demonstrated in this submittal, Water Systems Consulting, Inc. (WSC) is poised to be your indispensable as-needed, on-call partner for the duration of this contract. WSC's team brings unique value to MWDOC and your member agencies, including:

Responsive, proven on-call partner MWDOC can trust. WSC brings experience on over 55 on-call contracts with California agencies. Our submittal incudes client testimonials that speak to the quality of our work and our responsive service. In addition, we encourage you to contact our reference provided in Section 7. Plus, our Orange County office is nearby making us rapidly available for short notice needs. MWDOC can be confident you will receive cost-effective solutions, qualified resources, and responsive service every time from WSC.

Deep and diverse team of leading subject matter experts with accountable, visionary leadership. Our team's experience matches the required skills in the RFQ. Our team's work has been recognized as industry leading by our clients and the water/environmental industry. We offer MWDOC access to over 270 California water and environmental professionals, including 155 Bay-Delta Specialists firm-wide from ICF, the economic and financial resources of M.Cubed, and five Technical Advisors who bring industry leading insight into California water issues and opportunities. This expertise and leadership give MWDOC on-call access to the best-in-the-business professionals who are committed to MWDOC's success.

Unique insight into local, regional and statewide issues. Our team has diverse project experience spanning the State Water Project (SWP), Sacramento, San Joaquin Bay Delta, the Santa Ana River Watershed, Colorado River watershed, and on developing local supplies. Plus, the team will be led by Jeff Szytel, the founder and CEO of WSC who has spent his entire career building leading teams to solve diverse and complex challenges in California water. Through WSC's team, MWDOC will gain knowledge and insight to drive effective decision-making that supports Orange County's better water future.

Flexibility to right-size teams and solutions to meet MWDOC's needs. Our approach to on-call project delivery includes responsive and thoughtful project initiation and contracting, proven cost-effective project management, and a robust QA/QC program. MWDOC will have access to skilled project managers who have successfully delivered on-call projects both large and small. We will combine our subject matter experts with staff of varying experience levels to cost-effectively deliver your projects. Our contracting, accounting, and reporting will be transparent, flexible, and customized to meet your needs. Because WSC is structured efficiently we are nimble and flexible, we eliminate long internal chains of command to provide timely support and personnel attention. MWDOC will have seamless and cost-effective delivery of tasks large and small.

Your local partner, with vested interest in Orange County's water future. WSC and our team are established in the local water community. We bring a commitment to each client to build positive relationships, enhance knowledge transfer between our teams, and add value at every turn. MWDOC will benefit from our client focused approach.

We are excited for the opportunity to work alongside MWDOC and to help achieve your objectives. We welcome the opportunity to discuss our proposal with you in more detail, and to answer any questions you may have. Please contact our Project Principal and primary contact, Jeff Szytel, with any questions. Thank you for this opportunity, and we look forward to your response.

Jeff Szytel PE, MS, MBA
Project Principal

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Click through the hyper linked TOC to skip to a section.

Return to the TOC via the page number on the bottom of each page.

Table of Contents

HYPERLINKS TO SELECTION CRITERIA *Return to the TOC via the page number on the bottom of each page.*

Click through the hyperlinked cross references to skip to a section.

MWDOC SELECTION CRITERIA	WSC DELIVERS	PRIMARY CROSS REFERENCES
As-Needed / Technical Approach • Understanding of on-call engagement • Project approach • Project Management capability and as-needed contract administration • Demonstrated ability to work with MWDOC as a team	WSC brings experience on over 50 on-call contracts with California agencies. Your Project Principal, Jeff Szytel, has led over 25 on-call contracts and many innovative regional programs. Our approach brings powerful regional and State insights to MWDOC, expertise in leading solutions, valuable engagement, and efficient delivery.	SECTION 3
Team Experience • Relevant expertise • Experience and results with similar contracts • Demonstrated ability to perform on budget and schedule • Resources in each specified discipline	WSC's team bring MWDOC access to over 270 California water and environmental staff, including ICF's 155 Bay-Delta Specialists (firm-wide), the economic and financial resources of M.Cubed, and five technical advisors who bring 160 years of experience in California water and are experts in all aspects of Delta science, engineering, history, and policy. Our project management and contracting approaches have successfully delivered hundreds of on-call projects.	SECTION 3 SECTION 4 SECTION 7
Assigned Project Staff • Relevant experience • Professional qualifications • Availability of assigned staff • Demonstrated, cost-effective results	WSC brings a resourceful team with strong leadership, local presence and perspective, diverse capabilities, and statewide insight to provide valuable and responsive service to MWDOC and your customer agencies. Our team is available immediately to being productive work for MWDOC.	SECTION 2 SECTION 4 SECTION 7
Organization • Current workload and resources • Capacity and flexibility to complete high quality work in a timely manner • Ability to perform on short notice • Presentation, clarity, organization, and responsiveness of submittal	WSC's team is flexible, responsive and diverse. We have the resources and capacity and proven ability to be MWDOC's go-to team for on-call services. We encourage you to contact the client references provided in Section 7 for insight into the quality of WSC's services and work products.	SECTION 2 SECTION 4 SECTION 5 SECTION 7
Contracting Process Demonstrated commitment to cost-effective and accountable contracting processes	WSC's contracting, accounting, and invoice systems and approaches are transparent and flexible to meet MWDOC's unique needs.	SECTION 5

SECTION 1

About WSC & Your On-Call Team

Your Premier On-Call Team

WSC is an industry leader in integrated, next generation, water resource planning—we have combined our resources with the talents of outstanding project partners to create an on-call team to exceed MWDOC's expectations.

WSC's RFP Contact

Jeff Szytel PE, MS, MBA
Project Principal
805 Aerovista Place, Suite 201
San Luis Obispo, CA 9340
C: 619.807.8398
O: 805.457.8833 ext 101
jszytel@wsc-inc.com

WSC brings a resourceful team with strong leadership, local presence and perspective, diverse capabilities, and statewide insight to provide valuable and responsive service to MWDOC and your customer agencies. WSC is an industry leader in integrated, regional, next generation, water resource planning. Our qualifications are summarized below and our team is listed to the right.

Over 55 On-Call Services Contracts for California Water Utilities

Water Communications Supporting $2+ B
FOR INFRASTRUCTURE, DESIGN, INNOVATIVE WATER PLANNING, AND CONSTRUCTION PROJECTS

11
AWIA RISK & RESILIENCY PROJECTS

100+
INTEGRATED & REGIONAL WATER RESOURCE PLANNING PROJECTS

WSC is delivering traditional, regional, enhanced and/or integrated urban water management plans (UWMPs) for over 25 Southern California water agencies

Delivered 250+ Water Planning Projects
MASTER PLANNING
CAPITAL IMPROVEMENT PLANNING
DISTRIBUTION SYSTEM HYDRAULIC MODELING

EXCEPTIONAL
Understanding of Water Infrastructure

#1 Technical Advisor Team
FIVE RECOGNIZED EXPERTS REPRESENTING COMPREHENSIVE UNDERSTANDING OF CALIFORNIA WATER

WSC

Our Consulting Team Members

ICF Comprehensive Environmental Services

Founded in 1969, ICF is a recognized leader in water and environment services, including environmental impact assessments, biological assessments, physical and biological baseline conditions, quantitative modeling, scientific studies, data analytics, and ecosystem restoration. They are nationally recognized as leaders in permitting and environmental compliance and climate/sustainability.

Economics of Water

M.Cubed provides economic and public policy consulting in water and energy utility resource planning and rate-making, conservation measures, project impact analysis, regional economic modeling, and natural resource allocation policies. M.Cubed is well positioned to provide MWDOC with the detailed analyses required by today's complex economic and natural resource policy issues.

SECTION 2

Team Organization

Team Organization & Areas of Expertise

The organizational chart below shows specific key personnel and their key role(s) relevant to their area(s) of expertise, and specific areas of focus.

Your on-call team is thoughtfully assembled to be highly qualified, responsive, flexible, and diverse to meet all of MWDOC's on-call needs.

While key staff are aligned to a singular focus area in the organization chart below, we envision that any member of our team could bring expertise and value to all three of MWDOC's areas of focus that we are proposing for.

WSC's proposed team will be led by Jeff Szytel, who spent his entire 22 year career working in California water, and is embedded in California's water industry.

Jeff brings strong, One Water leadership and deep knowledge of how to successfully deliver water resource solutions that achieve widespread benefits to clients and their constituents. Jeff is committed to being a responsive and available partner to MWDOC.

PROJECT PRINCIPAL

Jeff Szytel PE, MS, MBA

TECHNICAL ADVISORY COMMITTEE

Doug Headrick PE, MS, MBA, T3
Curtis Schmutte PE
Timothy Quinn PhD
Chris Elliott ICF
Anthony Saracino

STRATEGIC COMMUNICATIONS

Holly Tichnor
Nina Heintz

ENGINEERING SUPPORT

Heather Freed PE, MS
Adam Donald PE, MS
Aaron Morland EIT
Patricia Olivas EIT
Lizzie Wiley EIT
Melissa Henrikson EIT

DIGITAL SOLUTIONS

Haley Lehman EIT, CCST

WATER & ENVIRONMENTAL PLANNING/MANAGEMENT

—BAY DELTA ACTIVITIES

Rob Morrow PE, MS
Dan Heimel PE, D4, T2, MS
Laine Carlson PE, T2, D2

ENVIRONMENTAL

Kevin Mackay ICF
Gregg Roy ICF

ENGINEERING

LOCAL SUPPLY INTEGRATION, INFRASTRUCTURE

Laine Carlson PE, T2, D2
Justin Pickard PE, CCM, LEED AP BD+

HYDRAULIC MODELING/ DEMAND FORECASTING

Jeroen Olthof PE, MS, MBA

GIS/DECISION SUPPORT

Spencer Waterman
Jeroen Olthof PE, MS, MSB

WATER QUALITY

Dan Heimel PE, D4, T2, MS
James Gonzales PG, CHG, MS
Antonia Estevez-Olea PE

WATER RELIABILITY PLANNING

RISK, RESILIENCE AND RELIABILITY

Kirsten Plonka PE
Maggie Messerschmidt MPA, MSES ICF
Josh Reynolds PE, MS

ECONOMIC ANALYSIS & RATES

David Mitchel MS
Richard McCann PhD

FUNDING

Justin Sutton

WATER MANAGEMENT POLICY

Jeff Szytel PE, MS, MBA
Teresa Chan JD ICF

COLORADO RIVER WATERSHED

Gregg Roy ICF

GROUNDWATER

Michael Cruikshank PG, CHG, MS

One page resumes for key personnel are provided in Appendix A.

Jeff is supported by **WSC's top water resource and engineering professionals.** These team members have assisted clients in conceptualizing, evaluating, designing, funding, and implementing numerous imported water, surface water, desalination, recycled water, and groundwater supply alternatives throughout California. WSC's team of engineers, planners, hydrogeologists, construction managers, funding experts, and strategic communications professionals deliver responsive and effective solutions to our on-call clients.

We excel at engaging internal stakeholders, regional partners, and elected officials in the water resources planning process to generate a broad base of support and momentum toward responsible, sustainable solutions.

As demonstrated in the Experience Matrix in Section 7, WSC's proposed team members' experience includes over 17 relevant projects matched against 20 of MWDOC's requested services.

ICF works throughout California on complex water resource projects, including water supply, storage, water operations, water quality, groundwater management, watershed planning, flood management, drought planning, water infrastructure improvements, water treatment, water reuse and recycling, ecosystem restoration, and climate risk planning.

For Bay-Delta issues, ICF supports Federal, State, and local agencies on a range of planning, compliance, permitting, and project implementation, such as Delta Conveyance, Reinitiation of Consultation for the Re-operation of the State Water Project (SWP) and Central Valley Project (CVP), Sites Reservoir, Suisun Marsh Plan, Freeport Water Project, California Department of Water Resources (DWR) Bay Delta Office Aquatic & Hydrodynamic task orders, and Metropolitan Bay Delta On-Call.

ICF's experts also support the Upper Santa Ana Habitat Conservations Plan (HCP) and Restoration Program, Los Angeles River Master Plan EIR, various task orders for Metropolitan Environmental Services On-Call, and Cal Water's Climate Risk Report.

M.Cubed is familiar with the institutional settings and constraints that dictate policy choices in the environmental, energy, water, utility regulation, agricultural, and economic development arenas. They regularly work as part of interdisciplinary teams of analysts to solve multifaceted policy problems. With access to a wide range of research and computing facilities, as well as extensive statistical, econometric, and mathematical model building capability, M.Cubed is well positioned to provide detailed analyses of complex economic and natural resource policy issues.

They have worked on reliability-adjusted cost analysis of water supply options, regional economic impacts of the proposed desalination, and assisting with water sales programs. Their experience also includes Delta climate change vulnerability analysis.

WSC's team includes over 50 professionals focused exclusively on water.

WSC's core consulting team is augmented by our proposed Technical Advisors who bring MWDOC unmatched expertise and a valuable perspective on California's changing water picture, including expertise and current working experience with the SWP, in the Bay Delta, and with DWR's Delta Conveyance (formerly Bay Delta Conservation Plan and California WaterFix). Together, our five Technical Advisors bring 160 years of experience in California water and are experts in all aspects of Delta science, engineering, history, and policy.

SECTION 3

Understanding Approach & Qualifications

SECTION 3

Understanding, Approach, & Qualifications

WSC brings a resourceful team with strong leadership, local presence and perspective, diverse capabilities, and statewide insight to provide valuable and responsive service to MWDOC and your member agencies.

Project Understanding

MWDOC plays a critical role securing reliable, affordable, and high-quality water for Orange County from Metropolitan Water District of Southern California (Metropolitan) and other sources. MWDOC facilitates regional collaboration to help advance important water resource initiatives. This work includes the development of local supplies, effective utilization of regional water delivery infrastructure, risk and resilience analysis and planning, and—in its role as a member agency of Metropolitan—maintaining long-term reliability of imported water supplies. To help support these priorities, MWDOC is forming a list of pre-qualified consulting firms to provide On-call Technical Services to Support Reliability Planning, Engineering, and Resource Development.

WSC's team of experts brings deep knowledge, context, and history to support MWDOC through impactful analysis and valuable insight in the following RFQ categories:

BAY DELTA AREA WATER AND ENVIRONMENTAL MANAGEMENT

ENGINEERING

WATER RELIABILITY PLANNING

Based on our understanding of MWDOC's needs, the selected on-call consultants must:

- Provide ready and responsive access to a diverse and highly qualified team of professionals to meet the needs identified in the RFP
- Perform as an extension of MWDOC's staff, serving in an as-needed support role
- Provide knowledge, expertise, and context for the various technical focus areas
- Support member agencies from an Orange County regional perspective on Choice and Core programs as directed by MWDOC staff
- Be a productive and supportive partner for MWDOC's value-driven engagement on relevant regional and statewide programs and issues
- Provide current and relevant information and context on issues and topics that may affect MWDOC's current and/or future demands or supplies

Project Approach

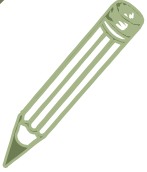
WSC brings a resourceful team with strong leadership, local presence and perspective, diverse capabilities, and statewide insight to provide valuable and responsive service to MWDOC and your Member Agencies. Our approach to this project is built upon four pillars:

Powerful insight

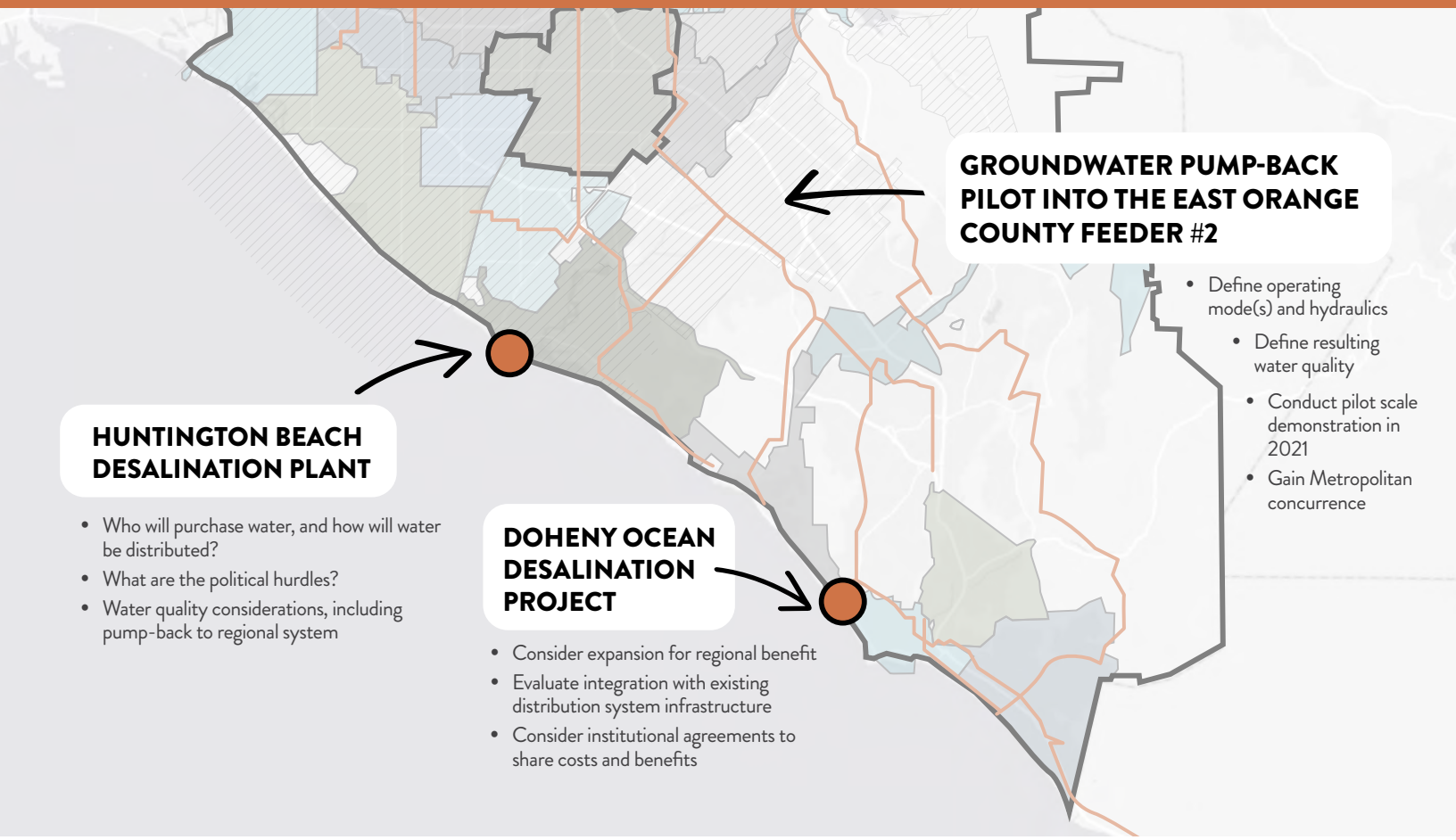
Leading solutions

Valuable engagement

Efficient delivery



MWDOC AND ITS MEMBER AGENCIES ARE LEADING THE WAY TO DEVELOP SOLUTIONS THAT ENHANCE THE LONG-TERM VALUE AND SECURITY OF ORANGE COUNTY'S WATER SUPPLY PORTFOLIO



GROUNDWATER PUMP-BACK PILOT INTO THE EAST ORANGE COUNTY FEEDER #2

- Define operating mode(s) and hydraulics
- Define resulting water quality
- Conduct pilot scale demonstration in 2021
- Gain Metropolitan concurrence

HUNTINGTON BEACH DESALINATION PLANT

- Who will purchase water, and how will water be distributed?
- What are the political hurdles?
- Water quality considerations, including pump-back to regional system

DOHENY OCEAN DESALINATION PROJECT

- Consider expansion for regional benefit
- Evaluate integration with existing distribution system infrastructure
- Consider institutional agreements to share costs and benefits

METROPOLITAN REGIONAL RECYCLED WATER PROGRAM

- What are the costs, benefits, and impacts to Orange County?
- Should MWDOC support the project?
- Can the project be modified to better serve OC's needs?

SANTA ANA RIVER CONSERVATION & CONJUNCTIVE USE PROGRAM

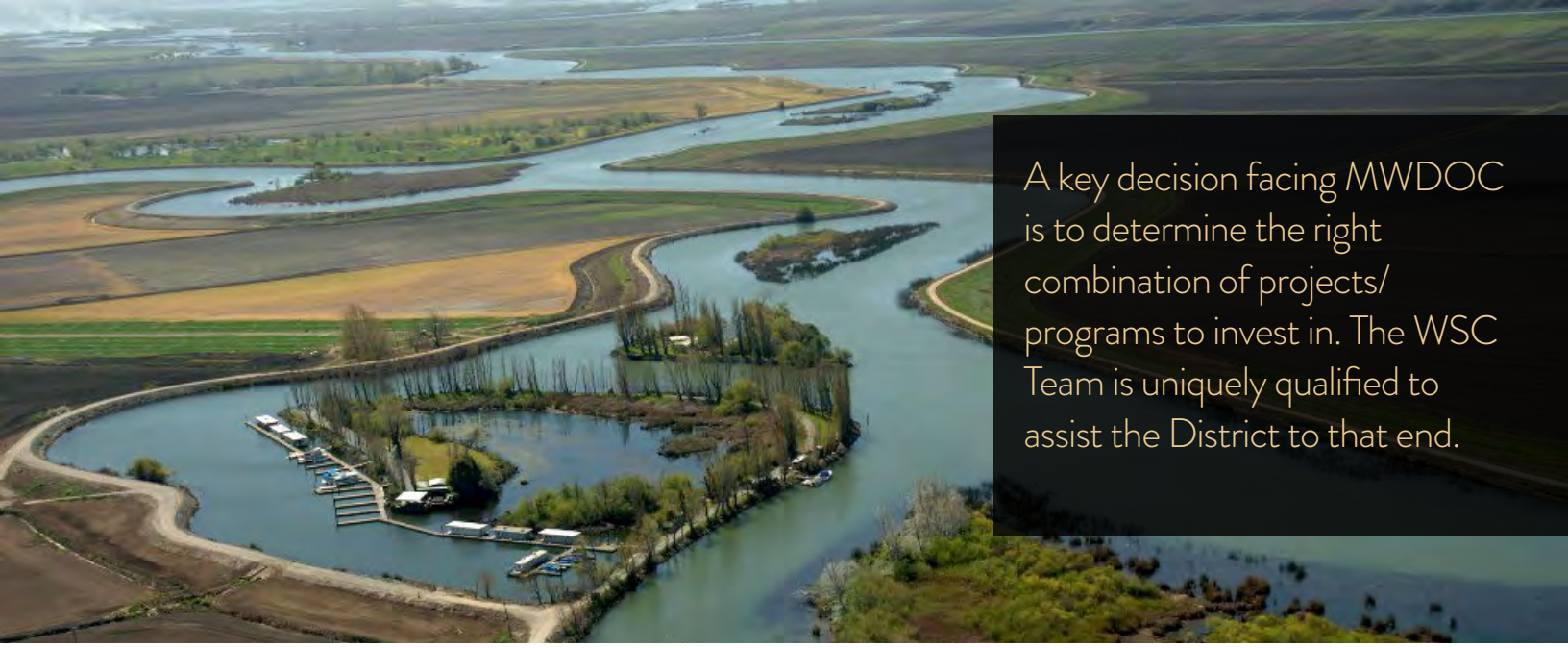
- Support regional effort for local/ regional groundwater storage
- Leverage SWP supplies
- Increase regional reliability

DELTA CONVEYANCE

- Critical backstop for imported supply
- Stay informed of ongoing work efforts in the Delta
- Support OC needs and messaging
- Coordinated internal and external communications
- Align with member agencies, Metropolitan, and SWP Contractors

REGIONAL RELIABILITY & RESILIENCE

- Finalize and calibrate hydraulic model
- Consider Tier 2 water from Metropolitan
- Provide economic analysis to support decision making (quantify benefits and costs)
- Update demand analysis including detailed forecasting by member agency
- Describe operational scenarios for emergency planning
- Define climate change resilience strategies
- Develop Core, Choice programs



A key decision facing MWDOC is to determine the right combination of projects/ programs to invest in. The WSC Team is uniquely qualified to assist the District to that end.

Powerful Insight

WSC's team of experts brings deep knowledge, context, and history to support MWDOC through impactful analysis and valuable insight in each of the RFQ categories. A key decision facing MWDOC is to determine the right combination of projects/programs to invest in. The WSC Team is uniquely qualified to assist the District to that end. The following section highlights some of the insight our team brings to MWDOC on the key opportunities and challenges it faces.

Delta Dynamics and State Water Project Opportunities

Water issues in the Delta—and considerations surrounding timing, quantity, and duration of water supply exports from the Delta—comprise one of the most complex and consequential water resources settings in the country. On the surface, co-equal objectives of reliable water supply and improved Delta ecosystem seem straightforward. But in the context of state and federal politics, overlapping and often conflicting regulatory jurisdictions, economic impacts and benefits, risk and reliability, species and habitat, local community values, urban and agricultural needs, and entrenched and well-funded special interests; the future of the Delta is anything but clear.

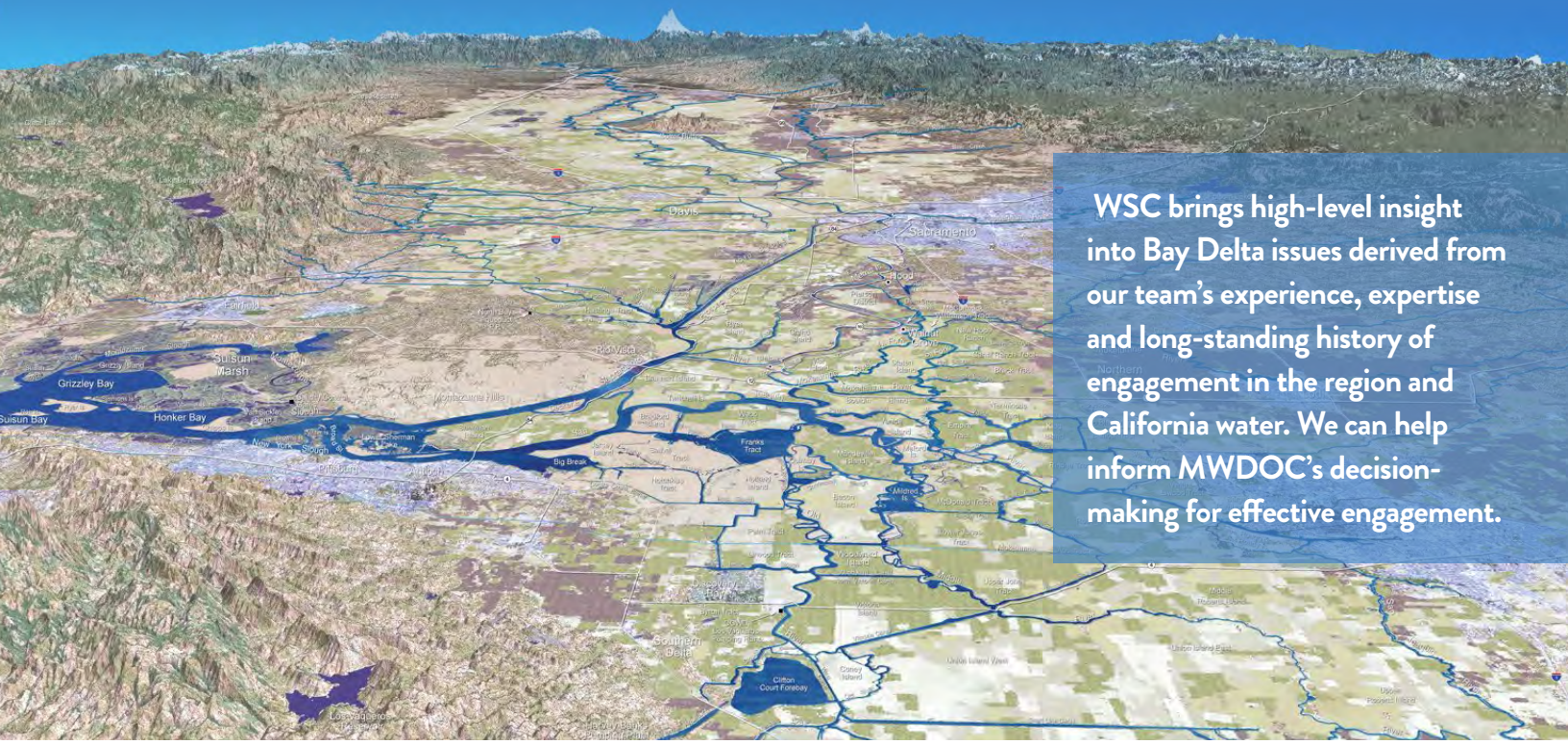
Plus, MWDOC is a member agency of Metropolitan, which has invested hundreds of millions of dollars into programs to advance Delta solutions to protect its imported water supply through the SWP. MWDOC has an opportunity to be a constructive participant in Delta issues but must do so in a way that aligns with Metropolitan's broader efforts, enhances local education and understanding of Delta issues, and finds focused opportunities to improve Delta conditions while staying true to its core mission and purpose. MWDOC's efforts must also consider the needs and dynamics of the broader SWP Contractors group to continue to build momentum and coordination toward productive water supply outcomes such as successful implementation of the Delta Conveyance project, a critical backstop for the region's imported water supply.

The SWP has been providing Southern California added water supply reliability since the first flows arrived in 1971. However, starting in the 1990s and accelerating in more recent years, the reliability of SWP water supplies has faced challenges due to droughts and, more importantly, fishery impacts in the Sacramento–San Joaquin Delta. As a result, the SWP Contractors, assisted by the DWR, have initiated several enhancement programs in an effort to reestablish the lost water supply reliability of the SWP. These enhancements, that include policy (Water Management Tools) and facility (Delta Conveyance) components, are both complex and costly.

At the most fundamental level, what is needed to accommodate the reduced reliability of SWP supplies is additional flexibility to manage wet years and prolonged dry periods. Both the Water Management Tools and Delta Conveyance provide this much needed flexibility. However, additional storage, outside the project, is also necessary to fully re-establish the supply reliability. The ability to capture wet year water, when the fishery impacts are reduced, and store it for dry-period use is crucial for the future economic vitality of Southern California. This three-pronged approach of Water Management Tools, Delta Conveyance, and New Storage is the combination of solutions that will get us there.

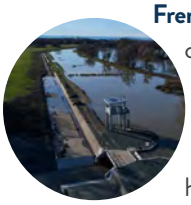
WSC's team includes some of the industry's foremost experts on wide ranging Delta topics. We couple that depth with leading practitioners in California water resources who work with Delta supplies and demands every day. We are continually reviewing and applying the latest studies and reports being produced on Delta issues and are experts in navigating technical content and uncertainty. Our Technical Advisors are available to advise and review our team's efforts, allowing our expert engineers and planners to develop analyses and recommendations that are focused, on-point, timely, and effectively advance MWDOC's interests within this complex setting.

Sacramento, San Joaquin Bay Delta



WSC brings high-level insight into Bay Delta issues derived from our team's experience, expertise and long-standing history of engagement in the region and California water. We can help inform MWDOC's decision-making for effective engagement.

Delta Smelt and Salmon ESA—The Delta is home to several species of fish that are protected by the ESA, namely the Delta Smelt and several species of salmon. To be permitted by the resource agencies, any proposed project in the Delta, including the Delta Conveyance Project, must protect these species and provide a pathway for recovery. Emerging technology such as Biosonics can help identify fish species and characterize fish location and movement, improving our ability to protect the species while maintaining water supply. Propagation of hatchery smelt could also be a way to help the smelt population recover.

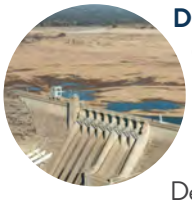


Fremont Weir/Yolo Bypass—The ancestral Delta was comprised of wetland and marsh environments that provided cover, food and nutrients for supporting thriving native fish populations. With levee building and draining of the Delta, most of the wetland habitat has been lost. By modifying the Fremont Weir and adapting operation of the Yolo Bypass to allow flows to enter more regularly, we can provide significant additional floodplain habitat to bolster native fish populations.

Seismic vulnerability—Many of the levees that form the channels that convey water through the Delta are not engineered structures and could fail in a moderate earthquake or flood event, which could lead to widespread flooding and intrusion of high salinity water miles inland, impacting the operation of the SWP pumps. The Delta Conveyance Project is the long term solution to address this risk, but in the interim, risk management solutions could include scenario modeling and artificial intelligence in addition to the emergency response plan being developed by DWR and US Bureau of Reclamation (USBR) to evaluate failure and recovery scenarios to optimize the level of interim investment for recovering from a major earthquake event.

Delta sustainability—Ongoing farmland subsidence combined with sea level rise create a growing problem of Delta sustainability. The Ocean Protection Council recommends that projects in the Delta be built to withstand sea level rise of 10-feet by 2100. Sustainability requires tidal habitat restoration, levee renovation, active and passive hydraulic controls, modified upstream reservoir operations, and Delta Conveyance Project to secure long-term water supply from the Delta. Planning to date has been limited to 3-feet rise in 50-years, and must be expanded to address the larger, longer-term risk.

Habitat restoration—In addition to restoration of the Yolo Bypass and tidal habitat, restoration could include floating peat tule marshes on the deeply subsided islands. This approach is currently being demonstrated at pilot scale, and promises to slow or reverse subsidence, provide additional food and habitat for native fish species, and reduce vulnerability to salinity intrusion in the event of an earthquake.



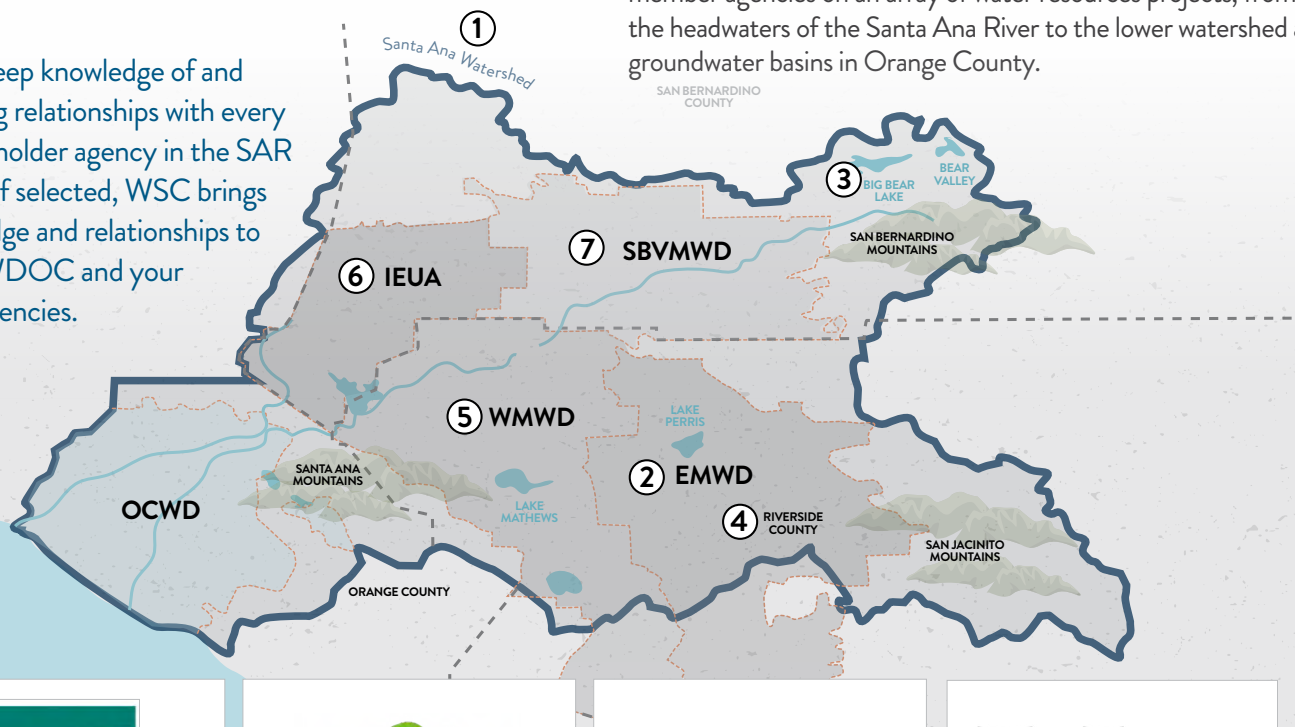
Drought response—Water supply during a drought is California's most valuable water. SWP contractors can build on planning and analysis that was conducted during the last drought to address regulatory, water rights, and physical constraints and structures of the Delta to increase the quantity of water that is available to be exported from the Delta during drought events. Benefit/cost analysis could support the re-operation of the Delta Cross Channel and construction of permanent, operable gate structures at Sutter and Steamboat sloughs to produce additional drought supply. Biosonics or similar technology could be used to inform operation of these structures to protect vulnerable fish species.

Regional Solutions–Partnerships in the Santa Ana River Watershed

Additional water storage projects are implementable in the Central and Sacramento valleys and, perhaps more beneficially, in the Santa Ana River Watershed. The Santa Ana River Conservation and Conjunctive Use Program (SARCCUP) was envisioned to take full advantage of the local groundwater storage opportunities by integrating these basins directly to the SWP. In addition, once stored, the imported water is not susceptible to SWP outages due to facility or seismic issues. Side benefits of SARCCUP include both contractual and organizational cooperation and coordination of water facilities and supplies that have not been experienced in more than a century.

MWDOC is an important stakeholder in SARCCUP. This program represents one of the most important regional efforts to maximize the use of available local water supplies and storage volumes to improve regional water supply reliability. WSC has long-standing relationships and knowledge throughout the Santa Ana River Watershed, and we are currently partnered with Santa Ana Watershed Project Authority (SAWPA) and many of its member agencies on an array of water resources projects, from the headwaters of the Santa Ana River to the lower watershed and groundwater basins in Orange County.

WSC has deep knowledge of and longstanding relationships with every major stakeholder agency in the SAR watershed. If selected, WSC brings our knowledge and relationships to benefit MWDOC and your member agencies.



SAWPA

- Strategic Plan
- Basin Monitoring Program Task Force: Ambient Water Quality Recomputation for Santa Ana Watershed

1

emwd

- 2020 Urban Water Management Plan
- Staff Extension Groundwater Development

2

BBARWA
BIG BEAR AREA REGIONAL WASTEWATER AGENCY

- Replenish Big Bear, Bear Valley Water Sustainability Project
- On-Call Engineering Services

3

Valley SAN BERNARDINO MUNICIPAL WATER DISTRICT

- 2020 Strategic Plan
- Regional Recycled Water Concept Study
- 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan
- 2015 Regional UWMP

WATER | ENERGY | LIFE
CITY OF RIVERSIDE PUBLIC UTILITIES

- 2020 & 2015 Urban Water Management Plan
- Annual Groundwater Assessment Report

4

WESTERN MUNICIPAL WATER DISTRICT

- Arlington Basin Groundwater Sustainability Plan
- 2020 UWMP

5

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

- Chino Basin Program
- On-Call Engineering and Planning Services

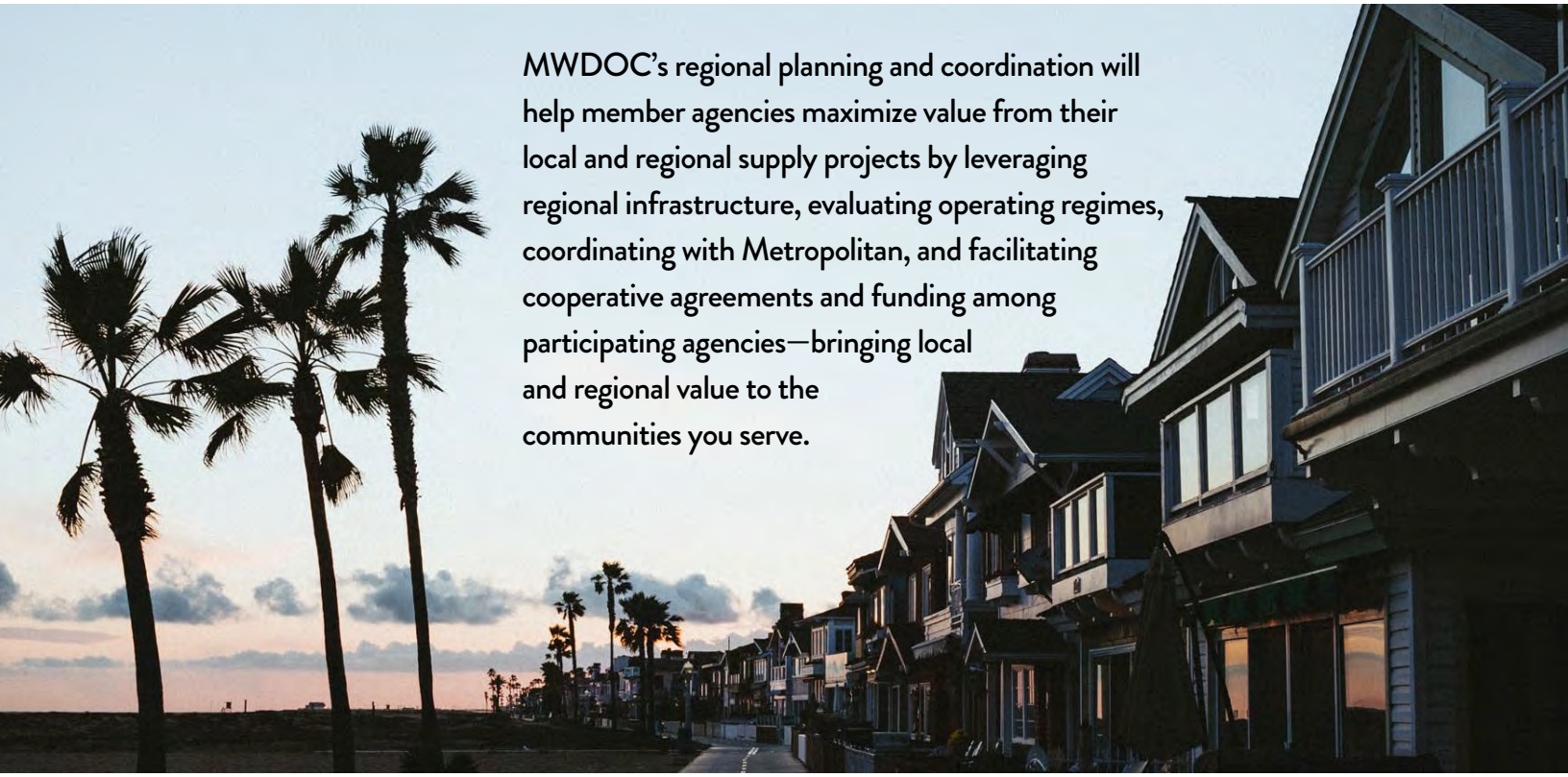
6

7

Maximizing Local Supplies and Regional Collaboration to Enhance Opportunity and Value

WSC understands the value and importance of local resource development to reduce reliance on imported supplies while enhancing resilience and reliability of the region's water supply portfolio. Water resource management strategies in Orange County are evolving to include many more variables and operational scenarios, and MWDOC's role is evolving as well. The following provides insight into regional opportunities to bring local and regional value.

- **Doheny Desalination Plant**—The Doheny Ocean Desalination project continues to move forward. With $30 million in grants from DWR and USBR, and intent to seek Water Infrastructure Finance and Innovation Act (WIFIA) financing, South Coast Water District continues to make progress on environmental permitting for the project. The project is envisioned to produce 5 mgd (expandable to 15 mgd) however South Coast is currently evaluating a smaller plant between 1.2 and 2.2 mgd. Given that South Coast's total demand is 5 mgd, there is significant opportunity to create regional benefits from the project by leveraging regional conveyance infrastructure and other local demands.
- **Huntington Beach Desalination Plant**—The proposed 50 mgd Huntington Beach Desalination Plant (HBDP) Project recently received a Tentative Order from the Santa Ana Regional Water Quality Control Board, with potential adoption later this spring. Key challenges remain, such as who will buy the water from Poseidon and how the water will be distributed. However, this project could become a viable and high capacity source of water for the region.
- **Local Groundwater**—MWDOC is evaluating the potential to produce local groundwater into the regional conveyance infrastructure during extended drought or emergency conditions (groundwater pump-back). The concept would utilize new or existing production wells located in the Orange County basin (e.g. Irvine Ranch Water District's Dyer Road Wellfield) or wells further north that would produce water directly into the East Orange County Feeder #2. Potential contaminants include a variety of volatile organic compounds (VOCs), perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), and any pump back operation into the regional conveyance system would need Metropolitan's acceptance.
- **Baker Water Treatment Plant (WTP)**—The Baker WTP owned by five agencies in South Orange County produces 28.1 mgd of treated surface water to help meet regional water demands. The plant was brought on-line in 2017 and became a base-loaded supply for the partner agencies that significantly reduced demand for treated water from MWDOC.
- **Metropolitan Regional Recycled Water Program**—This program is envisioned to produce 150 mgd of purified water that will be used to recharge the West Coast, Central, and Main San Gabriel Basins in Los Angeles County, and could ultimately deliver additional source water to the Diemer WTP for direct delivery to Orange County.
- **SARCCUP**—The SARCCUP program is a regional, cooperative program envisioned to provide additional dry year yield from regional groundwater basins through the conjunctive use of available surface water supplies from the Santa Ana River.



MWDOC's regional planning and coordination will help member agencies maximize value from their local and regional supply projects by leveraging regional infrastructure, evaluating operating regimes, coordinating with Metropolitan, and facilitating cooperative agreements and funding among participating agencies—bringing local and regional value to the communities you serve.

Leading Solutions

WSC's team of engineers, planners and communications specialists provide MWDOC with a deep bench of diverse capabilities to help you envision and deliver leading solutions.

Resource Development and New Supply Integration

As demands decline due to increasing water use efficiency and continued development of new supplies, the traditional paradigm for one-way delivery of imported supplies is evolving to include incorporation of an increasing quantity, variety, and geographic distribution of new local supplies. This evolving paradigm brings opportunities for increased regional resilience, water security, and cost certainty, but presents challenges related to water quality management and changing operations for existing wholesale delivery infrastructure. Some of the key challenges and WSC's value adding approaches are summarized below:

KEY CHALLENGE	WSC'S VALUE ADDING APPROACHES
Changing system hydraulics—As local supplies are brought on-line and water use declines due to conservation, flows in the regional system can drop significantly. Pump-back operations could even reverse flow in some circumstances.	WSC's team includes some of the industry's most experienced and respected hydraulic modelers. We understand the capabilities and limitations of these models and can help MWDOC apply these tools to effectively evaluate a range of scenarios. If mixed pressure/gravity flow conditions exist during low-flow periods, WSC can develop condition specific models to understand system dynamics, beyond the capability of a typical network model.
Water quality concerns—Local supplies will have differing water quality, including pH, Total Dissolved Solids (TDS), hardness, alkalinity, TOC and specific constituents of concern such as boron, VOCs, PFAS, etc.	WSC can use the District's hydraulic model to evaluate blending of the various constituents, to predict water quality at each point of delivery during the various operational scenarios.
Operational coordination—Integrating new local supplies will require a detailed understanding of the numerous conditions that affect system operations at the regional and local level.	An evaluation of operational scenarios can be developed to define supply/demand variability, production rates and timing, pumping, conveyance and storage, points of delivery, wholesale system operating criteria, system operating protocol, etc. to better define utilization of new local water supplies including operational plans for the system as a whole and for individual member agencies that align with the preferred integration scenarios.
Pump-back into the regional system – MWDOC and its member agencies are considering a pilot program to pump local groundwater into the East Orange County Feeder #2 (EOCF#2).	WSC is familiar with Metropolitan's constraints regarding pump-back operations. However, the EOCF#2 is owned by a local Joint Powers Authority and operated by Metropolitan. Additionally, Metropolitan recently changed their administrative code last year, allowing for turnover of pipeline to add local water to that pipeline in an emergency, with a focus on Diemer Plant reliability. Therefore, a pilot program is feasible, and WSC can help support any technical analysis that Metropolitan would want to support the project.

New Local Supplies

North Pleasant Valley Desalter
City of Camarillo

Ocean Desalination Siting & Integration Study
West Basin Municipal Water District

East Surface Water Treatment Plant PDR
East Valley Water District

Chino Basin Program
Inland Empire Utilities Agency

Regional Water Filtration Facility
Yucaipa Valley Water District

Central Coast Blue
City of Pismo Beach

Members of WSC's Team have led successful integration efforts for new local supplies throughout California, including hydraulic modeling, water quality analysis, regulatory analysis, jurisdictional analysis, operational scenarios, and risk management / economic analysis for new supplies.

Economic Analysis of New Supplies

MWDOC may be interested in evaluating the economic benefits of regional projects from an Orange County perspective as well as potential cost/benefit analysis for local supply projects. WSC's team includes M.Cubed, a widely respected and industry leading economics firm that specializes in the water industry. WSC's team of experts has decades of experience developing economic analyses to support and inform water resources management decisions at the local, regional, state, and national level.

Through his work with organizations such as the California Urban Water Conservation Council, the Alliance for Water Efficiency, the California Water Foundation, and the Public Policy Institute of California, our lead economics expert, David Mitchell of M.Cubed, pioneered many of the tools water planners routinely use today to conduct economic analysis of water resources systems.

Water Reliability Study Updates

Future updates to the District's regional Water Reliability Study could include updated demand forecasting, improved understanding of climate change and seismic risks, and updated water supply project projections.

WSC's team includes some of the pre-eminent water demand forecasting experts in the industry. WSC's tea, has prepared demand models for nearly 80 different agencies in California, representing nearly 30% of the state's population. M.Cubed has developed long-term demand and conservation models for Santa Clara Valley Water District, East Bay Municipal Utility District, San Diego County Water Authority, New York City, Columbus Ohio, Tampa Bay Florida, San Jose Water Company, City of Santa Cruz, Alameda County Zone 7, 25 service districts operated by California Water Service, 10 service districts operated by California American Water Company, and the San Francisco Public Utilities Commission. We have the expertise and experience to guide MWDOC in updating its regional demand forecast.

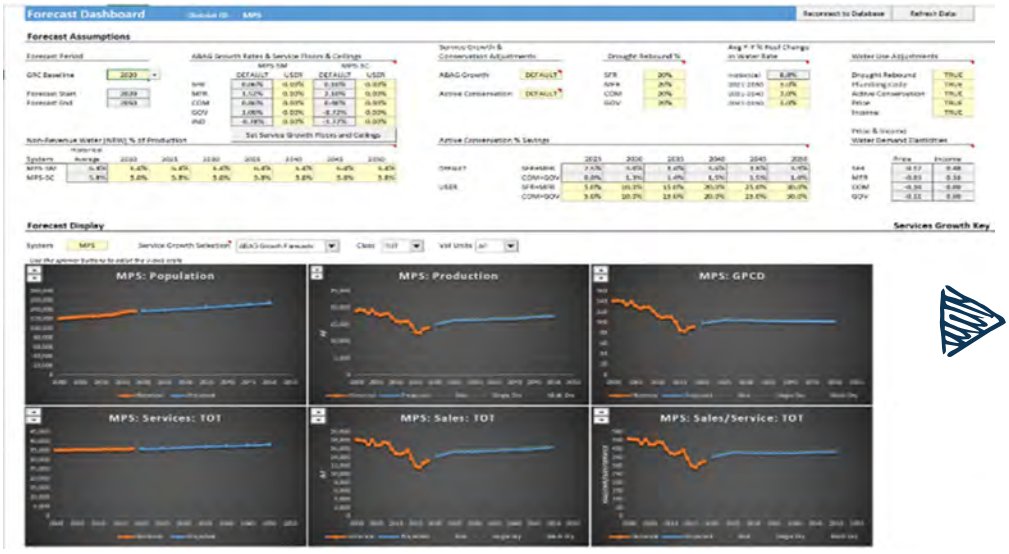
Risk/Resilience Analysis

WSC is leading climate change assessments and drought risk assessments for wholesale and retail agencies throughout California, including Eastern Municipal Water District, West Basin Municipal Water District, Western Municipal Water District and San Bernardino Valley Municipal Water District. Additionally, we are preparing seismic risk assessments for the American Water and Infrastructure Act (AWIA) for 10 agencies in California, including Mesa Water District in Orange County. We are prepared and experienced to support MWDOC in updating those portions of your Water Reliability Study.

Valuable Engagement

WSC is an integrated engineering and communications firm that specializes in California water, and we are uniquely positioned help MWDOC achieve your engagement goals. WSC will support MWDOC in achieving member agency alignment and support, enhance alignment and cooperation with Metropolitan, and support effective internal and external communication needs. Through these efforts, we can help you understand and support Delta initiatives to further your regional and member agency interests, expand cooperation and coordination within Orange County and the SAR watershed, and support targeted environmental stewardship.

WSC's water-focused strategic communications leaders include technical writers, graphic artists, public relations specialists, and experts in social media and digital engagement including every major online meeting platform. Our team also includes expert facilitators to help design and conduct collaborative sessions to inform and engage diverse stakeholders. We can prepare internal communication materials such as presentations, infographics, white papers, and technical memoranda. We can also help strategize and deliver outward facing materials such as web content, social media posts, flyers and pamphlets, and digital collateral such as video and computer animation to inform the public and/or communicate the region's priorities to external stakeholders.



WSC can prepare sophisticated multi-parameter econometric demand forecasting models for MWDOC's member agencies that predict the impacts of conservation rate design, as well as passive and active conservation to form a robust and reliable tool for ongoing use. This dashboard is an example from our team's work with California Water Service Company.

We Are Your Water Communications Partner

WSC specializes in supporting local, regional, and integrated water solutions that deliver long-term value—often within some of the most complex and sensitive circumstances in the west. WSC has more than 10 communications experts on staff who bring many years of water and environmental marketing and communications experience. We support clients throughout the west coast on all stages of program development—from environmental review, to design, to program development, construction, and operation.

Our integrated technical and communications approach prioritizes trust building, accessible public education, and facilitating inclusive public participation that supports the client's goals and community's needs concurrently. Consistently, this approach has helped clients minimize project risk, build sustained internal and public support, and proactively address challenges as they arise.

WSC and the City of Pismo Beach won the 2019 WateReuse National Outreach Project of the Year for our work on the Central Coast Blue Project.

We understand that an important goal for MWDOC is to build and sustain knowledge for the District and the region. Considering the District's limited staff, that means we will be relied upon to maintain continuity and provide ready access to our information and expertise through effective knowledge management and transfer. We thrive working in this staff extension capacity and we align our priorities directly with yours so that we can become a trusted and dependable partner.

Efficient Delivery

WSC and Our Consulting Team Provides Responsive, Comprehensive On-Call Engineering Services

WSC has supported more than 50 water, wastewater, and recycled water clients in California through on-call engineering services contracts, and we thrive in staff extension roles. WSC excels at providing on-call engineering services to clients through effective communication, technical expertise, and the appropriate application of resources. Our success at building efficient and trusting relationships with clients is represented by the number of clients who select WSC to be an on-call provider year after year.

Examples of WSC's Repeat On-Call California Agency Clients	Number of On-Call Contracts
Big Bear Community Services District	5
City of Arroyo Grande	6
City of Big Bear Lake	6
City of San Luis Obispo	12
City of Victorville	3
Eastern Municipal Water District	2
Inland Empire Utilities Agency	3

Our Project Principal is Jeff Szytel, WSC's founder, and he will serve as MWDOC's primary point of contact. This enhances efficiency and responsiveness and gives MWDOC accountable and reliable access to our team's full suite of capabilities. Plus, our team includes Technical Advisors to provide as-needed insight, analysis, and guidance on complex regional and statewide topics. We also understand MWDOC delivers "Core" and "Choice" programs to your member agencies, and we can structure our services to be consistent with that approach, offering service and benefits to the region as a whole, or just member agencies who opt-in.

We recognize the importance of your perspective and we operate on the idea that collaboration is vital to our ability to provide the highest level of responsive service to you.

Strategic Communications

10+ communications experts

Water Communications Supporting $2+ B FOR INFRASTRUCTURE, DESIGN, INNOVATIVE WATER PLANNING, AND CONSTRUCTION PROJECTS

industry experts COLLABORATION, PARTNERSHIP DEVELOPMENT, CONFLICT RESOLUTION, NEGOTIATION

Technical Advisory Committee

Recognized California water industry experts can be selectively integrated into projects to add value

WSC's Technical Advisors bring MWDOC unmatched expertise and a valuable perspective on California's changing water picture, including expertise and current working experience with the SWP, in the Bay Delta, and with Delta Conveyance. These team members are available to assist WSC and MWDOC as-needed in their areas of expertise. WSC will work with your staff to hand select the right expert(s) at the right time. This could include engaging Technical Advisors in topical workshops on Bay Delta issues, participating in small team discussions with MWDOC on specific issues, or providing reviews for team work products.

Approach, Project Management, and Quality Control/Quality Assurance for On-Call Services

Section Five of this submittal includes information on WSC's approach to developing, implementing and managing on-call projects. In addition, we have included client testimonials below and throughout our submittal, and client references in Section 7, Unique Experience. We encourage you to contact our references regarding the high quality service and work products provided by our team.

A summary of qualifications for these water leaders is provided on the following page.

Insightfully Led

Our leadership and big-picture thinking results in solutions that bring value long after our role on a project is complete.

"WSC's unique coaching, facilitation and leadership was essential to gaining our Board's approval for the next phase of the Chino Basin Program."

— Halla Razak
Former General Manager,
Inland Empire Utilities Agency

Responsive and Effective

We will go above and beyond to make sure your projects are successful. We are committed to earning your trust.

"WSC is responsive, professional, and always willing to help. I am impressed by their technical knowledge and ability to solve complex problems. They put in the extra work to meet deadlines and accommodate emergency requests. I look forward to working with them again on future projects."

— Candace Coleman
Project Manager, California American Water

Experienced and Innovative

We have the right people with the right experience and expertise to think outside the box for creative and effective solutions.

"WSC has utilized some very innovative approaches to solving complicated and difficult projects. They applied a well thought out methodology that has resulted in a sustainable and useful model that will serve the City well into the future. WSC has a broad background in Public Works and Utilities engineering disciplines and their staff are responsive, capable and accessible. I would highly recommend WSC as an on-call engineering firm."

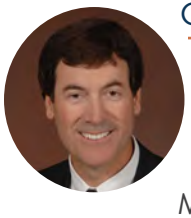
— David Hix, Deputy Director – Wastewater, City of San Luis Obispo

Technical Advisors

Doug Headrick
PE, MS, MBA, T3

Independent Consultant

Doug retired as San Bernardino Valley Municipal Water District's (Valley District's) General Manager in December 2019 after 10 years as General Manager and over 30 years in regional water resources management. Doug was involved in many proposed and executed SWP partnerships while with Valley District, including working with WSC on Valley District's Exchange Plan that looked to improve the framework for regional water exchanges. In addition to his regional perspective, Doug served on the Board of Directors for the Delta Conveyance Design and Construction Authority and the Delta Conveyance Finance Authority.



Curtis Schmutte PE

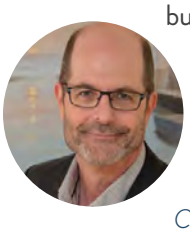
Independent Consultant

Curtis has worked for DWR, Metropolitan, and the Regional Water Quality Control Board. Over his 42-year career, he consistently leads programs and projects involving the Sacramento–San Joaquin River Delta and Suisun Marsh. As a consultant to Metropolitan, Santa Clara Valley Water District, and the State and Federal Contractors Water Agency, he has managed large-scale ecosystem restoration projects, assisting with legislative and policy strategies, and advancing new conceptual water conveyance alternatives to achieve a sustainable Delta. While employed by Metropolitan he provided technical and strategy assistance regarding Delta-related issues including seismic flood risk mitigation strategies, alternative Delta conveyance options and large-scale ecosystem enhancements.

Timothy Quinn PhD

Independent Consultant

During his 40-year career, Tim was at the center of California water policy. For over 20 years, he served on the staff of Metropolitan, most of that tenure as Deputy General Manager. He was integrally involved in the development of Southern California's first integrated water resources management plan. He served as Metropolitan's chief negotiator on many high-stakes water policy issues, including the CVP Improvement Act, the Monterey Amendments to the State Water Contracts, the Bay-Delta Accord, the CALFED Bay-Delta process, and numerous water marketing and groundwater storage partnerships. Throughout his career, Tim has worked with diverse interest groups and developed a reputation as a steadfast collaborative coalition builder.



Anthony Saracino
MS

Anthony M. Saracino Water Resource Consulting

Anthony has over 30 years of experience in water resources consultation. He brings expertise in water management, strategic planning, policy analyses, and technical support focused in the areas of water storage and groundwater management. He was a governor appointed member of the California Water Commission from 2010 to 2015 and served as Chair of the Commission for two years. As Director of the California Water Program for The Nature Conservancy he developed and implemented statewide water policies to support the Conservancy's objectives.

Chris Elliott

ICF

Chris is a principal-in-charge and program manager for complex environmental technical studies, documents, and regulatory compliance processes for water resource, flood management, habitat restoration, ports, and other projects. Chris routinely provides strategic guidance to clients on project development and implementation. Chris specializes in Sacramento Valley and Sacramento-San Joaquin River Delta systems, and integration of multiple-use-benefit objectives into projects (e.g., water supply, flood control, public use, and habitat). Regulatory expertise includes NEPA, CEQA, CWA (Sections 401, 402, and 404), ESA, NHPA (Section 106), California Fish & Game Code (Sections 1600 and 2800), and Rivers and Harbors Act (including Section 408 for alteration of federal works).

Chris is ICF's Overall Program Manager Bay Delta Conservation Plan/California WaterFix for DWR. In addition, he has served as Program Director for on-call services contracts with Metropolitan Water District of Southern California.

WSC's team of Technical Advisors is available to assist WSC and MWDOC as needed in their areas of expertise. Their knowledge will be on-call to MWDOC. WSC will work with your staff to hand select the right expert(s) at the right time. This could include engaging Technical Advisors in topical workshops on Bay Delta issues, participating in small team discussions with MWDOC on specific issues, or providing reviews for team work products.

Thank you for this opportunity, and we hope you select WSC for your On-Call consultant list.

Why Select WSC?

WSC's team is poised to be your indispensable as-needed, on-call partner for the duration of this contract. We believe that WSC's team brings unique value to MWDOC and your member agencies, including:

- **Committed, responsive, and accountable Project Principal**—WSC only succeeds if you do, and by working directly with WSC's Founder and CEO, you have the highest level of accountability, responsiveness and commitment of our Team's focus and resources.

- **Unmatched Delta knowledge, expertise, and insight**—WSC's Technical Advisory Committee includes experts with combined experience of over 160 years in California water, including experts in all aspects of Delta science, engineering, history, and policy.

- **Local Orange County perspective with statewide reach**—WSC has five (5) offices in Southern California, including an office in Laguna Hills, and nearly half of our business supports Southern California clients. We have a strong working knowledge of the regional needs, context, and priorities. Plus, our team is actively engaged throughout the State, and we routinely work on Delta related projects and programs. With WSC's Team, you get the best of both worlds – local perspective with statewide reach.

- **Team that thrives in an as-needed role**—Unlike many of our competitors, WSC's primary focus is the success of our clients, and the lack of bureaucracy and red tape means we are efficient and effective in an as-needed role. WSC's team brings the strength and capabilities of a much larger firm, with the efficiency and client service of a smaller, regional firm.

- **Integrated engineering and communications capabilities**—WSC is uniquely integrated with engineering and communications expertise. There is no other firm that brings this balance and capability. We can analyze and deliver your most challenging technical projects, while leading effective engagement, outreach, collaboration, and communications.

- **Deep bench of specialized resources from WSC, ICF, and M.Cubed**—This is a world class team. Although MWDOC has never worked with WSC before, we hope you review our qualifications and resumes and talk with our references to really understand what we bring. Our team is designed to meet your diverse needs on this RFQ, and we are ready to get started when you are.

SECTION 4

Resources, Capacity, & Commitment

Resources, Capacity, & Commitment

WSC's team has the expertise, resources, and commitment to provide MWDOC with the high-quality, responsive engineering services that you expect and deserve.

Depth of Resources to Deliver Innovation, Value, and Responsiveness

WSC was founded in 2007 with the vision of delivering exceptional client service, innovative solutions, high-quality deliverables, and a true client-consultant partnership. WSC is headquartered in San Luis Obispo and nine offices in California and the Pacific Northwest. WSC provides civil and environmental engineering and integrated strategic communications consulting services for water, groundwater, recycled water, wastewater, and water resources clients throughout the West Coast.

Over 50 Professional Team Members Focused Exclusively On Water

Regional Teams in 9 California Offices

Founded in 2007

Our team includes engineers and communications professionals specializing in water resources, drinking water, groundwater, recycled water and wastewater. Our team provides a complete one-water perspective. Our firm resources also include planners, hydraulic modelers, design engineers, certified hydrogeologists, construction managers, treatment plant and distribution system operators, funding experts, and strategic communications professionals.

ICF Bring Extensive Resources to MWDOC Including Over 600 Staff Members Nationwide

ICF's California staff includes over 200 professionals providing water resource planning, environmental impact assessments, biological assessments, physical and biological baseline conditions, quantitative modeling, scientific studies, data analytics, and ecosystem restoration. Their team includes 155 Bay-Delta specialists.

Our key team members are available to MWDOC now and are ready to begin productive work. Your project team is committed to responsive services through the life of the on-call contract. Your Project Principal, Jeff Szytel, will assure your resource needs are met for each task order.

	Availability		
Staff	2021	2022	2023
Jeff Szytel	30%	50%	70%
Justin Pickard	10%	30%	50%
Rob Morrow	30%	50%	70%
Dan Heimel	40%	60%	80%
Laine Carlson	20%	40%	60%
Kirsten Plonka	40%	60%	80%
Josh Reynolds	50%	70%	90%
Holly Tichnor	20%	40%	60%
Jeroen Olthof	30%	50%	70%
Michael Cruikshank	40%	60%	80%
Spencer Waterman	40%	60%	80%
Justin Sutton	40%	60%	80%
James Gonzales	40%	60%	80%
Antonia Estevez-Olea	30%	50%	70%
Haley Lehman	70%	90%	100%
Heather Freed	30%	50%	70%
Adam Donald	50%	70%	90%
Aaron Morland	50%	70%	90%
Patricia Olivas	40%	60%	80%
Lizzie Wiley	40%	60%	80%
Melissa Henrikson	60%	80%	100%
Nina Thoming	60%	80%	100%
Chris Elliott	50%	65%	65%
Teresa Chan	40%	50%	75%
Gregg Roy	30%	55%	65%
Kevin MacKay	70%	75%	75%
Maggie Messerschmidt	40%	50%	75%
Anthony Saracino	15%	20%	30%
Timothy Quinn	15%	20%	30%
Curtis Schmutte	15%	20%	30%
Doug Headrick	15%	20%	30%
David Mitchel	15%	20%	30%
Richard McCann	15%	20%	30%

Jeff Szytel PE, MS, MBA

PROJECT PRINCIPAL

Jeff is an integrated water resources planning expert, highly respected for his ability to engage and promote collaboration among multi-agency stakeholder groups in support of watershed-wide solutions. He brings strong One Water leadership and deep knowledge of how to successfully implement integrated water resources plans, and routinely leads the development of collaborative, innovative, and technically sound water planning and design projects and programs. His experience and detailed knowledge of water resources planning efforts will help to build consensus and buy-in through the planning process.

PROJECT EXPERIENCE

- Chino Basin Program, Inland Empire Utilities Agency, Strategic Advisor/Principal in Charge
- 2020 Metropolitan Water Resources Management Plan and 2020 UWMP, City of Fresno, Principal in Charge
- Water Vision Santa Barbara, City of Santa Barbara, Project Manager
- Integrated Regional 2020 UWMP, San Bernardino Muncipal Water District, Principal in Charge
- Adaptive, Integrated Water Resource Managment Plan, Northern Cities Management Area Technical Group, Principal in Charge
- Central Coast Blue, City of Pismo Beach, Principal in Charge

Laine Carlson PE, D2 and T2 Operator

LOCAL SUPPLY INTEGRATION AND INFRASTRUCTURE

Laine has over 15 years of experience working for a public utility and as a consulting engineer, focusing on water, wastewater, and recycled water systems. Her experience includes project management, capital improvement planning, hydraulic analysis, water and wastewater master planning, pipeline design, pump station design and analysis, and water standard development. She has developed an thorough understanding of how water and sewer utilities operate and the challenges they face.

PROJECT EXPERIENCE

- Chino Basin Program, Inland Empire Utilities Agency, Pipeline Distribution System Lead
- Regional Recycled Water Concept Study, San Bernardino Valley Municipal Water District, Project Manager
- Replenish Big Bear, Big Bear Area Regional Wastewater Agency, Project Manager
- Santa Ana River Conservation and Conjunctive Use Project, Santa Ana Watershed Project Authority, Project Manager
- Santa Ana River - Mill Creek Cooperative Water Project Agreement Update Support, San Bernardino Valley Water Conservation District, Project Manager

Rob Morrow

WATER & ENVIRONMENTAL PLANNING/MANAGEMENT—BAY DELTA ACTIVITIES

Rob's two decades of engineering experience centers on water resources projects with a focus on implementation of integrated water resources projects. He has led integrated water resources planning projects that analyzed water supply and demand portfolios that include imported water supplies, surface water, groundwater, stormwater, rainwater, graywater, groundwater recharge, and in-lieu recharge. He is experienced with financial revenue and funding strategy planning and preparing successful state and federal grant and loans.

PROJECT EXPERIENCE

- 2020 Metropolitan Water Resources Management Plan and 2020 UWMP, City of Fresno, Project Manager
- Water Vision Santa Barbara, City of Santa Barbara, Project Manager
- Central Coast Blue, City of Pismo Beach, Assistant Program Manager
- Paso Basin Supply Options Study, San Luis Obispo County Flood Control and Water Conservation District, Project Engineer
- Water Regulatory Compliance and Urban Water Management Plan, City of Oxnard, Recycled Water Permitting
- Sterling Recycled Water Center Groundwater Recharge Project, East Valley Water District, Project Manager

Dan Heimel PE, MS, D4 and T2 Operator

WATER & ENVIRONMENTAL PLANNING/MANAGEMENT—BAY DELTA ACTIVITIES AND WATER QUALITY REGULATORY COMPLIANCE

Dan has over 17 years of engineering and operations experience in the water and wastewater industry. His experience includes project and program management, hydraulic modeling, GIS implementation, water quality and drinking water utility regulatory compliance, sampling plan development and implementation, recycled water implementation, pilot studies, water quality and water supply watershed monitoring, groundwater recharge facility operations, and water quality data analysis.

PROJECT EXPERIENCE

- Central Coast Blue, City of Pismo Beach, Program Manager
- Water Vision Santa Barbara, City of Santa Barbara, State Water Project Alternative Lead
- Adaptive, Integrated Water Resource Managment Plan, Northern Cities Management Area Technical Group, Project Manager
- Long Term Supplemental Water Supply Alternatives Report, Santa Barbara County Water Agency, Project Engineer
- Paso Basin Supply Options Study, San Luis Obispo County Flood Control and Water Conservation District, Project Engineer

Justin Pickard PE, CCM, LEED AP BD+C

LOCAL SUPPLY INTEGRATION AND INFRASTRUCTURE

Justin has over 20 years of experience as a supervising engineer, project manager, and construction manager on a diverse range of civil engineering projects. Justin has worked both as a consultant for numerous public agencies and as a supervising engineer for West Basin Municipal Water District, managing complex recycled water and ocean water desalination projects. His expertise includes project management, construction management, and critical path method scheduling.

PROJECT EXPERIENCE

- North Pleasant Valley Desalter Project, City of Camarillo, Construction Manager
- Water Resource Recovery Facility Upgrade, City of San Luis Obispo, Program Manager
- Mesa Water Reliability Facility, Mesa Water, Construction Manager
- Hyperion Pump Station Improvements Project, West Basin Municipal Water District, Project Manager.
- West Basin Municipal Water District, Title 22 Recycled Water Alkalinity Improvements Project, Project Manager

Jeroen Olthof PE, MS, MBA

HYDRAULIC MODELING/DEMAND FORECASTING AND GIS/DECISION SUPPORT

Jeroen brings more than 25 years of experience in hydraulic modeling. His experience includes database development and integration of GIS with hydraulic models, recycled water customer databases, and asset databases planning and management of water and water resources. He specializes in data management, and decision support systems. He is a nationally recognized asset management expert who will support the development and implementation of robust decision support tools including decision algorithms to facilitate evaluation of supply alternatives, capital improvement planning, and maintenance optimization.

PROJECT EXPERIENCE

- Chino Basin Program, Inland Empire Utilities Agency, Hydraulic Modeling and Decision Support Lead
- 2020 Metropolitan Water Resources Management Plan and 2020 UWMP, City of Fresno, Decision Support Systems and UWMP Contributing Author
- Water Vision Santa Barbara, City of Santa Barbara, Santa Barbara, Decision Support Systems and Urban Water Management Plan Development
- Adaptive, Integrated Water Resource Managment Plan, Northern Cities Management Area Technical Group, Project Engineer
-

Josh Reynolds PE, MS

RISK, RESILIENCE, AND RELIABILITY

Josh has 22 years of experience in the planning, design, and construction of water, wastewater, and recycled water infrastructure. His expertise includes evaluating existing systems and planning future systems for reliability and resiliency. This includes conducting condition assessments to identify risk of failure, hydraulic modeling to evaluate operational scenarios during emergencies, pump sizing evaluations to extend asset life, and designing infrastructure that is resilient to seismic and climate events. He will apply his diverse array of water resources and infrastructure knowledge toward developing strategies and resources to improve the resilience of MWDOC's system.

PROJECT EXPERIENCE

- North Pleasant Valley Desalter Project, City of Camarillo, Program Manager
- Cayucos Sustainable Water Project, Cayucos Sanitary District, Project Engineer
- Integrated Water Resources Planning and Water Resource Recovery Facility Program, City of San Luis Obispo, Planning Project Manager
- Replenish Big Bear, Big Bear Area Regional Water Agency, Technical Advisor
- Central Coast Blue, City of Pismo Beach, Pismo Beach, Technical Advisor
- Wastewater Collection System Infrastructure Renewal Strategy, City of San Luis Obispo, Project Manager

Kirsten Plonka PE, AWIA

RISK, RESILIENCE, AND RELIABILITY

Kirsten has over 18 years of experience specializing in water utility management, master planning, and hydraulic modeling. She has completed Vulnerability Assessments for multiple clients in Southern California and is an AWIA certified leader in developing Risk and Resilience Assessments and Emergency Response Plans for public water utilities. Her experience includes coordinating with police departments, fire departments, medical facilities, and neighboring agencies for infrastructure projects with important risk and resilience components. Her approach helps clients maintain service to critical community assets and customers during routine operation and crisis situations.

PROJECT EXPERIENCE

- AWIA Risk and Resilience Assessment and Emergency Response Plan (RRA and ERP), City of Victorville, Project Manager
- AWIA RRA and ERP, Mesa Water District, Project Manager
- AWIA RRA, California American Water - Monterey District, Project Manager
- Utilities Department Emergency Response Plan Update, City of Carlsbad, Project Engineer
- AWIA RRA and ERP, City of Milwaukie, OR, AWIA Advisor
- AWIA RRA and ERP, Oak Lodge Water Services District, OR, AWIA Advisor

Michael Cruikshank PG, CHG, MS

GROUNDWATER RELIABILITY PLANNING

Michael is a certified hydrogeologist and engineer with more than 14 years of professional experience. He has technical expertise in hydrogeologic basin analysis, water resource planning, and evaluating water quality. His experience includes hydrologic data analysis, piezometric data collection and interpretation, production and monitoring well installation, well design, aquifer testing and analysis, managing field data collection programs, geographical information systems GIS applications, data management, data visualizations, and report graphics.

PROJECT EXPERIENCE

- Chino Basin Program, Inland Empire Utilities Agency, Recharge Facilities Lead
- 2020 Metro Water Resources Management Plan and UWMP, City of Fresno, Groundwater Lead
- Water Vision Santa Barbara, City of Santa Barbara, Groundwater Lead
- North Pleasant Valley Desalter Project, City of Camarillo, Hydrogeologist
- Central Coast Blue, City of Pismo Beach, Senior Hydrogeologist
- Recomputation of Ambient Water Quality, Santa Ana Watershed Project Authority, Project Manager and Senior Hydrogeologist

Spencer Waterman

GIS DECISION SUPPORT

Spencer has more than 10 years of experience as a planner with an emphasis on water resources planning and water use efficiency. He has extensive experience providing GIS and mapping services for water system master plans and hydraulic modeling projects. His planning related experience includes urban redevelopment plans, specific plans, and general plans.

PROJECT EXPERIENCE

- Water Vision Santa Barbara, City of Santa Barbara, Project Task Lead
- Regional Recycled Water Concept Study, San Bernardino Valley Municipal Water District, Staff Planner
- Adaptive, Integrated Water Resource Management Plan, Northern Cities Management Area Technical Group, Staff Planner
- Long Term Supplemental Water Supply Alternatives Report, Santa Barbara County Water Agency, Staff Planner
- Paso Basin Supplemental Water Supply Options Study, San Luis Obispo County Flood Control and Water Conservation District, Staff Planner

Holly Tichenor

STRATEGIC ADVISOR

Holly brings 24 years of strategic planning and communications experience for water and wastewater projects and programs. She is a project manager leading stakeholder coordination, strategic visioning and planning, and outreach implementation roadmaps on some of the West Coast's most innovative water reuse programs.

PROJECT EXPERIENCE

- Water Vision Santa Barbara, City of Santa Barbara, Communications Advisor
- Chino Basin Program, Inland Empire Utilities Agency, Project Manager of Strategic Communications
- Replenish Big Bear, Big Bear Area Regional Wastewater Agency, Communications and Outreach Lead
- Central Coast Blue, Multiple Agencies, Communications Project Manager
- North Pleasant Valley Desalter Rebranding and Outreach, City of Camarillo, Project Manager
- Strategic Plan Facilitation and Design. San Bernardino Valley Municipal Water District San Bernardino, Associate Manager and Facilitator

Justin Sutton

FUNDING

Justin has nine years of experience in the public, private, and non-profit sectors working on a diverse range of water resource, environmental, dnd civil engineering projects. His experience includes state and federal permit acquisition and management, contract administration, risk management, public outreach, funding procurement, document control, project negotiations, planning development and implementation, field inspections, and quality assurance.

PROJECT EXPERIENCE

- Replenish Big Bear, Big Bear Area Regional Wastewater Agency, Funding Lead
- North Pleasant Valley Desalter Facility, City of Camarillo, Funding Lead
- Central Coast Blue, City of Pismo Beach, Funding Lead
- Integrated Water Resources Planning and Water Resource Recovery Facility Project, City of San Luis Obispo, Funding Support
- Cayucos Sustainable Water Project, Pipeline and Toro Creek Crossing, Cayucos Sanitary District, Resident Project Representative

David Mitchell

ECONOMIC ANALYSIS AND RATES

David has 30 years of professional experience using statistical and economic methods to help guide water resources management and investment decisions. He has been deeply involved in urban water conservation planning and evaluation since he became the California Urban Water Conservation Council's first Project Manager and Director of Research back in 1993. Serving for 15 years in this capacity, he has had a direct hand in shaping many of the policies and technical resources guiding urban conservation in California.

PROJECT EXPERIENCE

- Regional Economic Impacts of the Proposed Huntington Beach Desalination Project, Poseidon Water, Economic Analyst
- Water Supply Strategic Plan Expert Panel, Santa Clara Valley Water District, Economic Analyst
- Economic-Hydrologic Simulation of Water Supply Reliability Investment, California Water Foundation, Economic Analyst
- East Bay Municipal Utilities District Water Supply Management Plan 2040, EDAW Inc., Economic Analyst
- Delta Risk Management Strategy, URS Corporation, Economic Analyst

Richard McCann

ECONOMIC ANALYSIS AND RATES

Richard has more than 35 years of experience with water, environmental and energy resource economics and policy. Richard has testified before and prepared reports on behalf of numerous federal, state and local regulatory agencies on energy, air quality, and water supply and quality issues. He evaluated the economic impacts of the State Water Board's proposed municipal drought regulations. He consulted to the California Bay-Delta Authority on the development of a multi-billion dollar ten-year financial plan and program element performance measures.

PROJECT EXPERIENCE

- Delta Climate Change Vulnerability Analysis, Delta Stewardship Council, Economic Analyst
- Nacimiento Water Project Water Sales Program, San Luis Obispo County Flood Control and Water Conservation District, Economic Analyst
- Potter Valley Project Acquisition Feasibility Study, Sonoma County Water Agency and Other Planning Agreement Parties, Economic Analyst
- Preparation of Water Storage Investment Program Application, Irvine Ranch Water District, Economic Analyst

Maggie Messerschmidt

RISK, RESILIENCE, AND RELIABILITY

Maggie is an environmental scientist and project manager with ICF's Climate Adaptation and Resiliency team. She supports agencies and organizations in better understanding their climate-driven vulnerabilities and preparing for and responding to climate change. She is experienced in driving systems transformation toward sustainable and adaptive futures, including analysis, design, and monitoring of nature-based solutions to challenges such as extreme heat and drought

PROJECT EXPERIENCE

- Climate Vulnerability Assessment, California Water Service, Project Manager
- Climate Change Risk Analysis, California Energy Utility, Project Manager
- Climate Vulnerability Assessment, Los Angeles County, Project Management and Technical Support
- California Adaptation Planning Guide V 2.0, California Governor's Office of Emergency Services, Reviewer
- Strategic Planning Process for the Urban Conservation Program, Arizona Chapter of the Nature Conservancy, Project Manager

Teresa Chan

WATER MANAGEMENT POLICY

Teresa serves as a project manager and environmental counsel on ICF's water resources team. Her experience includes in-depth legal review of complex environmental documents and assisting clients in seeking approval from public agencies for discretionary projects through compliance with CEQA, NEPA, and the California State Water Board water rights permitting process. She formerly served as staff counsel for the Department of Pesticide Regulation at CalEPA.

PROJECT EXPERIENCE

- Sites Reservoir Project EIR/EIS, Sites Project Authority, Task Lead
- Bay-Delta Conservation Plan/ California WaterFix EIR/EIS, DWR, Deputy Project Manager
- San Joaquin River/Southern Delta Water Quality Control Planning Support EIR – Supplemental Environmental Document, California State Water Resources Board, Project Coordinator
- Delta Wetlands Water Storage Project CEQA Compliance, Western Development and Storage, Sacramento-San Joaquin Delta, Legal Counsel

Gregg Roy

ENVIRONMENTAL COMPLIANCE

Gregg serves as a project director and project manager for large, multidisciplinary environmental compliance efforts, including NEPA and CEQA assessments for water resource development and flood control projects. He has extensive experience managing large interdisciplinary teams often composed of client, ICF, and subcontractor staff.

PROJECT EXPERIENCE

- California WaterFix/Bay Delta Conservation Plan EIR/EIS, California Department of Water Resources and Reclamation, Project Director
- Sites Reservoir Project EIR/EIS Sites Reservoir Authority and Reclamation, Mid Pacific Region, Sacramento, Senior Member
- Sacramento San Joaquin Delta Aquatics and Hydrodynamics MSA, California Department of Water Resources, Bay-Delta Office, Principle-in-Charge
- Lower Bois d'Arc Creek Reservoir Project, US Army Corp of Engineers – Tulsa District, Senior Reviewer

Kevin MacKay

ENVIRONMENTAL COMPLIANCE

Kevin is a restoration ecologist with more than 20 years of experience conducting site assessments, developing mitigation strategies, and preparing conceptual and detailed designs, and monitoring plans for wetland, riparian, and upland restoration/mitigation projects. He specializes in working collaboratively with clients, resource and regulatory agencies, and stakeholder groups to develop restoration/mitigation plans that integrate multiple objectives (e.g., special-status species habitat, recreation, flood protection) while addressing complex environmental compliance and regulatory requirements.

PROJECT EXPERIENCE

- Los Vaqueros Watershed Management Planning, Contra Costa Water District, Project Director and Lead Restoration Ecologist
- Upper Guadalupe River Reach 6 Revegetation Design, Santa Clara Valley Water District, Project Manager and Technical Lead
- Upper Penitencia Creek Improvement Project, Santa Clara Valley Transportation Authority/ Kimley-Horn and Associates, Technical Lead

SECTION 5

Project Management & Quality

Project Management & Quality

WSC brings MWDOC proven project management capabilities for responsive, cost-effective, high quality service

The WSC Team Will Exceed MWDOC's Expectations

We are committed to the success of MWDOC's on-call engineering projects

MWDOC would like to deliver a diverse range of projects through its on-call engineering program and WSC's team brings the right mix of skilled project managers and subject matter experts who are qualified to successfully deliver on projects both large and small. WSC has provided on-call engineering services to numerous public agencies throughout California and we pride ourselves on our ability to consistently exceed our clients' expectations.

WSC's Approach to On-Call Assignments

The flow chart and descriptions below outline WSC's contract/project initiation process. We will work collaboratively with MWDOC to integrate these value-added approaches with your internal processes and procedures.

Initial request from MWDOC and WSC's Responsiveness—Rapid contracting for complex projects that require diverse teams is required for on-call contracts. When MWDOC initiates a request from WSC we will strive to respond within 24 hours to confirm receipt of the request and coordinate next steps.

Clear understanding of MWDOC's goals and objectives—We recommend holding a project scoping and chartering meeting at the outset of each task order to clearly define goals and objectives and to reach a consensus on the scope of work from key representatives across MWDOC's organization. WSC's attention to these details early in the project facilitates development of a project execution plan, minimize changes and rework through the course of the project, and expedites review of deliverables.

To streamline communications, Jeff Szytel will serve as the primary contact for MWDOC, including for new task orders

Build the right team—Our team's deep bench of resources will allow us to dedicate the best qualified staff members to MWDOC's projects. We will combine our subject matter experts with staff of varying experience levels to cost-effectively deliver your projects. MWDOC will benefit from our client-focused approach and best-in-industry technical expertise.

Contracting process that flexes to meet MWDOC's needs—WSC routinely accommodate clients to meet their unique contracting, accounting, and reporting requirements and preferences.

WSC is nimble and structured efficiently to allow us to bypass long internal chains of command and provide timely support and personnel attention.

Proven Approach to Cost-Effective Project Management

WSC's approach to effective project delivery begins with an experienced project manager, a clear understanding of the MWDOC's objectives, a comprehensive project management plan, and a team of professionals with the collective goal of delivering a quality project. While we tailor our approach to each project based on the specific needs of the client, the foundation of our project management approach remains consistent regardless of the size of the project. This consistency will allow us to deliver the same high level of service to MWDOC that has distinguished WSC as an on-call service provider. Some highlights of WSC's proven approach to project delivery are summarized below and on the following page.

Critical Success Factors

We put people first and listen intently to define and deliver success. Through the project scoping process, we seek clarity on covert and overt success factors unique to each project and client. The critical success factors are often different from the typical budget and schedule drivers, and can include priorities such as facility operability, stakeholder buy-in, minimized impacts to adjacent property owners, or receipt of outside funding. Critical success factors are used to guide delivery of the project from initial planning through design, construction, and operation and help meet the client's strategic goals.

Schedule and Budget

WSC uses an integrated project management and accounting system, Ajera, to manage project progress and budget in real time so our project managers have immediate access to key project performance metrics. We use earned value management to identify discrepancies between planned and actual progress, allowing corrective measures to be implemented early to prevent cost overruns and schedule delays. WSC holds internal kickoff meetings with our project teams to assure that each team member understands and shares the commitment to managing the scope, schedule, and budget.

Communication and Responsiveness

WSC's project manager establishes an open and continuous line of communication with the client's project manager for each engagement. A well-established line of communication, and relationship based on trust, facilitate effective exchanges of information outside of regularly scheduled progress meetings, enabling quick resolution of questions and issues so the project can continue to progress smoothly. We know the importance of responding rapidly when you need us and are committed to being responsive, including being available for impromptu phone calls, in person meetings, and site visits.

Resource Management

WSC built a robust and flexible team to meet MWDOC's needs. We will consider each project at the outset to determine best fit and availability from our deep team of technical and managerial staff. Once the key staff are set for each task, we will proactively manage their workload to avoid competing priorities. We hold weekly workload planning meetings with our local and company-wide team to assess workload and make adjustments as needed to assure we can meet our commitments to MWDOC and other clients.

Cost-Effective and Efficient Project Delivery

Project delivery must be cost-effective and efficient to take advantage of the opportunity for streamlined procurement through the on-call agreement. We use earned value management to identify discrepancies between planned and actual progress, allowing corrective measures to be implemented early to prevent cost overruns and schedule delays. Our proven project controls will help ensure the delivery of MWDOC's projects on time and within budget.

- Consistent communication. Our project managers will establish an open and continuous line of communication with MWDOC's project manager for each engagement. A well-established line of communication facilitates exchange of information outside of regularly scheduled progress meetings and allows us to be responsive and provide timely updates on the status of project issues and deliverables. We build trust and long-standing relationships with our clients through our ability to be responsive to their needs.
- Follow-through. Unresolved issues impact project momentum and undermine confidence in the team. Our team members take ownership of issues and follow them through to successful resolution. We track outstanding issues in action item lists and document key project decisions in decision logs as a part of our robust document control and project management procedures.
- Quality assurance and quality control. The WSC team will implement a comprehensive quality control process for each of our projects/task orders. Our quality control plan is outlined on the following page.

Commitment to Quality

WSC strives for the highest quality in all our deliverables and we implement a workflow with QC measures. Our approach to QA/QC is outlined below.

Align WSC's team with MWDOC's goals. An internal kickoff meeting unites our team and key subconsultants around project goals, known client requirements, preferred lines of communication, QA/QC roles and expectations, project schedule, and budget.

Early QA/QC engagement sets up your projects for success, identifies opportunities to refine approaches, and increases quality and efficiency. During the initial project phase, our QA/QC leads will coordinate or perform the review of conceptual work, assumptions, and preliminary results and work products. QA/QC leads will attend the internal project team kick-off meeting and other key team meetings.

WSC's project-specific QA/QC plans are grounded in the philosophies, policies, and best practices outlined in our corporate Quality Management System Manual, which is available upon request. WSC will develop a QA/QC Plan specific for the project. This QA/QC Plan outlines the QA activities of the Project Manager and team members, and QC expectations for other project participants.

We will consistently conduct QC reviews throughout the project. Proven tools and experienced staff drive QC processes, assuring review comments are discussed, tracked, and addressed before deliverables are submitted to MWDOC. When beneficial, we will assign additional QC staff to review specific technical aspects of a project.

WSC uses QC checklists customized for each project to guide the QC reviewers. Our internal QC committee has developed thorough and comprehensive checklists for planning deliverables that help our planning teams provide the right information to reviewers at the right time in the process. The checklist also allows our senior technical staff to confirm that all calculations, drawings, specifications, and reports are thoroughly reviewed.

WSC can provide value-added and quality-enhancing services during the design and pre-construction phases, including constructability reviews. With construction management specialists on staff, WSC brings real-world knowledge to constructability reviews for early identification of potential construction issues or risks. Working with your staff, WSC can streamline the bidding and award process, resulting in competitive bidding, a faster start to construction and a strong relationship with the selected contractor right out of the gate.

Our QA/QC leads will follow progress and regularly check in with project managers and other team members. They will help anticipate, identify, and resolve issues as they arise. These periodic injections of a fresh perspective stimulate creativity and collaboration, and drive efficiency.

WSC understands the importance of an internal quality assurance and control (QA/QC) program, as our work has a direct effect on public health, safety, and resource management.

"WSC has been our On-Call Engineer since 2012. They consistently provide fast turnaround times and solutions that meet our needs. On several occasions, when we've requested mapping support, WSC provided the necessary files within a day."

— Mr. Reginald Lamson, General Manager,
Big Bear Lake Department of Water and Power

SECTION 6

Insurance

Insurance

WSC hold professional liability insurance as noted in the form below. We are able to meet the insurance requirements below and provide Certificates of Insurances when required by MWDO.

ACORD

WATESYS-01 THOMASR

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 3/22/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER License # 0E67768 IOA Insurance Services 3875 Hopyard Road Suite 200 Pleasanton, CA 94588	CONTACT NAME: Gigi Yuen PHONE (A/C, No, Ext): (925) 416-7862 FAX (A/C, No): (925) 416-7869 E-MAIL ADDRESS:
	INSURER(S) AFFORDING COVERAGE — NAIC #
	INSURER A : RLI Insurance Company — 13056
INSURED Water Systems Consulting, Inc. P.O. Box 4255 San Luis Obispo, CA 93403	INSURER B : State Compensation Insurance Fund of CA — 35076
	INSURER C : Arch Insurance Company — 11150
	INSURER D :
	INSURER E :
	INSURER F :

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY X PRO-JECT LOC OTHER:			PSB0001311	4/7/2020	4/7/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
A	AUTOMOBILE LIABILITY X ANY AUTO OWNED AUTOS ONLY SCHEDULED AUTOS HIRED AUTOS ONLY NON-OWNED AUTOS ONLY			PSA0001082	4/7/2020	4/7/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	UMBRELLA LIAB OCCUR X EXCESS LIAB CLAIMS-MADE DED RETENTION $			PSE0004546	11/16/2020	4/7/2021	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		9248982	4/7/2020	4/7/2021	X PER STATUTE OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
C	Professional Liab.			PAAEP0009104	12/6/2020	12/6/2021	Per Claim	2,000,000
C	Professional Liab.			PAAEP0009104	12/6/2020	12/6/2021	Aggregate	4,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

PROOF OF COVERAGE

All operations of the Named Insured, including the aforementioned project, if any.

CERTIFICATE HOLDER

SAMPLE

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Jessie Pancoast

ACORD 25 (2016/03)

SECTION 7

Unique Experience

Unique Experience

WSC is a full-service water resources firm with a team experienced in providing agencies with strategic short-term and long-term water supply reliability guidance, developing options, and providing resilient, cost effective solutions.

WSC has developed water resources solutions that provide benefits across economic, social, and environmental measures. We have evaluated numerous imported water, surface water, desalination, recycled water, and groundwater supply alternatives throughout the state and Southern California.

As demonstrated in the table below, WSC's proposed team members' experience includes over 17 relevant projects matched against 20 of MWDOC's requested services. Detailed descriptions for select projects are provided on the following pages.

California Water Experts

WSC has partnered with agencies on numerous regional, multi-agency, multi-benefit water resource projects and programs throughout California.

SELECT RELEVANT PROJECT EXPERIENCE	NEAR & LONG-TERM WR PLANNING	STATE WATER PROJECT	BAY DELTA ACTIVITIES	ENVIRONMENT PLANNING	WATER SECURITY & RESILIENCY	REGIONAL SOLUTIONS /PARTNERSHIPS	WATER MANAGEMENT/POLICY	DECISION FRAMEWORK	STAKEHOLDER COMMS	BOARD/COUNCIL COMMS	ENG. DESIGN & COST ESTIMATING	DEMAND PROJECTIONS	DISTRIBUTION PLANNING/ MODELING	LOCAL SUPPLY INTEGRATION, INFRASTRUCTURE	WATER QUALITY	ECONOMIC ANALYSIS /RATES	RISK, RESILIENCE, AND RELIABILITY	SURFACE WATER	GROUNDWATER	RECYCLED WATER	DESALINATION
Chino Basin Program, Inland Empire Utilities Agency	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2020 Metropolitan Water Resources Management Plan and 2020 UWMP, City of Fresno	●			●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●
Water Vision Santa Barbara, City of Santa Barbara	●	●		●	●	●	●	●	●	●		●	●	●		●	●	●	●	●	
Regional Water Resiliency Plan, San Luis Obispo County Flood Control and Water Conservation District	●				●	●	●	●	●	●		●	●	●			●	●	●	●	
Integrated Regional 2020 Urban Water Management Plan (IRUWMP), San Bernardino Valley Municipal Water District	●	●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●	●	
Adaptive, Integrated Water Resource Management Plan, Northern Cities Management Area Technical Group	●			●	●			●	●	●		●	●	●				●	●	●	
North Pleasant Valley Desalter, City of Camarillo	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●

SELECT RELEVANT PROJECT EXPERIENCE

	NEAR & LONG-TERM WR PLANNING	STATE WATER PROJECT	BAY DELTA ACTIVITIES	ENVIRONMENT PLANNING	WATER SECURITY & RESILIENCY	REGIONAL SOLUTIONS /PARTNERSHIPS	WATER MANAGEMENT/POLICY	DECISION FRAMEWORK	STAKEHOLDER COMMS	BOARD/COUNCIL COMMS	ENG. DESIGN & COST ESTIMATING	DEMAND PROJECTIONS	DISTRIBUTION PLANNING/ MODELING	LOCAL SUPPLY INTEGRATION, INFRASTRUCTURE	WATER QUALITY	ECONOMIC ANALYSIS /RATES	RISK, RESILIENCE, AND RELIABILITY	SURFACE WATER	GROUNDWATER	RECYCLED WATER	DESALINATION
SARCCUP Decision Support Model, San Bernardino Valley Municipal Water District	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Regional Recycled Water Concept Study, San Bernardino Valley Municipal Water District	●	●		●	●	●	●	●	●	●		●	●	●	●	●		●	●	●	●
Cayucos Sustainable Water Project, Cayucos Sanitary District	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Replenish Big Bear Program Management & Communications, Big Bear Area Regional Wastewater Agency	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Exchange Plan Facilitation and Updates (Santa Ana River & Mill Creek), San Bernardino Valley Municipal Water District	●	●			●	●	●	●	●	●				●	●		●	●	●	●	
Integrated Water Resources Planning, City of San Luis Obispo	●	●			●	●	●	●	●	●		●		●	●	●	●	●	●	●	
Long Term Supplemental Water Supply Study, County of Santa Barbara	●				●				●	●		●	●	●				●	●	●	
Paso Basin Supplemental Supply Options Supply, San Luis Obispo County Flood Control & Water Conservation District	●	●			●			●	●	●		●	●	●				●	●	●	
Central Coast Blue, City of Pismo Beach	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
Regional Urban Water Management Plan, Desert Water Agency	●				●	●	●	●	●	●		●	●		●		●	●	●	●	
Habitat Conservation Plan, Compliance and Restoration Support San Bernardino Valley Municipal Water District	●	●		●	●	●	●	●	●	●	●			●	●	●	●	●	●		
Central Valley Project and SWP NEPA and ESA Support Bureau of Reclamation	●	●	●	●	●	●	●	●	●	●				●	●	●	●	●			
Delta Conveyance EIR/EIS, Public Outreach, Permitting California DWR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
Updates to the Bay Delta Plan California State Water Board	●	●	●	●	●		●	●	●	●					●		●				

Regional Water Infrastructure Resiliency Plan

County of San Luis Obispo Flood Control & Water Conservation District

In collaboration with the Countywide Water Action Team (CWAT), WSC is developing a Regional Water Infrastructure Resiliency Plan (RWIRP) that identifies and analyses regional water supply vulnerabilities and opportunities, assessing their probability and impact, and providing a framework to enhance and maximize beneficial use of water resources including groundwater, recycled water, ocean desalination, regional surface water, and imported water for mutual benefit and regional resiliency. WSC is using a portfolio-based tool to map out supplies and demands for 41 agencies and assessing water portfolio reliability based on a rubric for influencing parameters of climate change, natural disasters, maintenance and failures, regulatory and environmental considerations, and water rights considerations.

The RWIRP is a critical resource for County agencies to address implications of the Governor's Water Resilience Portfolio policies, the SWP reliability, Sustainable Groundwater Management Act (SGMA) requirements, General Plan and Housing element requirements, and water use efficiency, and water resiliency and security planning legislation.

Reference: Courtney Howard, PE
Water Resources Division Manager, County of San Luis Obispo
(805) 781-1013, choward@co.slo.ca.us

> "WSC is helping several San Luis Obispo water agencies improve their water portfolio resiliency and reliability as they prepare for an uncertain future. Their inclusive process enabled agencies to take an active role in selecting the best-fit water supply options to meet their diverse needs, regulatory requirements, and vulnerabilities."
>
> - Courtney Howard, Division Manager, County of San Luis Obispo

Adaptive, Integrated Water Resource Management Plan/Central Coast Blue

Northern Cities Management Area Technical Group

For nearly a decade, WSC has provided integrated water resource planning and on-call support services for the Northern Cities Management Area Technical Group (NCMA TG)

The NCMA TG is comprised of the cities of Arroyo Grande, Grover Beach, Pismo Beach, and the Oceano Community Services District. The WSC team has provided staff extension services and led specific initiatives to provide the NCMA TG with responsive water resources planning services including: demand analysis, water supply portfolio optimization, decision support, strategic planning, hydraulic modeling, source of supply reliability and alternatives analysis, and technical support services.

After seawater intrusion was detected in the coastal aquifer in 2009, WSC developed a water supply, production, and delivery model that allowed the agencies to maximize inter-agency surface water deliveries and reduce groundwater pumping during the historic drought. The system model incorporated constraints for available supply, treatment capacity, conveyance pipeline capacity, seasonal system demand, and intertie delivery capacity to develop optimized water supply portfolio management strategies.

WSC applied a triple bottom line approach to evaluate long-term supplemental water supply alternatives, helping identify the most viable and beneficial water supply project for the region: Central Coast Blue. Central Coast Blue is an indirect potable reuse project that will purify wastewater for injection into the Santa Maria Groundwater Basin to prevent seawater intrusion.

WSC developed a water supply portfolio analysis toolset that allows each agency to evaluate the reliability of their water supplies under a variety of drought scenarios. This analysis was combined with stakeholder workshops to evaluate cost/benefit sharing methodologies, enabling each agency to identify the need for supplemental water, the fiscal impact to their rate payers, and the benefit to their water supply portfolios. The stakeholder engagement process has driven regional collaboration and transparency around finding a shared water supply solution, and it assisted in generating support from elected officials and obtaining policy direction to move the project forward.

Reference: Ben Fine, Director of Public Works, City of Pismo Beach, (805) 773-7037, bfine@pismobeach.org

Development of the County of San Luis Obispo's RWIRP is driven by collaborative workshops with the CWAT. WSC uses toolsets in workshops to transparently present complex technical supply and demand information, elicit stakeholder input, and ultimately develop consensus on ways to optimize use of available supplies.

Chino Basin Program

Inland Empire Utilities Agency California

Inland Empire Utilities Agency (IEUA) is leading a regional program that would create a new recycled water resource with multi-purpose and wide-geographic benefits. The Chino Basin Program is in the pre-engineering development stages and is unique in the collaborative approach being utilized to work through member agency agreements, rate impacts, and engineering decisions in close coordination with partners. The partner agencies include the Chino Basin Watermaster, Water District of Southern California (Metropolitan), the Department of Fish and Wildlife and the State Water Resources Control Board.

The program envisions providing 15,000 AFY of new supply to the Chino Basin, emergency groundwater storage for use during extended drought, and new infrastructure with flexible operating conditions to maximize benefits to local agencies. WSC is assisting in preparing a Preliminary Design Report that includes alternatives analysis, hydraulic modeling, hydrogeologic analysis, and facility sizing recommendations, including pump-back into the regional Metropolitan system. The program could include a new advanced water treatment facility, recycled water distribution, injection and extraction wells, new wellhead treatment, and potable water distribution facilities.

WSC's team is leading coordination internally and externally with more than 30 stakeholders. WSC has utilized many avenues to reach and share information with all audiences including elected officials, media, public, and member agency representatives.

Reference: Liza Munoz, PE
Senior Engineer, Inland Empire Utilities Agency, (909) 993-1522, lmunoz@ieua.org

Through effective partnerships with SWP Contractors, DWR and the California Department of Fish and Wildlife, the project will develop new water supplies that will be stored in the Chino Basin Water Bank for ecological benefit in the Bay-Delta watershed while providing water supply reliability and improved water quality benefits to the Chino Basin and IEUA's member agencies.

2020 UWMP & Metropolitan Water Resources Management Plan

City of Fresno

WSC has partnered with the City of Fresno to update their Metropolitan Water Resources Management Plan (Metro Plan), providing a road map for the City's water supplies, water infrastructure, and sustainable growth through 2070. The 2020 Metro Plan also includes a Programmatic and Project Environmental Impact Report and 2020 UWMP.

The Metro Plan will document the City's existing water assets, supplies, infrastructure, and rights to evaluate multiple future supply and demand scenarios considering different assumptions on conservation, pace of growth, surface water availability, climate change impacts, and groundwater management actions.

WSC's evaluation tools developed include a Groundwater Water Budget and Supply/Demand Scenario Tool. New demand projections are based on population, employment, and land use projections and the plan will investigate methods to optimize existing supplies. Existing supply optimization and new supplies requires creative partnerships and identifying mutually beneficial projects.

WSC is preparing the City of Fresno's Metro Plan, which sets City's water resources vision and plan for the next 50-years. As part of that effort, WSC is evaluating approaches to balance wet and dry conditions for reliable supplies both within the City and outside the City through partnerships, such as groundwater banking, including Delta sustainability considerations for the City's San Joaquin River and Kings River supplies. The approaches are structured as part of an adaptive management plan that is dependent on changes in surface water reliability from, for example, climate change or regulatory constraints.

Reference: Brock Buche, Assistant Director of Public Utilities, City of Fresno, (559) 621-5325, Brock.Buche@fresno.gov

"WSC's unique coaching, facilitation and leadership was essential to gaining our Board's approval for the next phase of the Chino Basin Program."

—Halla Razak, Former General Manager,
Inland Empire Utilities Agency

Water Vision Santa Barbara

City of Santa Barbara

The City of Santa Barbara's water supply portfolio is one of the most diverse in California. It includes local surface water, groundwater from two main aquifers, tunnel infiltration, ocean desalination, imported SWP water, and recycled water. WSC is conducting an integrated evaluation of optimized supply portfolios involving all of the City's water assets to produce a robust strategic road map for the City's long-term water security.

WSC is developing a clear road map for the City's current and future supply portfolio that includes a plan for the role of ocean desalination (the City's newest supply) as conditions change. Going beyond traditional cost and reliability factors, WSC's expanded evaluation and alternative process incorporated risks and future uncertainties into the evaluation to evaluate citywide resilience. Risks and uncertainties are used in multiple steps throughout the planning process, including the development of alternatives, developing risk scores for the alternatives, and developing resilience scenarios to test the top alternatives.

Reference: Mr. Joshua Haggmark, Water Resources Manager, City of Santa Barbara, (805) 564-5393, JHaggmark@SantaBarbaraCA.gov

For the City of Santa Barbara, WSC's team designed and led comprehensive stakeholder engagement process to: support community-aligned water planning decisions; build community and decision-maker trust; support the City's triple bottom line water planning goals; and forge new and expanded relationships between the City and critical community perspectives. Services included stakeholder mapping, discovery interviews, and recruitment/ management of a diverse 30-member stakeholder group; creating an actionable public feedback loop; and the design of Water Vision Month, a public outreach campaign that included the development of pre-recorded educational videos, a virtual engagement platform, and live virtual lunch and learns presented by City staff.

Integrated Regional 2020 Urban Water Management Plan

San Bernardino Valley Municipal Water District

WSC is collaborating with the San Bernardino Valley Municipal Water District (Valley District) to create a comprehensive document for guiding water resource management for the Upper Santa Ana River Watershed. The cohesive planning framework consolidates, updates, and merges the common elements of the Upper Santa Ana River Watershed Integrated Regional Water Management Plan (IRWMP) and the San Bernardino Valley Regional Urban Water Management Plan (RUWMP) into a new document: the 2020 Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (IRUWMP). WSC is developing tools and data sets to help empower effective communication and decision-making. The IRUWMP will align related ongoing efforts, such as the Upper Santa Ana Habitat Conservation Plan and SARCCUP, and others, to build regional momentum and broad-based support for projects and programs. WSC is positioning regional initiatives within the state's evolving water framework, and positioning Valley District and participating agencies for funding opportunities.

Valley District is the fifth largest contractor for the SWP, serving an area of 353 square miles and a population of nearly 700,000 people. For more than four years, WSC has provided integrated water resources planning for Valley District, including their 2015 RUWMP and 2020 IRUWMP.

Reference: Bob Tincher, Deputy General Manager, San Bernardino Valley Municipal Water District, (909) 387-9211, bobt@sbvmwd.com

"What I appreciate about WSC is that they perform like they are part of our staff team constantly striving to add value and exceed expectations...I have absolute confidence in them to deliver a plan that will exceed our expectations and provide "rails" that will guide our agency into a bright future."

- Bob Tincher, Deputy General Manager, San Bernardino Valley Municipal Water District

On-Call Services and North Pleasant Valley Desalter

City of Camarillo

WSC provides program, construction management, and on-call services to the City. WSC is serving as the program manager and construction manager for the City's North Pleasant Valley (NPV) Groundwater Desalter Project. WSC has managed the program from preliminary design through permitting, funding, detailed design, and construction. In addition, WSC has provided on-call engineering services for the Camarillo Sanitary District including sanitary sewer manhole rehabilitation and design of a new recycled water storage tank.

WSC helped the City secure over $15 million in grant funding for the NPV Desalter Project along with LRP funding from MWD, which was instrumental in making the project financially feasible.

Reference: Lucie McGovern, Deputy Director of Public Works, City of Camarillo, (805) 388-5334, lmcgovern@cityofcamarillo.org

On-Call Services and Replenish Big Bear

Big Bear Area Regional Wastewater Agency

WSC is managing a recycled water project to offset potable water use and achieve water supply sustainability for the Big Bear Valley. WSC is working alongside four regional partners within the Big Bear Valley to develop a One Water project that will create a new, sustainable water resource to benefit the Valley and the entire Santa Ana River watershed. WSC helped define the preferred alternative, facilitated numerous technical working sessions, and is preparing the preliminary design for the program. WSC has provided funding support for the project, which was recently awarded more than $4.5 million as part of the IRWM Proposition 1 Funding Award.

The work in this program grew out of relationships and work completed for the Agency over several on-call contracts which included task orders for pipeline analysis, hydraulic modeling, treatment facility upgrades, on-call support during construction of infrastructure projects, and SCADA upgrades.

Reference: David Lawrence, General Manager Big Bear Area Regional Wastewater Authority (909) 584-4033 | dlawrence@bbarwa.org

ICF Relevant Experience

Upper Santa Ana River Habitat Conservation Plan and Tributaries Restoration Project

San Bernardino Valley Municipal Water District

Valley District and its partner agencies are in the process of preparing a HCP for the Upper Santa Ana River (Upper SAR). The primary purpose of the HCP is to give the Upper SAR water agencies the ability to construct identified public infrastructure projects that would impact endangered species and require take coverage under the Federal Endangered Species Act (FESA).

These projects have tremendous public value by increasing regional water supply reliability and improving flood protection.

ICF assessed existing conditions and prepared preliminary restoration designs for five tributary restoration sites to create habitat for species covered under the Upper SAR HCP, with a focus on restoring habitat for Santa Ana sucker: Anza Creek, Old Ranch Creek, Hole Creek, Hidden Valley Creek, and Evans Lake Creek. The designs were used in a second broader analysis ICF completed in 2018 that focused on identifying opportunities and constraints for restoring habitat for the remaining species covered under the HCP and for restoring jurisdictional Aquatic Resources (wetlands and waters of the U.S. and State) to offset potential impacts from water management activities. A preliminary restoration design for an additional site, Hidden Valley Ponds, was also completed. A key milestone was achieved in 2018 when ICF completed 30% level engineering drawings for the sites and used the designs to begin permitting work and CEQA compliance. ICF is currently working with Valley District to prepare the 60%, 90%, and final plans and specifications for restoration of four of the tributary sites.

Reference: Heather Dyer, MS, MBA, General Manager San Bernardino Valley Municipal Water District, (909) 387-9200, heatherd@sbvmwd.com

Long-Term Operation of the Central Valley Project and State Water Project

Bureau of Reclamation

ICF is presently assisting Reclamation with reinitiation of consultation under Section 7 of the ESA and associated NEPA for long-term operation of the CVP and SWP. This work follows prior service to Reclamation on the coordinated long-term operation of the CVP and SWP in California. ICF led the preparation of a combined biological assessment BA and ESA Section 7 consultation to obtain revised BOs which included preparing introductory sections, developing a proposed action description, preparing species accounts, conducting an effects analysis, and preparing conclusions regarding the effects of the proposed action.

In coordination with Reclamation, the ICF team also developed modeling tools to analyze the effects of future proposed water operations under different water year types and under future climate change. In addition, ICF compiled an administrative record in compliance with Reclamation and legal guidelines.

Throughout the project, federal court decisions at the District and Circuit Court levels affected the scope and schedule of the project, requiring ICF to be highly flexible in managing this project.

Reference: Cynthia Meyer, Program Analyst, Bay-Delta Office, Reclamation Interior Region 10 California-Great Basin, (916) 414-2425, cameyer@usbr.gov

Delta Conveyance/California WaterFix/Bay Delta Conservation Plan

California Department of Water Resources

California WaterFix (CWF) was a foundational water supply and ecosystem improvement project to improve SWP and CVP operations. ICF is presently evaluating the project elements from CWF now as the Delta Conveyance Project, for which Reclamation has recently signed on as a cooperating agency. As part of these efforts, ICF performed a detailed peer review of the initial analysis and proposed how best to streamline the CEQA and NEPA analysis and conduct a technically and legally defensible analysis on an aggressive timeline

- Completed the BDCP draft EIR/EIS, the BDCP/CWF partially recirculated draft EIR/supplemental EIS, and the final EIR/ EIS and assisted Reclamation and DWR in public release of all documents (including ensuring compliance with state and federal regulatory requirements)
- Prepared, produced, and delivered the draft BDCP BA/2081(b) application and assisted with the NMFS and USFWS BOs and CWA Section 404 analyses and mitigation plan for the water delivery infrastructure
- Developed and led an extensive public outreach and agency coordination program, including responding to thousands of comments on the EIR/EIS
- Conducted extensive community outreach in the form of town hall meetings, public meetings, easy-to-understand handouts, targeted informational materials for various stakeholders, web resources, and frequently asked questions

ICF demonstrated their ability to work effectively on a challenging public process involving multiple agencies, stakeholders, and the public to provide analysis of effects that has withstood scientific scrutiny. ICF provided the staff experts and managers needed to explain complex fish and wildlife issues and hydrologic, water quality, and biological model results in an understandable way.

Reference: Mary Lee Knecht | Public Affairs Officer, Interior Region 10 | California-Great Basin, (916) 978-5101, mknecht@usbr.gov

Additional Relevant ICF Experience:

- Climate Vulnerability Assessment for Water Resources and Infrastructure, California Water Service Company
- As-Needed Environmental Services, Los Angeles County Department of Public Works, Programs Development Division
- As-Needed Environmental Services, Orange County Parks
- On-Call Environmental Planning Services Contracts and Bay Delta Services Contract, Metropolitan Water District of Southern California
- The Clearwater Master Facilities Plan and New Ocean Discharge System EIR/EIS , County Sanitation District of Los Angeles
- Lower Colorado River Multiple Species Conservation Plan (MSCP) Implementation Assistance, Bureau of Reclamation
- Olympic Well Field Groundwater Management Plan Implementation, City of Santa Monica
- San Ramon Valley Recycled Water Program, Public Information and Community Outreach, Dublin San Ramon Services District/East Bay Municipal Utility District Recycled Water Authority
- California Aqueduct Conveyance of Non-Project Groundwater EIR, Westlands Water District
- Whitewater River Stormwater Channel and Coachella Valley Stormwater Channel, Coachella Valley Water District
- Civic Center Wastewater Treatment Plant, City of Malibu
- Lower Colorado River Basin Shortage Guidelines Reservoir Operations EIS, Bureau of Reclamation
- Water Supply Project Environmental Compliance, Monterey Peninsula Water Management District

M.Cubed Relevant Experience

Urban Water Supply Investment: Why Shortage Cost Matters

California Water Foundation

Working with Dr. David Sunding of UC Berkeley and Gary Fiske of Gary Fiske and Associates, David Mitchell developed economic-hydrologic simulation models to evaluate costs and benefits of alternative urban supply reliability investments. These models were applied to two case studies. The first, for Eastern Municipal Water District, evaluated a proposed 60,000 AF groundwater bank that would store imported surface water and advanced treated recycled water. Importantly, this case study examined how contemporaneous reliability investments by the water agency's primary wholesale water supplier could negatively or positively impact the value of local reliability projects.

The second, for Marin Municipal Water District, used the economic-hydrologic simulation framework to evaluate the impact of planned investments in water conservation on future levels of system storage and reliability. This study introduced the concept of the reliability-adjusted unit cost of water supply, which explicitly adjusts a project's unit cost of supply for avoided water shortage costs.

Reference: Andrew Fahlund, Senior Program Officer, (916) 414-3310, afahlund@waterfdn.org

Reliability-Adjusted Unit Cost Analysis of Supply Alternatives

Santa Clara Valley Water District

Working with a prime consultant, David Mitchell constructed a spreadsheet model that works in conjunction with the District's hydrologic simulation model to compute reliability-adjusted unit costs of water supply alternatives contained in the District's 2040 Water Supply Master Plan. Reliability-adjusted unit costs incorporate estimates of avoided water shortage costs into the calculation of the unit cost of supply, allowing for a more comprehensive assessment and ranking of supply alternatives in terms of supply reliability performance.

Reference: Metra Richert, Water Supply Planning & Conservation Manager, (408) 265-2600, mrichert@valleywater.org

Regional Economic Impacts of the Proposed Huntington Beach Desalination Project

Poseidon Resources

Prepared a regional economic impact assessment of the proposed desalination project using the IMPLAN input-output modeling system. Evaluated project impacts in terms of changes in income and employment during the construction and operation project phases. Income and employment impacts were assessed for three regions: (1) Orange County, (2) elsewhere in California, and (3) elsewhere in the United States. Updated previous analyses of regional impacts prepared by M.Cubed in 2003 and 2014.

Reference: Scott Maloni, Vice President, Poseidon Resources, (760) 655-3996, smaloni@poseidon1.com

Santa Clara Valley Water Supply Strategic Plan Expert Panel

Santa Clara Valley Water District

Provided review on the list of water supply projects and programs being considered, the assumptions being used to model and evaluate the projects and programs, early drafts of staff analysis and recommendations, and the short list of projects and programs being considered for the Water Supply Master Plan. Provided comments and questions at key junctures on staff's work products for the District's consideration. Reviewed and commented on the methodologies and assumptions used by District staff to prepare the business case analysis of the California WaterFix and other water supply alternatives.

Reference: Metra Richert, Water Supply Planning & Conservation Manager, (408) 265-2600, mrichert@valleywater.org

Nacimiento Water Project Water Sales

San Luis Obispo County Flood Control and Water Conservation District

Developing a program to sell temporarily surplus water contracted by six municipalities to other water users within the county. Includes clarifying contractual and water rights issues, identifying potential candidates for purchasing water and purposes for that water, means of conveying water, recommending preferred means of selecting and negotiating deals, and outlining logistical issues for the program.

Reference: Wes Thomson, San Luis Obispo County, Department of Public Works, (805) 788-2101, WThomson@co.slo.ca.us

Delta Climate Change Vulnerability Analysis

Delta Stewardship Council

Working with a project team on behalf of to estimate the amount of economic assets and activity exposed to the hazards of increased climate volatility within the Sacramento-San Joaquin Rivers Delta and dependent on water exports. The economic activity exposed to water supply vulnerability is derived from reductions in water supplies across a distribution of delivery conditions for the SWP and CVP that result in either reduced agricultural output or increased municipal water supply costs. The economic value identified as vulnerable is used to develop strategies to adapt to climate change and associated sea level rise.

Reference: Harriet Ross, Assistant Planning Director, (916) 445-5825, Harriet.Ross@deltacouncil.ca.gov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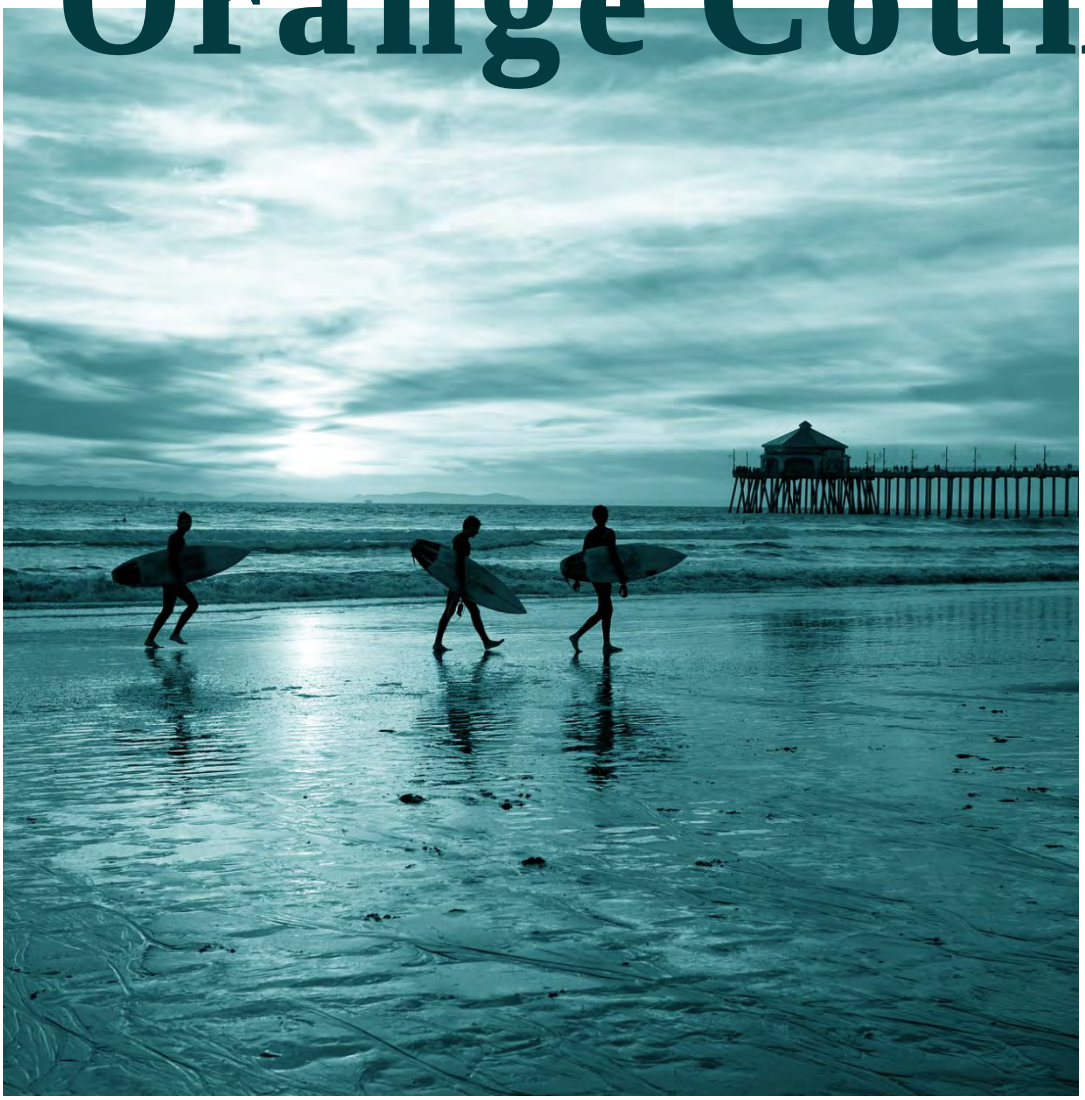
RAFTELIS

On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development

STATEMENT OF QUALIFICATIONS / MARCH 25, 2021

Municipal Water District of Orange County



Diversity and inclusion are an integral part of Raftelis' core values.

We are committed to doing our part to fight prejudice, racism, and discrimination by becoming more informed, disengaging with business partners that do not share this commitment, and encouraging our employees to use their skills to work toward a more just society that has no barriers to opportunity.

REGISTERED MUNICIPAL ADVISOR

Raftelis is registered with the U.S. Securities and Exchange Commission (SEC) and the Municipal Securities Rulemaking Board (MSRB) as a Municipal Advisor.

Registration as a Municipal Advisor is a requirement under the Dodd-Frank Wall Street Reform and Consumer Protection Act. All firms that provide financial forecasts that include assumptions about the size, timing, and terms for possible future debt issues, as well as debt issuance support services for specific proposed bond issues, including bond feasibility studies and coverage forecasts, must be registered with the SEC and MSRB to legally provide financial opinions and advice. Raftelis' registration as a Municipal Advisor means our clients can be confident that Raftelis is fully qualified and capable of providing financial advice related to all aspects of financial planning in compliance with the applicable regulations of the SEC and the MSRB.

Table of Contents

Separately attached:

- Appendix A: Resumes
- Appendix B: Billing Rates
- Appendix C: Exceptions to the Standard Consulting Agreement

March 25, 2021

Mr. Charles Busslinger, PE - Director of Engineering/District Engineer
Municipal Water District of Orange County
18700 Ward Street, Fountain Valley, CA 92708

Subject: Statement of Qualifications for On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development

Dear Mr. Busslinger:

Raftelis is pleased to submit this proposal, which outlines how we can assist the Municipal Water District of Orange County (MWDOC) by providing economic, demand forecast, and water rate analysis on Water Reliability Planning projects.

To assist MWDOC with the services outlined in its Request for Qualifications (RFQ), we propose a project team with unparalleled experience and a reputation for quality service. I will serve as the Project Manager, ensuring that the project stays on schedule, is within budget, and effectively meets MWDOC's objectives. Both I and, our proposed Assistant Project Manager, Steve Gagnon, PE (AZ), have more than 20 years of experience in California and Orange County. Steve is currently conducting MWDOC's water rate study.

Raftelis is known as a leader in financial planning and rate setting, however Raftelis also has economic analysis experience. For example, I recently assisted West Basin Municipal Water District in evaluating the economics of a reverse osmosis plant by partnering with Dudek. Steve is helping the City of Oxnard evaluate the economic benefit of a recently constructed recycled water plant. Our broader team brings significant value with expertise in economics, project delivery, water rate analysis, demand forecasting, and facilitating complex water issues. A couple of our key differentiators include:

Depth of Resources and Experience. With 120 consultants, Raftelis has the largest water, wastewater, and stormwater utility financial and management consulting practice in the nation. Over the years, we've assisted more than 1,000 utilities across the country and conducted thousands of studies. Most importantly, our work history with MWDOC and its Member Agencies provides us with valuable insights into your unique circumstances. Our depth of resources and prior experience with your organization will ensure your objectives are met.

Modeling Experts. We develop some of the most sophisticated yet user-friendly financial planning/rate models available in the industry. These real-time decision support tools enable the examination of different policy options and their financial/customer impacts. Our models are custom built for each client in a cost-effective manner to ensure alignment with the client's financial and accounting structure and the functionality desired by each client.

We are proud of the resources that we offer and welcome the opportunity to work with MWDOC and its professional staff to meet MWDOC's objectives. Please do not hesitate to contact me by phone at 213.327.4405 or by email at sgaur@raftelis.com if you have any questions.

Very truly yours,

Sanjay Gaur, Vice President

Firm Identification

Firm name: Raftelis Financial Consultants, Inc. (DBA Raftelis)

Point of contact: Sanjay Gaur, Vice President
445 S. Figueroa Street, Suite 1925, Los Angeles, CA 90071
P: 213.262.9304 / E: sgaur@raftelis.com

Key Personnel Disciplines

THE PROJECT MANAGER AND ASSISTANT PROJECT MANAGER ARE VERY FAMILIAR WITH MWDOC AND HAVE ASSISTED OTHER AGENCIES TO EVALUATE WATER SUPPLY ECONOMICS.

Our team includes senior-level professionals to provide experienced project leadership with support from talented consultant staff. This close-knit group has frequently collaborated on similar successful projects, providing MWDOC with confidence in our capabilities.

Below is an organizational chart showing the structure of our project team which will provide support for MWDOC's Water Reliability Planning projects. In a separate attachment, we have included brief resumes for each of our team members as well as a description of their role on the project.

WHO IS Raftelis

RAFTELIS IS THE TRUSTED ADVISOR TO UTILITIES AND THE PUBLIC SECTOR.

+ **VISIT** RAFTELIS.COM **TO LEARN MORE**

Raftelis provides utilities and public-sector organizations with insights and expertise to help them operate as high-performing, sustainable entities providing essential services to their citizens. We help our clients solve their financial, organizational, technology, and communication challenges, achieve their objectives, and, ultimately, make their communities better places to live, work, and play.

Length of time in business: 27 years

Areas of expertise:

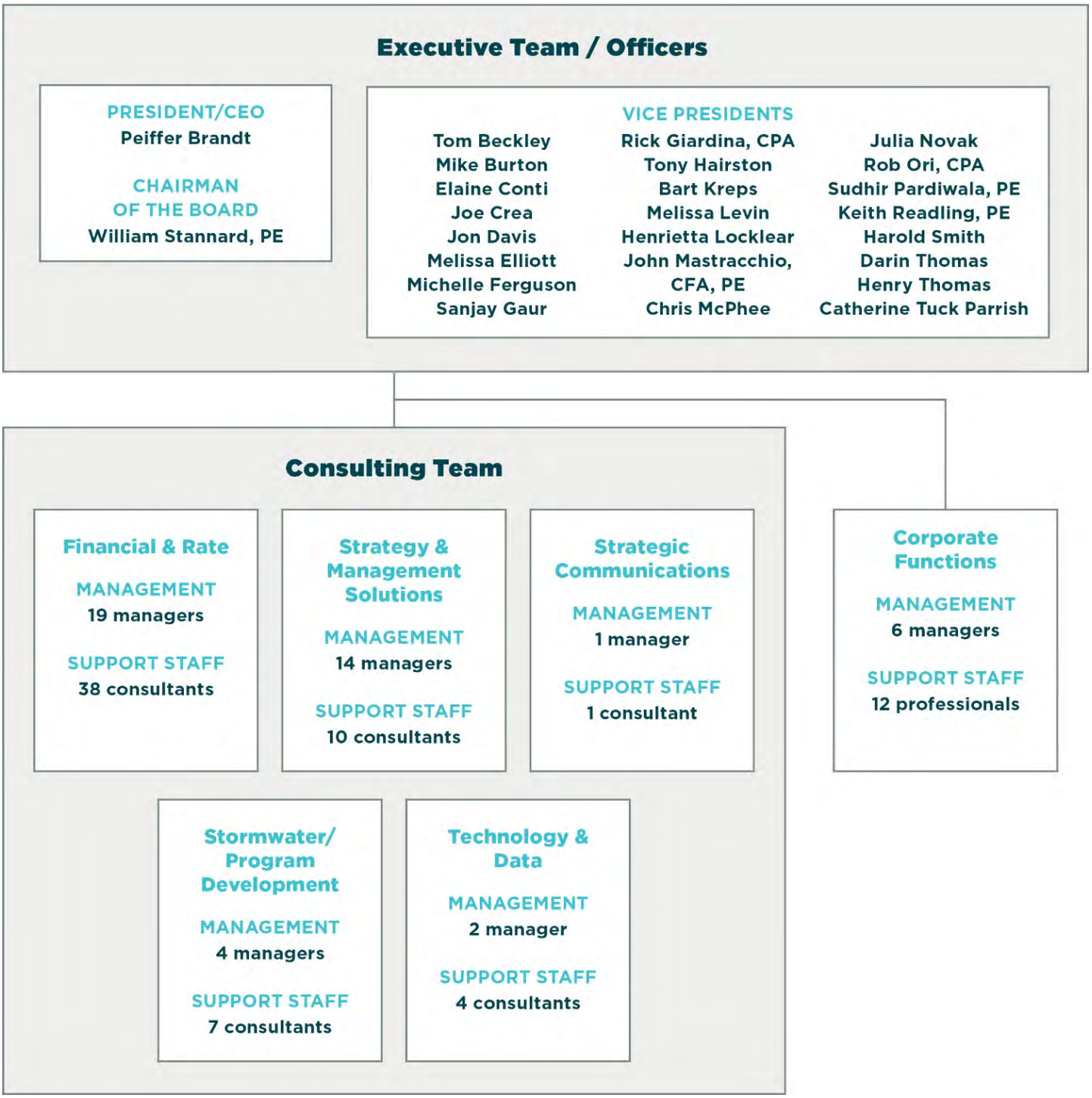
Finance
- Affordability
- Debt issuance support
- Financial and capital planning
- Rate, charge, and fee studies

Management
- Executive recruitment
- Organizational and operational assessments
- Program development and implementation support
- Strategic planning

Technology
- Billing, permitting, and customer information audits
- Business process development
- Data management, analytics, and visualization
- Performance measurement and dashboarding
- Software solutions

Communications
- Graphic design and creative services
- Media and spokesperson training
- Public involvement and community outreach
- Risk and crisis communication
- Social media strategy
- Strategic communication planning

Number and areas of specialty of personnel: Over the last five years, our firm has grown from 60 to 143 employees. Raftelis' staff consists of some of the most knowledgeable and skilled consulting professionals in the municipal consulting industry. The organizational chart below shows the full organization and reporting structure of our firm.



MWDOC & RAFTELIS

The Right Fit

Raftelis helped Southern California agencies evaluate the economics of water supply projects, and we hope to use this expertise to assist MWDOC.

RESOURCES & EXPERTISE

This project will require the resources necessary to effectively staff the project and the skillsets to complete the required components.

With 120 consultants, Raftelis has the largest water-industry financial and rate consulting practice in the nation. Our depth of resources will allow us to provide MWDOC with the technical expertise necessary to meet your objectives. In addition to having many of the industry's leading rate consultants, we also have experts in key related areas, like stakeholder engagement and data analytics, to provide additional insights as needed.

DEFENSIBLE RECOMMENDATIONS

When your elected officials and customers are considering the validity and merit of recommended changes, they want to be confident that they were developed by experts using the latest industry standard methodology.

Our senior staff is involved in shaping industry standards by chairing various committees within the American Water Works Association (AWWA) and the Water Environment Federation (WEF). Raftelis' staff members have also co-authored many industry standard books regarding utility finance and rate setting. Being so actively involved in the industry will allow us to keep MWDOC informed of emerging trends and issues and to be confident that our recommendations are insightful and founded on sound industry principles. In addition, with Raftelis' registration as a Municipal Advisor, you can be confident that we are fully qualified and capable of providing financial advice related to all aspects of utility financial planning in compliance with federal regulations.

HISTORY OF SIMILAR SUCCESSES

An extensive track record of past similar work will help to avoid potential pitfalls on this project and provide the know-how to bring it across the finish line.

Raftelis staff has assisted 1,000+ utilities throughout the U.S. with financial and rate consulting services with wide-ranging needs and objectives. Our extensive experience will allow us to provide innovative and insightful recommendations to MWDOC and will provide validation for our proposed methodology ensuring that industry best practices are incorporated.

USER-FRIENDLY MODELING

A modeling tool that your staff can use for scenario analysis and financial planning now and into the future will be key for MWDOC going forward.

Raftelis has developed some of the most sophisticated yet user-friendly financial/rate models available in the industry. Our models are tools that allow us to examine different policy options and cost allocations and their financial/customer impacts in real time. Our models are non-proprietary and are developed with the expectation that they will be used by the client as a financial planning tool long after the project is complete.

EXPERTS ON CALIFORNIA REGULATORY REQUIREMENTS

This expertise will allow MWDOC to be confident that our recommendations take into account all of these regulatory requirements.

The regulatory environment in California has become more stringent due to Proposition 218. Besides developing well-thought-out financial plans, Raftelis staff members are very knowledgeable about these regulations and have made presentations on this subject at various industry conferences. In addition, we are frequently called on to be expert witnesses regarding these regulatory matters.

How we stack up

27 years serving the public sector

OUR TEAM INCLUDES

120+ consultants focused on finance/management/communication/technology for the public sector

5 chairs **&** **20** members of AWWA and WEF utility finance and management committees and subcommittees

& the President of AWWA

RAFTELIS HAS PROVIDED ASSISTANCE FOR

1,200+ public agencies and utilities

that serve more than **25%** of the U.S. population

including the agencies serving **38** of the nation's 50 largest cities

In the past year alone, we worked on **900+** projects for **600+** agencies in **44** states

Leading the industry

Raftelis staff shape industry standards for water and wastewater utility finance and management through our active leadership in AMWA, AWWA, WEF, and EPA. Leadership positions and projects for these organizations include:

AMWA

- INSIGHT database and survey

AWWA

- President
- Asset Management Committee - 1 member
- Benchmarking Committee - 1 member
- Finance, Accounting, and Management Controls Committee - Chair and 2 members
- Management and Leadership Division - Vice Chair & Trustee
- Rates and Charges Committee - 4 members
- Strategic Management Practices Committee - Chair
- Co-lead biennial *National Water & Wastewater Rate Survey*

WEF

- Finance and Administration Subcommittee - Chair
- Technical Practices Committee - 1 member
- Utility Management Committee - 5 members
- WEFTEC Conference Planning Committee - 1 member

EPA

- Environment Financial Advisory Board - 1 member

We wrote the book

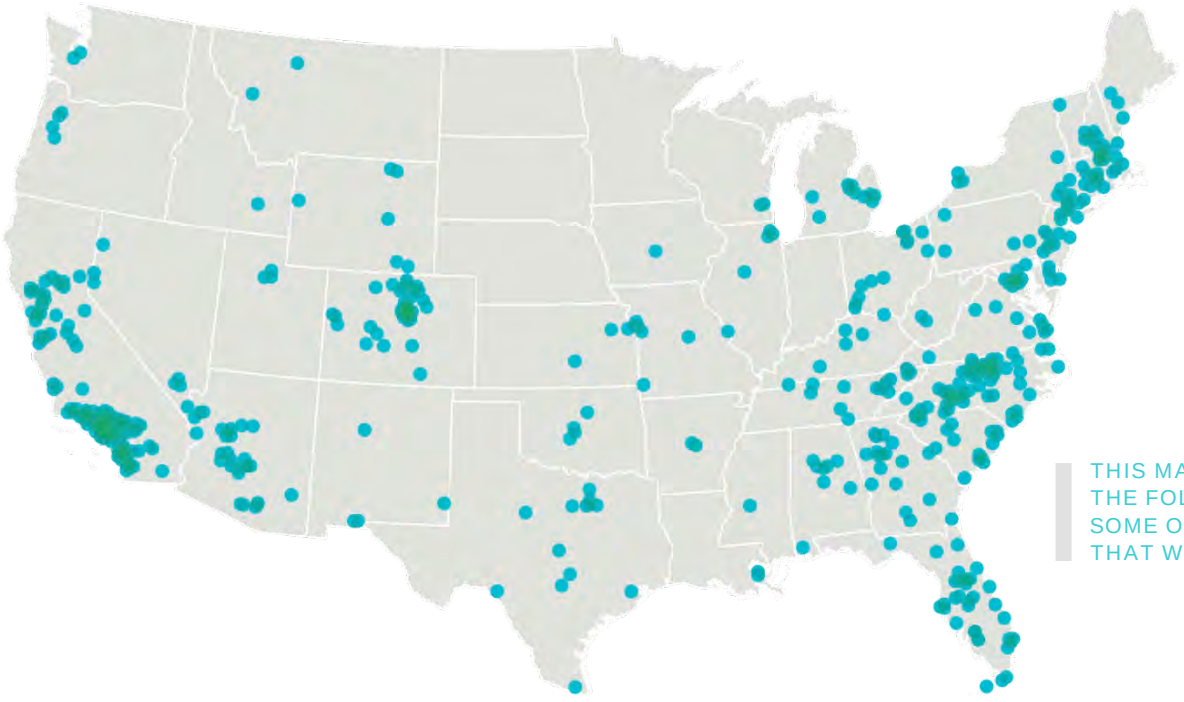
Raftelis staff have co-authored many of the industry's leading guidebooks regarding water and wastewater financial and management issues, including:

- *Affordability of Wastewater Service* (WEF)
- *Manual of Practice No. 27, Financing and Charges for Wastewater Systems* (WEF)
- *Manual M1, Principles of Water Rates, Fees and Charges* (AWWA)
- *Manual M5, Water Utility Management* (AWWA)
- *The Effective Water Professional* (WEF)
- *Water and Wastewater Finance and Pricing: The Changing Landscape*
- *Water and Wastewater Rate Survey* (conducted and published collaboratively with AWWA and Raftelis)
- *Water Rates, Fees, and the Legal Environment* (AWWA)

Experience

RAFTELIS HAS THE MOST EXPERIENCED UTILITY FINANCIAL AND MANAGEMENT CONSULTING PRACTICE IN THE NATION.

Our staff has assisted more than 1,200 public agencies and utilities across the U.S., including some of the largest and most complex agencies in the nation. In the past year alone, Raftelis worked on more than 900 financial/organizational/technology consulting projects for over 600 agencies in 44 states, the District of Columbia, and Canada.



THIS MAP AND THE MATRIX ON THE FOLLOWING PAGES SHOW SOME OF THE UTILITY CLIENTS THAT WE HAVE ASSISTED.

Raftelis has provided financial/ organizational/technology assistance to utilities serving more than

25% of the U.S. population

California Experience

This table lists the California utilities that Raftelis has assisted over the past five years on financial, rate, and/or management consulting projects.

Client	Affordability Analysis & Program Development	Debt Issuance Support	Dispute Resolution	Financial and Capital Improvements Planning	Rate Case Support	Rate Design	Risk Analysis	Cost of Service	Development / Impact Fees	Stormwater Utility Development	Organizational Optimization	Water/Wastewater Utility Valuation
Alameda County Water District		●		●		●	●	●	●			
Anaheim, City of				●		●	●	●				
Arroyo Grande, City of				●		●	●	●				
Atwater, City of				●	●	●		●				
Bakersfield, City of		●		●		●		●				
Benicia, City of									●			
Beverly Hills, City of		●		●		●	●	●	●		●	
Borrego Water District			●	●		●						
Brea, City of				●		●		●				
Brentwood (CA), City of				●		●	●	●				
CAL FIRE/San Luis Obispo								●				
Calleguas Municipal Water District		●		●		●	●	●				
Camarillo, City of		●		●		●		●	●			
Carlsbad Municipal Water District		●		●		●	●	●				
Casitas Municipal Water District				●		●		●				
Castaic Lake Water Agency			●	●		●	●	●	●			
Central Basin Municipal Water District		●		●			●	●				
Central Contra Costa Sanitary District				●		●		●				
Channel Islands Beach Community Services District				●		●		●				
Chino Hills, City of				●		●		●				
Chino, City of				●		●		●				
Chowchilla, City of				●		●	●	●				
Corona, City of						●			●			
County of San Diego				●				●		●		
Crescenta Valley Water District				●		●		●				
Cucamonga Valley Water District				●		●						
Del Mar Union School District		●										
Delta Diablo Sanitation District											●	
East Bay Municipal Utility District				●				●	●			
East Orange County Water District				●		●		●	●			
East Valley Water District				●		●	●	●				
Eastern Municipal Water District				●								
El Toro Water District				●		●		●				
Elk Grove Water District	●			●		●	●	●	●			
Elsinore Valley Municipal Water District				●		●			●			
Escondido, City of		●		●		●	●	●	●			
Galt, City of		●		●		●		●	●			
Glendora, City of						●						
Goleta Water District				●		●	●	●				
Goleta West Sanitary District			●	●		●	●	●	●			
Helix Water District				●		●		●				
Henderson, City of				●		●		●	●			
Hollister, City of				●		●		●	●			
Holtville, City of				●				●				
Huntington Beach, City of				●		●	●	●				
Imperial County				●		●		●				
Inland Empire Utilities Agency				●								

Client	Affordability Analysis & Program Development	Debt Issuance Support	Dispute Resolution	Financial and Capital Improvements Planning	Rate Case Support	Rate Design	Risk Analysis	Cost of Service	Development / Impact Fees	Stormwater Utility Development	Organizational Optimization	Water/Wastewater Utility Valuation
Irvine Unified School District		●										
Jurupa Community Services District				●		●	●	●				
Kern County Water Agency					●							
La Canada Irrigation District				●		●		●				
La Habra Heights County Water District				●		●	●	●	●			
Laguna Beach, City of				●								
Lake Valley Fire Protection District				●			●	●				
Las Virgenes Municipal Water District				●		●		●				
Leucadia Wastewater District				●		●						
Livermore, City of				●		●		●	●			
Long Beach City of	●	●		●		●		●				
Los Alamos Community Services District		●		●		●		●	●			
Los Angeles Department of Water and Power						●		●				
Los Angeles, City of Bureau of Sanitation					●							
Madera, City of		●		●								
Mammoth Community Water District				●		●		●				
Marin Municipal Water District					●							
Merced, City of				●		●		●	●			
Mesa Water District				●				●				
Metropolitan Water District of Southern California			●									
Modesto Irrigation District						●		●				
Mojave Water Agency				●		●	●					
Monterey County Water Resources Agency				●		●		●				
Monterey, City of		●		●		●	●					
Moulton Niguel Water District									●			
Municipal Water District of Orange County					●			●				
Napa Sanitation District				●		●		●				
Ojai Valley Sanitary District				●		●		●				
Olivenhain Municipal Water District				●		●	●					
Ontario Municipal Utilities Company								●				
Ontario, City of				●		●	●	●				
Orange, City of				●		●		●				
Palo Alto, City of				●		●	●	●				
Phelan Pinon Hills Community Services District	●			●		●		●	●			
Placer County Water Agency					●			●				
Pleasant Hill Recreation & Park District				●				●				
Pomona, City of				●		●		●	●			
Rainbow Municipal Water District				●		●	●	●				
Ramona Municipal Water District				●		●		●				
Rancho California Water District						●	●	●	●			
Redlands, City of				●		●	●	●	●			
Rincon del Diablo Municipal Water District				●		●		●				
Riverside Public Utilities				●		●	●	●	●			
Roseville, City of		●		●					●			
Sacramento Regional County Sanitation District						●						
Sacramento, City of				●		●		●				
Salton Community Services District				●				●				

Client	Affordability Analysis & Program Development	Debt Issuance Support	Dispute Resolution	Financial and Capital Improvements Planning	Rate Case Support	Rate Design	Risk Analysis	Cost of Service	Development / Impact Fees	Stormwater Utility Develoment	Organizational Optimization	Water/Wastewater Utility Valuation
San Bernardino Valley Municipal Water District						●						
San Bernardino, County of				●		●		●	●			
San Clemente, City of				●		●	●	●				
San Diego, City of Public Utilities Department		●	●	●		●	●	●	●			
San Dieguito Water District				●		●		●				
San Elijo Joint Powers Authority				●	●	●	●	●	●			
San Gabriel County Water District				●		●		●				
San Gabriel, City of				●		●		●				
San Jose, City of								●				
San Juan Capistrano, City of				●		●	●	●	●			
Santa Ana, City of								●				
Santa Barbara, City of				●		●	●	●	●			
Santa Clara Valley Water District			●	●	●							
Santa Clarita Water District		●		●		●	●	●	●			
Santa Cruz, City of				●		●	●	●				
Santa Fe Irrigation District				●		●	●	●	●			
Santa Fe Springs, City of				●		●		●				
Santa Margarita Water District				●		●	●	●				
Santa Rosa, City Attorney's Office									●			
Scotts Valley Water District		●		●		●	●	●	●			
Shafter, City of				●		●		●				
Shasta Lake, City of				●		●	●	●				
Sierra Madre, City of	●			●		●		●				
Signal Hill, City of				●		●		●				
Simi Valley, City of				●		●	●	●	●			
Sonoma, City of				●		●		●				
South Mesa Water Company				●		●	●	●				
South Pasadena, City of				●		●		●				
South San Francisco, City of				●				●				
Sunnyslope County Water District				●		●	●	●	●			
Sweetwater Authority				●		●		●				
Temescal Valley Water District				●		●		●	●			
Thousand Oaks, City of				●		●	●	●	●			
Torrance, City of				●		●		●				
Trabuco Canyon Water District				●		●		●				
Triunfo Sanitation District				●		●		●				
Tustin, City of				●		●		●				
Union Sanitary District				●		●	●	●	●			
Ventura Regional Sanitation District				●		●		●				
Ventura, City of	●	●	●	●	●	●	●	●	●			
Vista, City of				●		●			●			
Walnut Valley Water District				●		●		●				
Watsonville, City of	●			●		●	●	●				
West Basin Municipal Water District				●		●	●	●				
Western Municipal Water District				●		●		●	●			
Yorba Linda Water District				●		●		●				
Zone 7 Water Agency				●		●		●				

Below, are projects descriptions that are similar in scope to MWDOC's project. We have included references and urge you to contact them to better understand our capabilities and our quality of service.

Municipal Water District of Orange County

CALIFORNIA

Reference
Harvey De La Torre, Assistant General Manager
18700 Ward Street, Fountain Valley CA 92708
P: 714.593.5027 / E: hdelatorre@mwdoc.com

Raftelis assisted the Municipal Water District of Orange County (MWDOC) to set charges for their member agencies. The charges recover the costs to serve their member agencies. Services such as representation at the Metropolitan Water District, engineering and planning services, and water conservation services.

A unique challenge for MWDOC is that one of their member agencies is a groundwater replenishment agency, and the prior rate structure allocates costs in proportion to meter counts at each agency. The groundwater replenishment agency has no meters and is, therefore, currently allocated costs in proportion to water use, which varies significantly. After an internal assessment of how MWDOC staff spends its time, it was deemed reasonable to assess the groundwater agency a charge based simply on the total agency count.

Raftelis held three meetings with the member agencies and performed a survey to solicit input on a fair and reasonable rate structure and, in-particular, to assess member agency thought on the new proposed groundwater charge. The member agency meetings were facilitated by Melissa Elliott. Her goal was to ensure as many opinions were heard as possible. Raftelis then briefed the MWDOC finance committee regarding member agency input. It is likely that the Board will approve an equal charge for the groundwater replenishment agency and a fixed charge in proportion to the meter count at each member agency.

Mojave Water Agency

CALIFORNIA

Reference
Kathy Cortner, General Manager
13846 Conference Center Drive, Apple Valley, CA 92307
P: 760.946.7054 / E: kcortner@mojavewater.org

As a State Water Project contractor, Mojave Water Agency (MWA) is entitled to receive an annual allotment of up to 82,800 acre-feet of water from the State Water Project via the California Aqueduct to replenish local aquifers that serve residents living within 4,900 square miles of the High Desert in San Bernardino County. The essential mission of MWA is to seek sources of water, including supplemental water, and to deliver that water in the most effective fashion to ensure the quality of life within its boundaries.

In 2012, MWA engaged Raftelis to develop the financial plan model as a tool to assess risk in water supply variance, capital spending plans including estimated Delta repair costs, and property tax growth rates and to evaluate associated potential financial impacts and ensure financial sufficiency for MWA's operational and capital expenditures. The financial model included economic analysis on different types of Water Banking and Water Exchange Programs and evaluated them under different hydrological conditions. Raftelis presented the model to the Board of Directors to show the financial health under various scenarios related to water supply, hydrological conditions on the State Water Project, and growth rates. The model was delivered to MWA staff along with a training session to demonstrate all key aspects of the model and a user manual for MWA's future use.

In 2013, MWA retained Raftelis to upgrade its financial plan model to include a water leasing module to evaluate the potential water supply risk under different growth and hydrological conditions and the associated risks and financial impacts of selling their multi-year pool water to defer the Delta repair costs. Upon completion of the model upgrade, Raftelis conducted financial sensitivity workshops with MWA staff and the Board, presented the results of the study, and delivered the model to MWA along with a manual for its future use and reference.

In 2015, MWA again retained Raftelis to provide ongoing financial plan support to examine the financial effects of the historic drought. Because of the then ongoing drought, the Department of Water Resources' costs had been rapidly increasing. Raftelis was retained to evaluate the feasibility, magnitude, and efficacy of potential financial tools that would help the agency generate additional revenue. As part of this project, Raftelis met with the MWA Board and the Personnel, Finance & Security working group on an ongoing basis as the agency's financial outlook changed. At the conclusion of the study, Raftelis provided the agency with an update to its Strategic Financial Plan.

Since 2015, Raftelis has assisted the agency in updating its financial model and evaluating different types of risk and different water exchange programs. In 2021, Raftelis will update the Strategic Financial Plan to reflect current conditions.

West Basin Municipal Water District

CALIFORNIA

Reference
Margaret Moggia, Executive Manager of Finance
17140 South Avalon Boulevard, Carson, CA 90746
P: 310.660.6256 / E: margaretm@westbasin.org

In 2016, West Basin Municipal Water District (West Basin) engaged Raftelis to conduct a water rate restructuring study and evaluate their fixed and volumetric revenue collection. Raftelis created a financial planning model, which presented rate structure alternatives, and compared West Basin's rate/revenue structure to that of peer water wholesale agencies. Based on Raftelis' work, West Basin successfully adopted a fixed charge.

In 2019, West Basin engaged Raftelis again to perform an ocean water desalination cost benefit analysis as a local drinking water supply. Working as a subcontractor for the engineering firm GHD, Raftelis is currently analyzing West Basin's financial health and ability to fund the desal plant. We are assessing West Basin's future capital and operational expenditures, debt obligations, and recycled water and brackish water desalination cost alternatives. In addition, Raftelis is examining the different rate structure alternative to price desal to its retail agencies. Lastly, Raftelis is conducting a spatial affordability analysis based on census track, retail rates, and the associated impacts on desal. This work is expected to be completed in April 2021.

City of Oxnard

CALIFORNIA

Reference

Omar Castro, Water Division Manager
251 South Hayes Avenue, Oxnard CA, 93030
P: 805.385.8139 / E: omar.castro@oxnard.org

Raftelis teamed with Gannett Fleming to prepare a Water Resources Management Plan for the City of Oxnard (City). Raftelis' main task was to assess the financial benefit of the recently construct Advanced Water Purification Facility (AWPF), which is part of their overall water supply. The AWPF receives water from the City's wastewater treatment plant and creates a new source of water as the City receives groundwater pumping allocations for water sold to farmers, who would normally pump groundwater and contribute to saltwater intrusion. Some of the water is also injected for later use as part of an aquifer storage and recovery project.

Raftelis is helping the City answer the question, "Is the AWPF beneficial to City water customers?" by calculating the net present value of the AWPF. It is anticipated that the City's share of groundwater will decrease over the next 20 years and the City will have to purchase costly imported state water. The AWPF will hopefully minimize these water purchases and reduced future water customer bills.

Firm's Capacity

RESUMES

In a separate attachment, we have included brief resumes for each of our team members as well as a description of their role on the project.

WORKLOAD

With the depth of 120 consulting professionals and, specifically, the current and anticipated workload of the individuals assigned to this project, we have the availability to provide the requested services in a timely and efficient manner to meet the scheduling requirements and objectives of MWDOC. As a rule, Raftelis operates at a company-wide project utilization of approximately 65% to 75%. This level of utilization, which we expect to continue through the proposed timeline of this project, will provide the project team with ample time to allocate to MWDOC's engagement.

Raftelis actively manages the distribution of our staff hours to ensure we allocate the necessary resources to meet the needs of each of our clients. Raftelis' executive and management team participate in a weekly conference call to review the number of consulting hours required to meet the needs of our clients during the upcoming week. This weekly meeting allows our project managers to deploy our consulting staff in a flexible manner that ensures a suitable level of hours will be devoted to each client.

Quality Control Process

QUALITY ASSURANCE/QUALITY CONTROL

Credibility is crucial for building consensus and support for implementing the recommendations of a study. The fastest way for MWDOC to lose credibility with your stakeholders is to provide information that is incomplete or incorrect. MWDOC must have total confidence that the information provided by the consultant is as accurate as possible.

Raftelis has developed a Quality Assurance (QA) process that consistently results in accurate deliverables of the highest quality. Each QA plan is tailored to the specific project, but there are a number of common elements such as senior-level participation, outside perspective, and involvement from project initiation. The QA plan that we will implement as part of this project embodies these elements. We have found that a well-defined QA plan ensures that our work products will be of the highest quality and meet or exceed the standards that our clients have come to expect from Raftelis. We have included time in the project approach and schedule to allow for the necessary QA reviews.

PROJECT MANAGEMENT/ADMINISTRATION

Raftelis employs several management strategies to heighten the effectiveness and efficiency of the services we provide to our clients. We place a high priority on being responsive to our clients, and, as we determine scope and staffing for each project, we carefully consider our workload and the availability of resources to meet client needs and project schedules.

Each week, the Raftelis management team participates in a conference call to review the number of consulting hours required to meet the needs of our clients during the upcoming week. This weekly meeting allows our project managers to deploy our consulting staff in a flexible manner that ensures a suitable level of hours will be devoted to MWDOC even during periods of accelerated deadlines and heavy work requirements.

Our project management conference calls provide Raftelis project managers with opportunities to effectively distribute work within a project. However, it is equally important that consulting hours spent on the project are tracked and compared to project budgets on a real-time basis. Raftelis uses project management software to monitor project progress, consulting hours, and budgets.

If selected for this project, we will conduct a comprehensive scoping meeting with MWDOC staff and our project team to discuss the work plan to ensure we are in agreement on how best to achieve MWDOC'S goals and objectives. This meeting will include a discussion of our proposed schedule and MWDOC's timing requirements for meetings, milestones, and deliverables so that our teams have a full understanding of what to expect on the project. Throughout the project, we will provide MWDOC with frequent updates so that you are constantly aware of the status of the project and our progress towards meeting milestones and deadlines.

Client#: 1722483 RAFTEFIN

ACORD CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 1/20/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer any rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Cameron M Harris & Co, LLC
Div USI Ins
6100 Fairview Road Ste 1400
Charlotte, NC 28210

CONTACT NAME: Joana Schlee-Dahmer
PHONE (A/C, No, Ext): 704-901-8656 FAX (A/C, No):
E-MAIL ADDRESS: joana.schlee-dahmer@usi.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : National Fire Insurance Co. of Hartford	20478
INSURER B : Continental Insurance Company	35289
INSURER C : American Casualty Company of Reading PA	20427
INSURER D : Continental Casualty Company	20443
INSURER E :	
INSURER F :	

INSURED
Raftelis Financial Consultants, Inc.
227 West Trade Street, Ste. 1400
Charlotte, NC 28202

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			6076000011	01/21/2021	01/21/2022	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$500,000
							MED EXP (Any one person)	$15,000
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							$
D	AUTOMOBILE LIABILITY			6076000025	01/21/2021	01/21/2022	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
B	X UMBRELLA LIAB X OCCUR			6076000039	01/21/2021	01/21/2022	EACH OCCURRENCE	$5,000,000
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$5,000,000
	DED X RETENTION $10000							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N			6076305637	01/21/2021	01/21/2022	X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N	N/A		6076000042 - CA			E.L. EACH ACCIDENT	$1,000,000
	(Mandatory in NH)						E.L. DISEASE - EA EMPLOYEE	$1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - POLICY LIMIT	$1,000,000
D	Professional Liab			652071235	01/21/2021	01/21/2022	$5,000,000 Limit	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

Raftelis Financial Consultants, Inc.
227 W. Trade Street Suite 1400
Charlotte, NC 28202-0000

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Paula B Bulman

Firm's Unique Qualifications

PROJECT APPROACH

We have developed the proposed approach based on our extensive experience in providing analytical solutions that meet the goals and objectives of the study, stakeholders, and legal environment. The approach below is an outline, however Raftelis will work with MWDOC to refine the approach once the specifics are determined. We have used a similar project approach on many of our analytical projects for utilities throughout California and the U.S.

Task 1: Project Initiation and Management

We believe that the execution of a productive kick-off meeting is the most effective way to begin a project of this nature. The goals for this meeting include:

- Providing a forum to finalize the scope of the project, work plan, and schedule with MWDOC staff
- Discussing MWDOC's goals and objectives
- Reviewing the data needs for the project

Accomplishing these objectives will help to ensure that the project progresses as smoothly as possible. Prior to the kick-off meeting, we will prepare a detailed data request list that will identify the information needed to complete the various analyses.

Analytical Framework

During the kick-off meeting, Raftelis will discuss the analytical framework to evaluate the different options MWDOC is interested in examining. The first step is to identify the issues to be examined. The next step is to ask which questions we want to answer. We will work with MWDOC staff to determine the appropriate questions so that they ensure a successful project. Once these steps are determined, Raftelis will collect the appropriate data and specify the type of Excel model to be developed.

Project Management

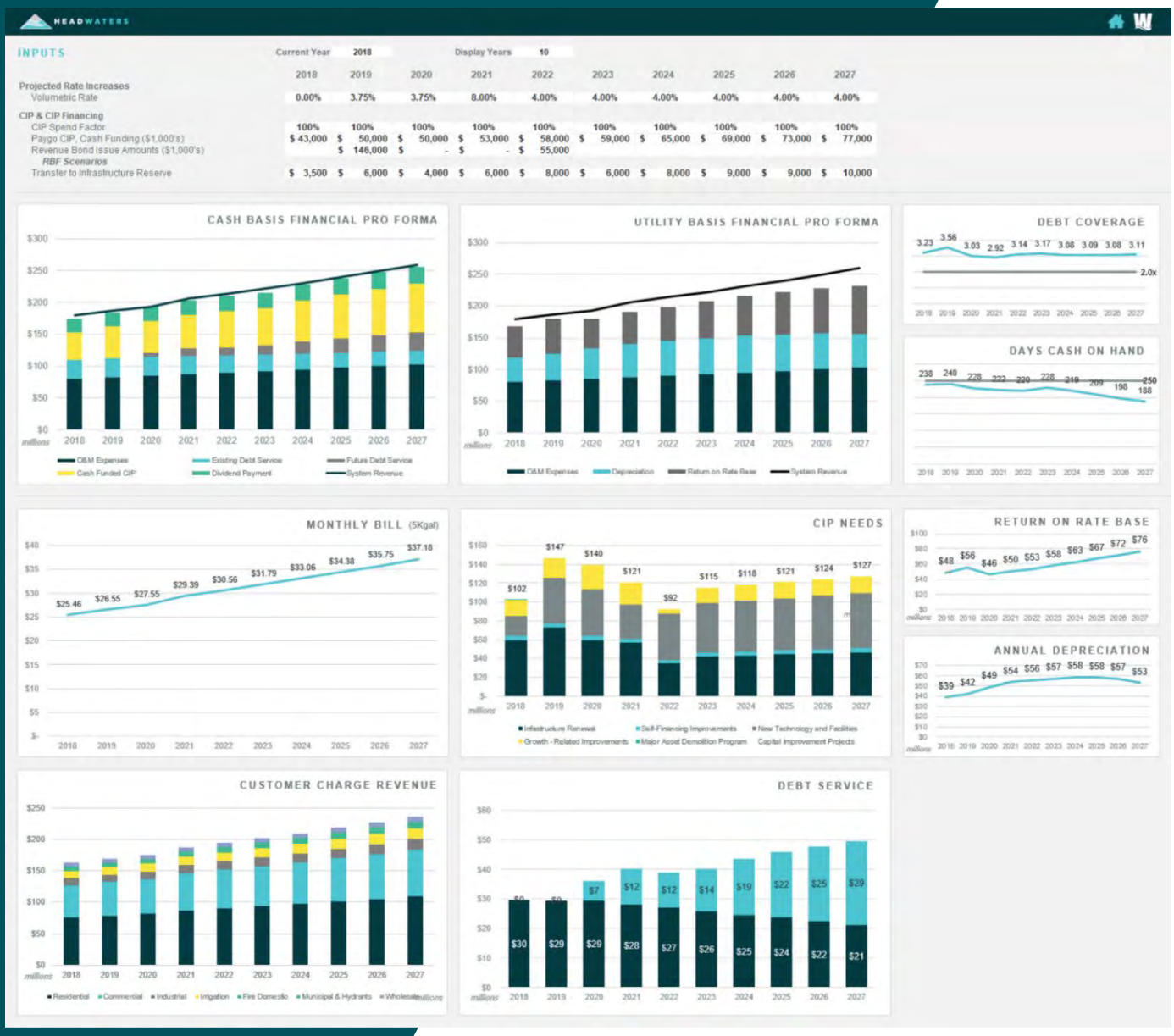
In order to successfully complete the project, Raftelis will be in constant communication with MWDOC staff regarding data requests, data validation, data decisions, and reviewing preliminary and final results. Much of this can be accomplished through conference calls, emails, and demonstrations using tools such as Microsoft Teams or GoToMeeting. These efforts facilitate consistent and competent project management to ensure that all deadlines and objectives are met in a timely and efficient manner. We believe in a no-surprises approach so that MWDOC is always aware of the project status.

Task 2: Analytical Model

Based on outcomes from Task 1, Raftelis will develop a document that summarizes our understanding of the issues that needs to be examined. MWDOC staff will review this document to ensure it is accurate and provide any correction as needed. Based on this information, Raftelis will develop the appropriate Excel model. The model will be tailored to the specifications of this project and will be non-proprietary. The model will be a deliverable to MWDOC. The model will include an interactive dashboard that has visualizations that will aid in decision-making, such as "what-if" scenario analysis. In addition, Raftelis will conduct sensitivity/risk analysis to have a better understanding of how outlier events could affect the results of the study. It is anticipated that there will be many different iterations of the model.

Raftelis will develop a customized analytical model for MWDOC that incorporates a dashboard to allow you to easily run scenarios and see the impacts in real time.

Shown below is a sample dashboard that we developed for another project.



Task 3: Workshops

With the development of the analytical model, Raftelis will conduct workshops with stakeholders and, if needed, Board members. Task 1 will have identified the process of how many workshops would be required and how to gain buy-in. Raftelis can either create a presentation material that shows the results of the model or even show the model live. Raftelis will discuss the pros and cons of showing the model live to stakeholders. Based on input from stakeholders and Board members, Raftelis will update the analytical tool. The goal of the workshop is to develop consensus on which solution makes sense. The analytical model will assist in guiding this process.

Task 4: Reports and Presentations

Draft Report

The draft report will document the process that took place, data and assumptions used, and provide any recommendations. An electronic copy of the draft report will be presented MWDOC staff for their review and comment.

Final Report

Raftelis will incorporate MWDOC staff's comments of the draft report into a final report. Upon finalization of the report, MWDOC will be provided an electronic copy of the report. In addition to the final report, MWDOC will also be provided with electronic copies of the final analytical model in Excel. If needed, Raftelis will also deliver a model training workshop for MWDOC staff.

Presentations

We will prepare a PowerPoint presentation summarizing the process, findings, and recommendations in a clear and concise manner. We will provide a draft of this presentation to MWDOC staff for their review and comment prior to delivering the final version.

Raftelis will also present our findings using this presentation and other outreach materials at a Board meeting or other public events.

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

Proposal for On-Call Technical Services to

SUPPORT RELIABILITY PLANNING, ENGINEERING & RESOURCE DEVELOPMENT

March 25, 2021

WOODARD &CURRAN

COMMITMENT & INTEGRITY
DRIVE RESULTS

24422 Avenida de la Carlota | Suite 180
Laguna Hills California 92653
www.woodardcurran.com

T 800.426.4262
T 949.420.5300

March 25, 2021

Charles Busslinger, PE
Director of Engineering/District Engineer
Municipal Water District of Orange County
cbusslinger@mwdoc.com

Re: Proposal for On-Call Technical Services to Support Reliability Planning, Engineering & Resource Development

Dear Mr. Busslinger:

Thank you for this opportunity to submit our qualifications for this On-Call Technical Services contract. We know that the MWDOC is facing a range of challenges, including risks and uncertainties surrounding State Water Project modernization efforts, the first ever Lower Basin shortage on the Colorado River, reliability impacts from climate change and regulatory requirements, and water quality challenges with integration of new supplies into Orange County's water system.

Our proposed team of technical experts and task managers, led by Persephene St. Charles, was curated to meet MWDOC's needs and be a trusted strategic partner in achieving its goals. At any time, our team can be augmented to provide additional services as needed. We believe our team is the right on-call partner for MWDOC for the following reasons:

1. We bring **extensive experience in the relevant disciplines** through our focus as a water and environment focused planning and design firm. We understand that funding is critical to the success of these projects.
2. Our team has **managed over 40 on-call service contracts** in California, with a robust history of acting in extension of staff roles for our clients. As a result, we know how to efficiently respond to task order requests and secure the right technical staff.
3. We value the partnership we share with our clients. This means being responsive to their needs, requests, and time pressures. From our office in Laguna Hills, **we can quickly and efficiently respond to MWDOC's needs.**
4. Our extensive **experience working with California water agencies** including the California Department of Water Resources and Metropolitan Water District has provided hands-on project familiarity and an understanding of the issues impacting MWDOC.

We greatly appreciate this opportunity. Please contact Persephene St. Charles at 213-223-9466 or pstcharles@woodardcurran.com if you have any questions.

Sincerely,

WOODARD & CURRAN

Persephene St. Charles
Vice President and Principal in Charge

SECTION 1

Firm Profile

Firm Profile

7 offices in California

Woodard & Curran Company, Inc.
24422 Avenida De La Carlota #180
Laguna Hills, CA 92653
P: 949.420.5300
Fax: 949.420.5301

Principal Contact:
Persephene St. Charles, Contract Manager
pstcharles@woodardcurran.com

Woodard & Curran has been at the forefront of water resources planning in California for the past 30 years. With over 120 water resource professionals across California, our team will provide the specialized expertise to meet MWDOC's needs, with local service through our office in Laguna Hills.

SECTION 2

Team Organization

Team Organization

Woodard & Curran has been serving utilities, cities, towns, and state governments for over 41 years. Today, we offer services beginning with studies, concept, and design, on through construction and operations to address our clients recycled and potable water, wastewater, stormwater, and civil engineering needs including:

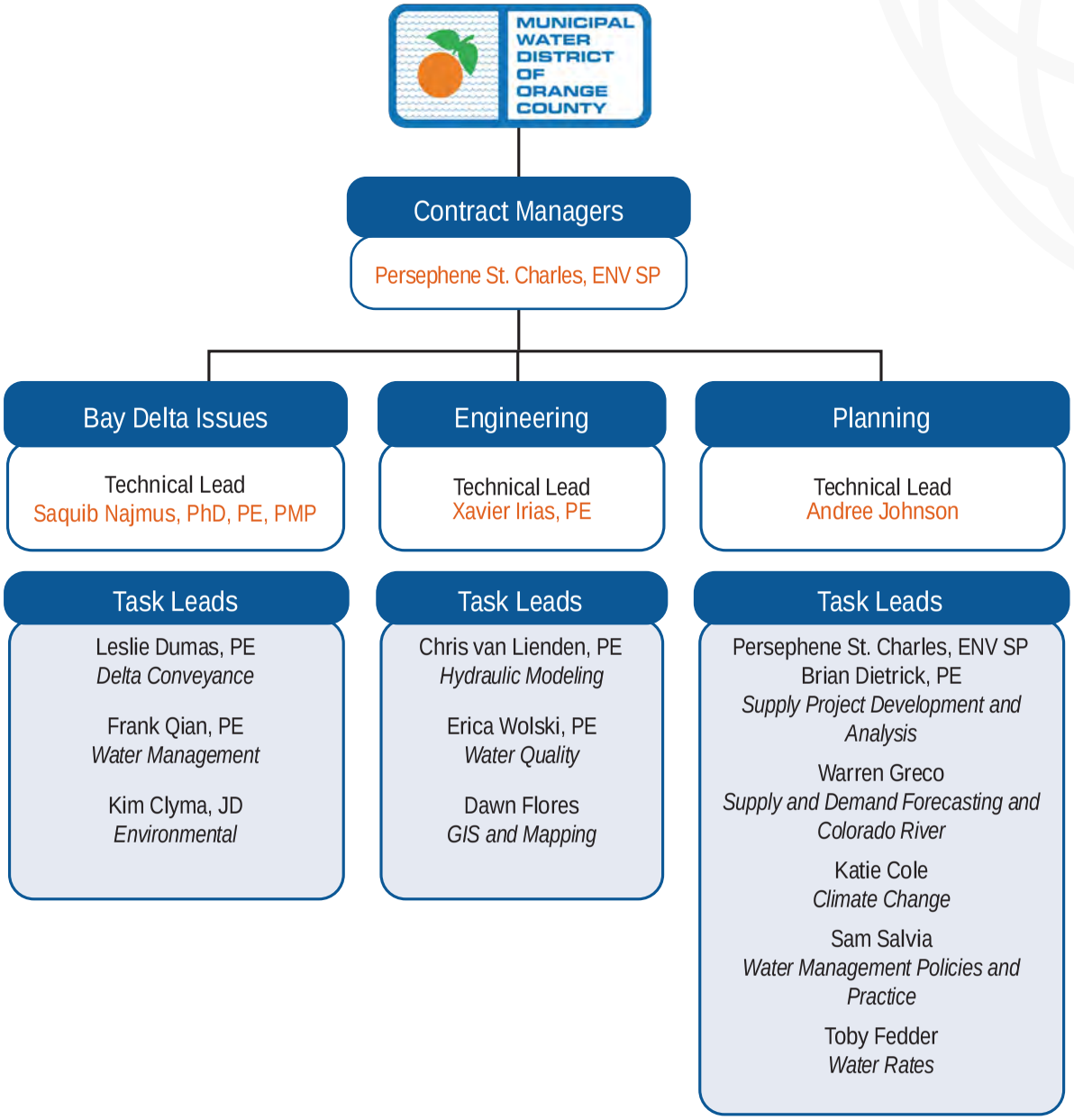
- water supply & treatment
- hydraulic and water quality modeling
- water distribution system design and operations
- water management policies, practices, and economics
- GIS & web-based information systems
- economic analysis of water reliability projects
- master planning
- indirect and direct potable reuse
- civil engineering
- operations & maintenance consulting services
- funding & grant assistance
- water resource planning
- water & environmental planning and management
- water recycling

A Leadership Delivering Innovative Solutions

With an experienced management team, MWDOC can be confident that Woodard & Curran will provide the necessary guidance for the project. Our team members have significant experience performing on-call engineering services and all staff members have the requisite training and proven track record to successfully ensure the completion of your projects.

Contract Manager, Persephene St. Charles, will have ultimate responsibility for this project and MWDOC's overall satisfaction with Woodard & Curran's work. She will be assisted by three **Technical Leads** who will be involved in the day-to-day activities regarding project development and communications with MWDOC's staff, technical decisions, and ensure quality management and overall performance. **Saquib Najmus** will be the Technical Lead for the Bay Delta Issues. He has several years of experience in hydraulic and water quality modeling consisting of the California Central Valley Simulation (C2VSim) and California Simulation of Evapotranspiration of Applied Water (Cal-SIMETAW). **Xavier Irias** will be the Technical Lead for the Engineering portion. As the former Director of Engineering for a major California water utility, Xavier has extensive experience developing and implementing capital programs and delivering complex projects while working with a variety of stakeholders through planning, design and construction. Lastly, **Andree Johnson** will be our technical Lead for the Water Reliability Planning. She has extensive expertise in water demand forecasting, water use efficiency program planning and implementation, drought management, and water supply planning and development. They will communicate regularly with Persephene who will coordinate with MWDOC and the project team to ensure continuity of the project and facilitate workshops with the operations staff.

Organization Chart



SECTION 3

Firm Description

Firm Description

Woodard & Curran is an integrated engineering, planning, science, and operations company. Privately held and steadily growing, we serve public and private clients locally and nationwide. Our company was founded in 1979 on a simple business concept: provide an enjoyable place to work with opportunity, integrity, and commitment, and we will attract talented people. Over the past nearly four decades, we have become an industry leader in the planning, design, and construction of water, wastewater, recycled water, stormwater, and food control projects. Our nationwide firm delivers a breadth and depth of services to meet today's complex water management needs, paired with local staff committed to making your needs their top priority.

We have in-house water and wastewater engineering and design disciplines as well as construction professionals with experience in all project delivery methods, including design-build. The firm has received numerous honors and awards, and we have ranked among Engineering News-Record's top 100 environmental firms every year since 2000.

Area of Expertise	Specialties
Engineering	▪ Water Distribution Design and Operations ▪ Hydraulic Modeling ▪ Water Quality ▪ GIS and Mapping
Water Reliability Planning	▪ Environmental and Water Resource Management ▪ Water Demand Forecasting ▪ Economic Analysis of Water Reliability Projects ▪ Climate Change ▪ Colorado River Issues ▪ Water Rates ▪ Water Management Policies and Practices
Water and Environmental Management/Planning (Bay -Delta Activities)	▪ Planning and Management of Habitat Ecosystems ▪ Water Quality and Water Management ▪ State Water Project planning and operations ▪ Delta Conveyance Project

Firm Description

43 On-Call Contracts

30 YEARS

supporting DWR on projects including Bay Delta planning and intiatives.

Woodard & Curran OPERATES OVER **80**

water, wastewater, and groundwater treatment facilities across the U.S.

FOUNDED IN 1979

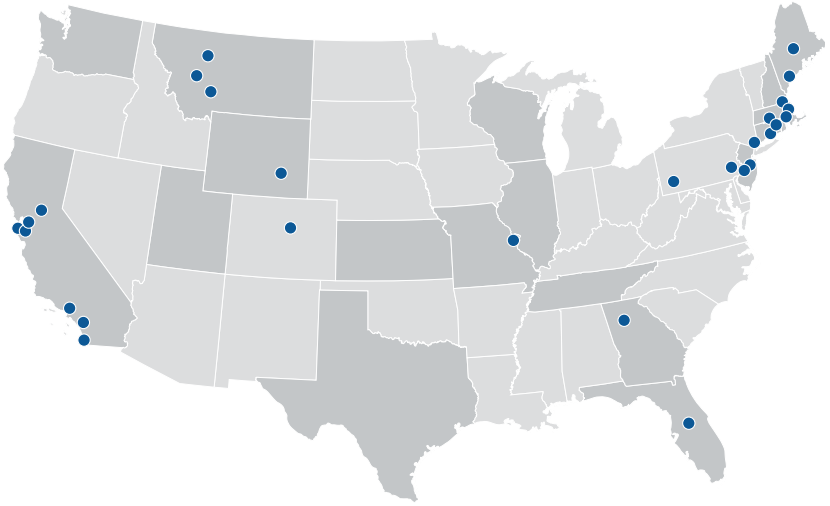
1,125 highly qualified **PROFESSIONALS**

CA Water Resource PROFESSIONALS **120**

28 OFFICE LOCATIONS across the United States

Including **7 offices in California**

Woodard & Curran recently **ranked No. 70** on the list of *Engineering News Record's* ***"Top 500 Design Firms"*** and is **ranked No. 28** among the California firms



Over the last 5 years, Woodard & Curran has applied for **$1.8 billion** in grants and loans. Approximately **$1.4 billion** dollars in grants/ loans were **awarded to our Clients.**

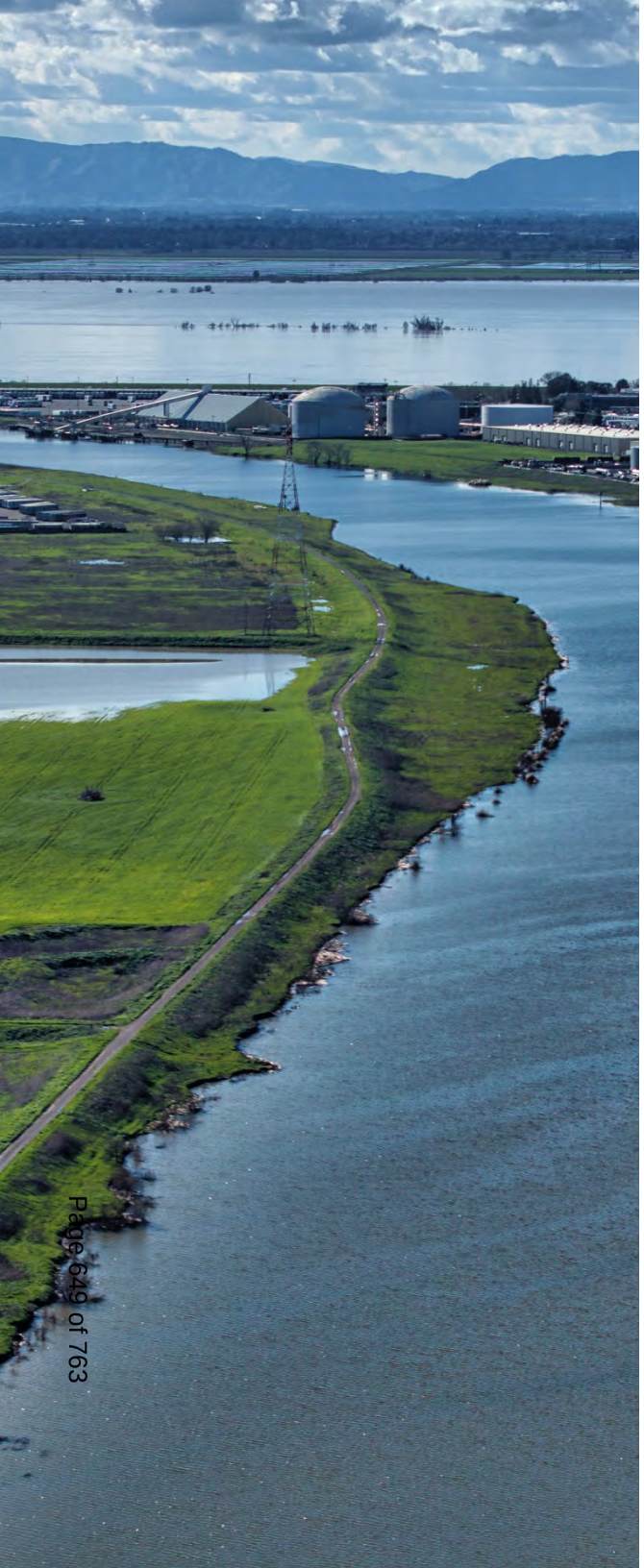
LAST THREE YEARS:

1,870 Total Clients

1,184 Government Utility Clients

SECTION 4

Firm's Capacity



Firm's Capacity

Project Team

Woodard & Curran's experts have extensive experience delivering services for a wide range of projects: from small-scale work to large, complex, multi-service contracts. We have a successful track record of generating innovative and creative solutions that enable projects to advance beyond otherwise-insurmountable obstacles.

We at Woodard & Curran pride ourselves in the number and duration of long-term client relationships we've maintained through diligence, rigor, and attention to client needs. Most recently, these relationships have been enabled through a wide array of On-Call contracts. Many of these On-Call contracts have been awarded successfully due to our history of performance. Below is a map showing our successful On-Call contract clients.

- Anaheim
- Berkeley
- CCCSD
- Delta Diablo
- Fullerton
- Gilroy
- Lancaster
- Los Angeles
- Milpitas
- Modesto
- Pacifica
- Palo Alto
- Pittsburg
- Redwood City
- Sacramento
- San Clemente
- San Francisco
- San Carlos
- San Jose
- San Mateo
- Santa Clara
- Santa Rosa
- San Diego
- Los Angeles, Department of Public Works
- Castaic Lake Water Agency
- Coachella Valley Water District
- County of San Mateo
- East Bay Municipal Utility District
- Eastern Municipal Water District
- Encina Wastewater Authority
- Los Angeles County Waterworks
- Orange County Sanitation District
- Pasadena Water and Power
- Placer County
- Regional San (SRCSD)
- Riverside County Flood Control and Water Conservation District
- San Francisco Public Utilities Commission
- Santa Clara Valley Water District
- Sonoma Water (SCWA)
- State of CA, Department of Water Resources
- Union Sanitary District
- U.S. Bureau of Reclamation
- Zone 7 Water AGency
- Walnut Valley Water District
- Yucaipa Valley Water District

We have the staff available to meet MWDOC's needs. On the following pages we have provided biographies and project highlights for each of our team members including their availability. Our entire project team is listed on the organizational chart in Section 2.

Persephene St. Charles | Contract Manager

Availability: 20%

"Thanks so much for all of your time, patience, consideration and professionalism. It is always a pleasure to work with Woodard-Curran."
- Nichole Horton, City of Pomona

Persephene brings over 20 years of experience leading local and regional planning projects focused on water supply, water quality, recycled water, stormwater, food protection, and watershed issues throughout California. She is an expert in facilitating collaborative processes to develop regional multi-party water supply projects and programs that provide multiple benefits.

As our proposed contract manger, Persephene will work directly with MWDOC staff to understand the services and support that are needed and facilitate development of scope and budget proposals to meet those needs. As a Senior Principal at Woodard & Curran, Persephene often serves as contract manager on large as-needed service contracts. Examples include:

- **Los Angels County Department of Public Works:** Water Resources Engineering As-needed (2 contracts, 20 task orders, $10M)
- **West Basin Municipal Water District:** Greater Los Angeles County IRWMP (2 contracts, $2M)
- **Pasadena Water and Power:** Engineering As-needed (3 contracts, 40 task orders, $10M)
- **LA Department of Water and Power:** Recycled Water Master Plan (1 contract, 15 task orders $11M)

As Woodard & Curran's National Practice Leader for Water Resources, Persephene is uniquely qualified to provide alignment of MWDOC's needs with Woodard & Curran's staff resources to ensure that we are providing the highest level of service and expertise. In addition, Persephene will be available to provide her technical expertise in the development and evaluation of water supply concepts and ideas of interest to MWDOC. Through her work with well over 100 water-related agencies and groups throughout Southern California, Persephene has a strong understanding of how water is managed through the region given our unique hydrologic, engineered, political systems. She has worked with multiple regional groups on developing creative water supply opportunities that involve tapping into our complex systems to find opportunities where we can work together to improve cost effectiveness, resilience, sustainability of our water resources and infrastructure. Examples include:

- **Los Angeles County Water Plan:** Working with LA County Public Works staff to develop a new planning process to enhance regional project/program development in support of a consistent vision for the future of collaborative water management in LA County
- **Support of Southern California IRWMPs:** (GLAC, Antelope Valley, San Diego, SAWPA, Coachella Valley, Santa Barbara County Upper Santa Margarita Watershed): Providing a variety of project development, regional planning and implementation strategy and funding support services to several regions since 2006.
- **Water Supply/Resources Planning:** (e.g. City of Pomona, Pasadena Water & Power, County of Santa Barbara): worked with groups to develop integrated water supply alternatives and ideas, assess technical viability, as well as support prioritization through cost effectiveness, cost/benefit, and triple bottom line analysis.

Saquib Najmus, PhD, PE, PMP | Bay Delta Issues: Technical Lead

Availability: 20%

Dr. Saquib Najmus, a recipient of the prestigious Hugo Fischer Award from the California Water and Environmental Modeling Forum, has more than 30 years of experience in water resources planning and management. Saquib is an industry leader in water budget development and integrated groundwater and surface water modeling in California. Saquib is currently the project manager for the groundwater modeling and analysis component of the Delta Conveyance Project EIR/EIS project of DWR. He is the original developer of the California Central Valley Simulation (C2VSim) model coarse grid, which is used by DWR's Bay-Delta Office in analyzing the impacts SWP and CVP operations on groundwater in the Central Valley. He has co-developed, with California Department of Water Resources (DWR), the concept of systems-based approach (land, surface water and groundwater systems) to water budget development that culminated in the "Handbook for Water Budget Development: With or Without Models" published by DWR in 2020. He has been working with the California Department of Water Resources (DWR) as a key consultant for the Integrated Regional Water Management (IRWM) and Sustainable Groundwater Management (SGM) programs since their inception. He is the consultant team project manager for the development of California's Groundwater (Bulletin 118) Update 2020, published by DWR in March, 2021.

Project Highlights:

DWR, CA – Delta Conveyance Project EIR/EIS, Groundwater. Project Manager. Currently leading the development of a integrated groundwater and surface water model for the Delta area to evaluate the impacts of Delta Conveyance Project alternatives on groundwater. He is also Principal-in-Charge for the groundwater chapter for the Delta EIR/EIS, coordinating with the CalSim team and other EIR team members on project alternatives definition, and analysis and evaluation of groundwater impacts, including threshold of significance.

DWR, CA – California's Groundwater (Bulletin 118) Update 2020 Project Manager. Worked as a member of the core team in designing and developing content and analysis of Bulletin 118 Update 2020. Worked with DWR in developing findings and recommendations for achieving statewide sustainable groundwater management goals.

DWR, CA - Water Budget Framework Project. Project Manager currently working with DWR in developing a water budget framework for watershed-based water budget. He analyzed and mapped the Water Portfolio data for DAU Counties with reference to C2VSim model subregions. Saquib developed recommendations for IWFM enhancements and C2VSim enhancements to achieve consistency with the common vocabulary.

DWR, CA – Water Sustainability Atlas. As Principal-in-Charge, led the design and development of the DWR's online Water Sustainability Atlas (Atlas) to support the California Water Plan and Integrated Regional Water Management (IRWM) programs. The statewide GIS-enabled Atlas assists DWR in meeting strategic initiatives and serve and benefit multiple programs and stakeholders across jurisdictions. The Atlas will collect and present data from local agencies and will summarize IRWM accomplishments, investment needs, and outcomes and also track the system performance.

DWR, CA – Sacramento Valley Simulation Model (SVSim). Project Manager currently working with DWR in developing an IWFM application for the Sacramento Valley with a special focus on evaluating the impacts of groundwater substitution transfers on stream depletion and providing the starting point for estimating water budgets at the scale of groundwater sustainability agency (GSA) in Sacramento Valley.

DWR, CA – Groundwater Impact Analysis in Kern County for Monterey Plus-Revised Environmental Impact Report (EIR). As Project Manager, evaluated the impact of Kern Water Bank (KWB) operations on groundwater. This groundwater impact analysis is being conducted as part of the CEQA work for the Monterey Plus Revised EIR.

Leslie Dumas, PE | Delta Conveyance

Availability: 30%

Leslie has 30 years of experience and is a hydrologist, water resource engineer and project manager providing hydrogeologic, hydrologic, environmental and scientific consultation for projects throughout the United States. She has managed multi-disciplinary teams on a wide variety of projects, including water resources planning, groundwater investigation, modeling, resource planning, environmental permitting, and stormwater planning. She has prepared and/or reviewed planning and environmental documentation, including CEQA Initial Studies and Environmental Impact Reports, Urban Water Management Plans, Groundwater Management Plans, and Stormwater Pollution Prevention Plans for various civil projects, and has worked extensively in the San Joaquin Valley and San Francisco Bay Area.

Project Highlights:

Department of Water Resources (DWR), CA – Delta Conveyance Project EIR. Preparing analyses relating to groundwater-related impacts associated with changes in groundwater elevations and storage, movement of groundwater plumes, and other potential impacts from the construction and operation of new intake facilities along the Sacramento River and new conveyance facilities, including a tunnel to convey water from the new intakes to the existing SWP Banks Pumping Plant.

San Luis & Delta-Mendota Water Authority, CA – Northern & Central Delta-Mendota Region Groundwater Sustainability Plan Preparation and Subbasin Coordination. Project Manager responsible for working with SLDMWA in coordinating the development of six GSPs for the Delta-Mendota Subbasin. The project required detailed understanding of Central Valley Project operations, impacts to CVP and SWP infrastructure, and understanding of the interrelationships between groundwater and surface water.

Frank Qian, PE | Water Management

Availability: 35%

Frank's work focuses on water resources engineering and hydrologic modeling. His experience includes setting-up water resources models and software such as a MODFLOW, Integrated Water Flow Model (IWFM), macro-scale hydrologic model (VIC), and the integrated surface water and groundwater model (SacIWRM).

Project Highlights:

DWR, CA - Water Budget Handbook and Dashboard. Frank was a primary author of the Handbook for Water Budget Development and developed mapping between IWFM and MODFLOW model outputs and the water budget schematic. The framework established in the handbook serves as the basis for the development of the companion Water Budget Dashboard, a tool for visualizing and communicating water budget data.

Sacramento County Flood Control Agency, CA – Groundwater Recharge Site Assessment. Conducted a recharge feasibility analysis to determine recharge potential sites along the Folsom South Canal.

South Valley Water Resources Authority – Groundwater Banking Screening Analysis. Evaluated water districts and entities for water rights and contracts, water sources, potential project yields, and conveyance infrastructure to determine potential partners for developing groundwater recharge projects.

Kim Clyma, JD | Environmental

Availability: 25%

With over a decade of environmental science and planning experience, Kim thrives on finding solutions that benefit her clients, the environment, and their communities. She has managed and contributed to a variety of assessment, planning, design, and permitting projects across disciplines and sectors but focused on water and hydropower. Emphasizing her work on complicated multifaceted projects Kim has conducted constraints analyses, CEQA/NEPA reports (EIRs, EAs, IS/MNDs, CEs, ERs, etc.), alternative analyses, permitting strategies and applications (CWA 401, 402, 404, CDFG 1602, CVFPB Encroachment Permits, Williamson Act, local codes, FAA, FERC), technical and field studies (water quality, visual, biology, air quality, cultural, farmlands, noise), engineering environmental support, and spatial analyses. Kim's unique perspective obtained from her involvement in the realms of water and environmental law results in the production of strategic solutions, defensible documents, and unique compliance strategies.

Project Highlights:

Department of Water Resources, CA - State Water Contractors Water Fix Contract Amendment Environmental Impact Report. Environmental Planner involved in project scoping and development of this environmental impact report to support contract amendments to the state water contractors State Water Project contract amendments. Kim was tasked with preparation of the Hazards and Hazardous Materials as well as Geology and Soils sections of the Environmental Impact Report looking at future water operation conditions and potential impacts resulting from operations.

California American Water Company, CA - Capital Improvement Program Permitting Strategy. As Environmental Planner, supported development of CalAm's CIP process by preparing a permitting needs strategy. Review included federal, state, and local permitting requirements for this Public Utility regulated by the CPUC. Kim provided review and identification of potential permits required including local entitlements, CPUC, State Water Board and CEQA requirements, and potential Federal Funding and waters requirements.

Bureau of Reclamation, CA - Upper San Joaquin River Storage Basin Investigation Supplemental Draft Environmental Impact Statement. NEPA Coordinator oversaw preparation of the Supplement to the Draft Environmental Impact Statement prepared for the Bureau of Reclamation for this new water reliability project in the San Joaquin Watershed. The supplemental review continues to support the evolving feasibility report and evaluate the new alternative for the proposed Temperance Flat Reservoir within Millerton Lake upstream of Friant Dam. Kim managed over ten key staff on development of updated technical analysis for areas such as hydrology, groundwater, socioeconomics, and fisheries resources all while assisting the Bureau of Reclamation with complying with and implementing NEPA streamlining procedures. Supplemental review includes review of water operations, delivery, and infrastructure throughout the Central Valley including operations of the Central Valley Project and San Luis Reservoir.

Xavier Irias, PE | Engineering: Technical Lead

Availability: 25%

Senior Technical Practice Leader Xavier Irias has more than three decades of experience planning, designing and managing water systems. As the longtime chief engineer for East Bay MUD in Oakland, Xavier directed many complex planning studies and risk assessments for EBMUD's large water system which includes over 4,000 miles of pipe, 30 dams, 160 tanks and 124 pumping plants. Among his responsibilities was the development and execution of a $2B capital five-year plan. Now at Woodard & Curran, his work includes leading the Water System Master Plan for Marin Municipal Water District as well as lead roles on several other projects including risk assessment, system modeling and simulation, and complex alternatives analysis.

Project Highlights:

Del Puerto Water District and San Joaquin River Exchange Contractors, CA – Del Puerto Canyon Reservoir Project. Performed QC review of 30% design of conveyance facilities. The project included a 300 cfs pumping plant, approximately one mile of 84" diameter steel pipe, and a tie-in to the Delta Mendota Canal.

City of Brentwood, CA - Brentwood Wastewater Plant Expansion. As Project Manager during construction, Xavier oversaw $50M in improvements including new basins, aeration blowers, secondary clarifier, and various upgrades to existing systems.

Santa Clara Valley Water District, CA - Upper Llagas Creek Flood Control Improvements. Project manager of $150M project that makes major flood control improvements along 14 miles of channel. Elements include a large-diameter tunnel, earthwork and creek restoration, utility relocation, and large concrete box culverts. Phase 1 was awarded in July 2019 and is under construction. Phase 2A will bid in summer 2020.

Chris Van Lienden, PE | Hydraulic Modeling

Availability: 30%

Chris has experience in water, wastewater, and stormwater infrastructure projects, including system evaluation, modeling, and design. He is currently the operations lead for Woodard & Curran's hydraulic modeling and master planning group in California and has led hydraulic model development for a variety of project sizes and types for municipal agencies throughout California. Chris has extensive experience in data analysis and report writing, and technical software skills including InfoWorks CS and ICM, WaterGEMS, H2Omap Water and Sewer, InfoWater, InfoSewer, InfoSWMM, HEC-RAS, ArcGIS, and other analysis tools. Over the past 10 years, Chris has completed model development and master plans for Central Contra Costa Sanitary District (Central San), City of San Mateo, Town of Hillsborough, City of Roseville, Delta Diablo Sanitary District, Fair Oaks Sewer Maintenance District (San Mateo County), Novato Sanitary District, and supported many others.

Project Highlights:

Town of Windsor, CA – Water Master Plan Update. Project Manager for the model updates, which also included an update of the Town's existing and future demands, and is using the results of the analysis to develop a 20-year CIP.

City of Anaheim, CA – Water System Model Update. Reviewed the implementation of model revisions and confirmed calibration accuracy, and reviewed the model documentation.

Erica Wolski | Water Quality

Availability: 30%

Erica has 20 years' experience specializing in drinking water and recycled water regulatory compliance. In addition to her consulting engineering experience, she has worked for the State Water Resources Control Board, Division of Drinking Water in the field operations branch and in the Recycled Water Unit. Her project experience includes the design of water and wastewater treatment facilities, assistance with the DDW and RWQCB permitting. Erica tracks upcoming water quality regulations for emerging contaminants, such as PFAS, and microplastics, closely for Woodard & Curran and its clients and makes recommendations for how to integrate these requirements into their existing water quality monitoring plans. While working at DDW, she inspected and permitted water systems, assisted in developing drinking water and recycled water policy, and gave presentations on behalf of DDW.

Project Highlights:

Vallecitos Water District, CA – Evaluation of San Marcos Valley Groundwater Basin Supply Options. Project Manager reviewed the use of the basin as a source of non-potable irrigation water, source water for a drinking water desalter and for potential use for groundwater recharge and extraction of advanced treatment recycled water.

Los Angeles Department of Water and Power, CA - Headworks Direct Potable Reuse Evaluation. Ms. Wolski is the task lead for development of the Roadmap Technical Memorandum which lays out the assessments needed and proposed schedule for LADWP to construct a 1.0 mgd DPR demonstration facility and later modify it into a 1.0 to 10 mgd full scale DPR facility for discharge to the Headworks Reservoir Complex. Other assessments involved with include source water quality evaluation including for NDMA and DBP formation and integration of the advanced purified effluent into the drinking water system, including corrosion control, nitrification, disinfection residual stability and DBP formation.

Yucaipa Valley Water District (YVWD), CA - DDW Permitting and Other Regulatory Assistance. Project Engineer assisting with the permitting process for the District's water treatment plant which began operation in 2007. Erica also prepare YVWD's triennial Public Health Goal reports and fluoridation cost reporting.

Dawn Flores | GIS and Mapping

Availability: 25%

Dawn has over 13 years' experience in water resources planning and management. She has extensive experience in GIS analysis and advanced data analysis. She has served as a company GIS lead, providing direction on best practices for mapping and spatial analyses, and developing processes and procedures to support water resources planning. Dawn has applied spatial analysis solutions to projects ranging from spatial projection of demands for use in hydraulic models to developing maps to preparing "heat maps" of nonpotable demand density to delineating watersheds. In addition, she has extensive experience in preparing maps for use in technical reports, public facing documents and presentations.

Dawn is also experienced in applying climate risk analysis to water resources planning. She has conducted qualitative climate change vulnerability analyses as part of regional planning, including IRWMPs and a vulnerability study prepared for the Metropolitan Water District of Southern California. She has also incorporated quantitative climate change analyses into long-range water supply planning studies. For example, Dawn is currently managing a supply reliability study being prepared for California Water Services that is incorporating climate change assumptions into modeling scenarios.

Project Highlights:

City of Los Angeles Department of Water and Power (LADWP), CA - Los Angeles Recycled Water Master Plan. GIS Specialist maintaining a GIS database, analyzing spatial data and creating project maps. An in-depth master plan for utilization of recycled water across the City of Los Angeles is being created.

City of Pomona, CA – Strategic and Master Planning. Deputy Project Manager for development of the City's 2018 Strategic Plan, Water and Wastewater Master Plans, and Integrated Water Supply Plan Update. Dawn assisted in facilitating workshops with City staff to perform a SWOT analysis, developed objectives and targets, and drafted the Strategic Plan for the water and wastewater department. Dawn was responsible for development of the Integrated Water Supply Plan (IWSP) update, which included facilitating workshops with City staff, revisions to current and projected baseline supplies, analysis of potential supply and facility options, and development of alternatives that reflect the City's desire to both increase supply independence and contribute to regional water supply security. Dawn was also responsible for development of the Water Master Plan, which included coordination with a hydraulic modeling team and software development team, coordination with City staff to obtain data and modeling criteria, development of demand projections, and development of a CIP project list.

West Valley Sanitation District, CA - 2012 Project Prioritization Process Update. GIS Specialist responsible for conducting a GIS analysis to develop scores related factors such as land use, road type, stream distance, accessibility, and diameter. Woodard & Curran worked with West Valley Sanitation District to complete a risk evaluation of its sanitation system for use in the prioritization of projects.

California Water Services - Bay Area Regional Water Supply Reliability Study – Project Manager responsible for preparing a supply reliability study that incorporates supplies and demands for Cal Water's four service areas located in the Bay Area.

Indio Subbasin Alternative Plan Update – Serving as support for development of demand projections, supply projections, and plan scenario development.

Andree Johnson | Technical Lead: Planning

Availability: 30%

Andree brings more than 14 years' experience in water resources planning and management. She has extensive expertise in water demand forecasting, water use efficiency program planning and implementation, drought management, and water supply planning and development. She specializes in the management of complex multi-agency projects and programs, working with a variety of stakeholders to meet individual needs and achieve collective benefits. Andree has previously worked with MWDOC on a variety of water planning efforts, including the integration analysis for the Huntington Beach desalination project and the 2010 Urban Water Management Plans, and brings a strong understanding of Orange County's unique water supply challenges and opportunities.

Prior to joining Woodard & Curran, Andree served was a Senior Water Resources Specialist for the Bay Area Water Supply and Conservation Agency, a regional agency similar in structure to MWDOC, where she managed implementation of the Long Term Reliable Water Supply Strategy, including evaluation of new water supply projects such as water transfers, investments in regional storage facilities, and indirect potable reuse projects. Andree led BAWSCA's Regional Demand and Conservation Study, which prepared individual water demand forecasts and conservation savings estimates for each of BAWSCA's 26 member agencies incorporating impacts of climate change, demand hardening, and economic conditions. Andree also managed development of BAWSCA's Conservation Strategic Plan, which developed the approach for complying with the new statewide water use efficiency requirements, as well as implementation of the Regional Water Conservation Program for 26 water providers. She is experienced in the development and implementation of drought response and water conservation regulations and is a member of DWR's Standards, Performance Measures, and Methodologies Workgroup. She also provides water policy leadership as Board Secretary for the Urban Water Institute.

Project Highlights:

Los Angeles County Water Plan – Managing development of plan for the County's water resources future, which includes organizing and facilitating technical workgroups and stakeholder coordination meetings, leading technical analysis of water resources challenges and solutions, developing plan to identify strategies and actions to address the identified challenges, and overseeing development of the planning portal.

Bay Area Water Supply and Conservation Agency – Providing ongoing strategic support on a variety of water supply planning and water use efficiency efforts, including AB 1668 and SB 606 implementation, demand forecasting, water reliability analysis, drought planning, and conservation program development.

Municipal Water District of Orange County & Poseidon Resources, CA – Lead analyst for a series of studies evaluating methods, costs, and institutional arrangements for integration of desalinated water into Orange County's water supply. Analyzed demand patterns and system operations for each of the 19 agencies interested in participating in the project. Examined "wheeling" issues associated with the use of existing facilities and prepared cost estimates. Identified institutional arrangements for water exchange agreements and evaluated the potential reliability impacts.

Orange County Water District, CA – Facilitation of Joint Agency Working Group on Annexations. Facilitator for a working group of Orange County Water District (OCWD) and its 19 member agencies to establish an agreement for potential annexation of additional lands into the OCWD service area. Perform analysis of annexation policies and financial impacts and water supply impacts to OCWD's member agencies. Lead bi-weekly forums to discuss the annexations and associated issues.

Brian Dietrick, PE | Supply Project Development and Analysis

Availability: 25%

Warren is a water resource planner with more than 12 year of experience in integrated resource management with a focus on dynamical systems models and other decision support tools. Warren brings prior experience from wholesale water providers in Arizona and Southern California. At the Central Arizona Project he was part of small team responsible for long-range water resource planning, policy analysis, and program development. With the Municipal Water District of Orange County he provided analysis of policies and programs at Metropolitan Water District of Southern California as well as regional water resource planning. Warren's recent works has included the development of a water demand projections and conservation tool for Woodard & Curran, including tracking and technical analysis on the implementation of the state-wide Urban Water Use Objectives, the use of GoldSim and RiverWare software for reliability planning, and climate change reliability and vulnerability assessments.

Project Highlights:

Santa Ana Watershed Project Authority (SAWPA), CA - Santa Ana River Conservation and Conjunctive Use Program (SARCCUP). Co-project manager for the SARCCUP program management. The Program focuses on banking 150,000 AF to 180,000 AF of wet year water in multiple groundwater basins and providing the extraction facilities and linkages to allow up to 60,000 AFY of banked water to be utilized by all five agencies during dry water year conditions. The $160 million Program is being funded by a combination of $55 million in Proposition 84 grants and $105 million in local funding. The Program also includes in-stream conservation efforts (Arundo removal), water use efficiency programs, and environmental habitat enhancements for the endangered Santa Ana Sucker.

The Perris North Basin Groundwater Contamination Prevention and Remediation Program. Program Manager. This remediation program was developed to address areas of contamination in the Perris North Basin that have forced the shutdown of wells, threatened potable water supply wells, or have the potential to threaten contamination of existing or future water supply well sites. This multi-benefit program will prevent the spread of contamination in the Basin by extracting and treating contaminated groundwater near the source of contamination, accelerating the cleanup of contamination through the use of active treatment, and protecting areas of the Basin not contaminated by intercepting and remediating plumes before they reach potable wells. The Program includes seven new extraction wells at six new locations, with treatment facilities co-located at three of the sites. The Program also includes a network of new monitoring wells. EMWD was awarded a $45 million grant through the SWRCB's Proposition 1 Groundwater Grant Program (GWGP) to fund the $90 million program.

Eastern Municipal Water District (EMWD), CA - Recycled Water Strategic and Master Plan. Project Manager evaluated options to achieve zero year-round discharge as flows from four wastewater treatment plants increase from 45,000 AFY to 80,000 over 30 years. The plan focuses on options to implement over 20,000 AFY of groundwater recharge via surface spreading, 10,000 AFY of large landscape irrigation, and 10,000 AFY of agricultural irrigation. The plan was successful in avoiding the need for new seasonal storage, limiting the need for elevated storage, and removing $70 million of projects from the previous CIP.

Warren Greco, PE | Supply and Demand Forecasting and Colorado River

Availability: 20%

Warren is a water resource planner with more than 12 year of experience in integrated resource management with a focus on dynamical systems models and other decision support tools. Warren brings prior experience from wholesale water providers in Arizona and Southern California. At the Central Arizona Project he was part of small team responsible for long-range water resource planning, policy analysis, program development, and led the analysis of the Colorado River water management issues. With the Municipal Water District of Orange County he provided analysis of policies and programs at Metropolitan Water District of Southern California as well as regional water resource planning. Warren's recent works has included the development of a water demand projections and conservation tool for Woodard & Curran, including tracking and technical analysis on the implementation of the statewide Urban Water Use Objectives, the use of GoldSim and RiverWare software for reliability planning, and climate change reliability and vulnerability assessments.

Project Highlights:

Marin Municipal Water District – Providing updates, customization, and training for the GoldSim model of the District's supply system and a reliability analysis for the District's Urban Water Management Plan and Water Shortage Contingency Plan.

City of Oceanside Urban Water Management Plan and Water Shortage Contingency Plan – Finishing and update the UWMP WSCP using Woodard & Curran demand and conservation tool and the Alliance for Water Use Efficiency Tracking Tool.

Cachuma Conservation Release Board & City of Santa Barbara – Providing RiverWare modeling and other supporting technical services to simulate the operations of Lake Cachuma under a range of operational scenarios in support of water supply and fisheries analyses, including water supply reliability under climate change.

Indio Subbasin Alternative Plan Update – Developing water demand and conservation assumptions and water supply impacts under climate change for the Sustainable Groundwater Management Act.

Katie Cole | Climate Change

Availability: 25%

Katie has 8 years of experience and specializes in regional and integrated planning efforts; conservation and potable offset work; and funding tracking, identification, application, and administration. She works with her clients to understand how climate change and other risk factors may impact water supplies, infrastructure, and her client's ability to meet customer demands. Katie is experienced in identifying and evaluating strategies for reducing future consumptive water use and in evaluating water sources and developing projects and programs to balance water supplies. Known for effectively communicating with diverse stakeholder groups, Katie enjoys working through the collaborative process to arrive at multi-benefit solutions

Project Highlights:

San Francisquito Creek Joint Powers Authority, CA - FEMA Hazard Mitigation Grant Program Grant Applications. Project Manager responsible for overseeing the strategy and development of benefit-cost ratios for two flood mitigation grant applications submitted to the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP). Work included developing a strategy for the benefit-cost ratio, collecting data and references related to historical flood damage costs, and using FEMAs BCA toolkit to develop benefit-cost ratios for a Creek Widening project and Coastal Levee project, both of which will mitigate the negative impacts of flooding. Once fully implemented, the projects will help remove residential and commercial areas from the 100-year floodplain with 3 feet of sea level rise.

Marin Municipal Water District, CA - Water Resources Plan 2040. Project Planner responsible for developing and analyzing options to improve MMWD's resiliency to ensure that it can continue to provide reliable, high quality water to its customers. The plan defines measures needed to maintain resiliency through climate change, extended droughts, and other unforeseen events. To develop the plan, Woodard & Curran developed a hydrologic model using GoldSIM that included MMWD's supply system and defined future supply vulnerabilities.

San Francisco Public Utilities Commission, CA - Ocean Beach Project Implementation Support. Project Manager responsible for outreach and facilitation support for the Ocean Beach Coordination Team, a working group of over 10 city agencies responsible for implementing projects that support the Ocean Beach Master Plan. The Ocean Beach Master Plan is a comprehensive vision to address sea level rise, protect coastal infrastructure, restore coastal ecosystems, and improve public access. Katie provides ongoing support to the Coordination Team by preparing for monthly Coordination Team meetings, developing outreach materials for the public, and organizing meetings with the larger Steering Committee.

Sam Salvia | Water Banking and Exchanges

Availability: 15%

Samantha is a civil engineer with more than 15 years' experience in water resources management, planning, and environmental compliance. Samantha combines a technical background in surface water and operations modeling with practical experience in water resource management issues. Her experience working in the public sector provides her an understanding of water agency and client perspectives. While a principal engineer at the Contra Costa Water District, Samantha led the District's $100 million capital project to build a new Delta drinking water intake from project planning through design. As a consultant, she provides clients with strategic guidance and oversees water resources planning efforts for complex, multi-benefit and multi-agency projects. Her work involves all aspects of water resources including groundwater, drinking water, wastewater, surface storage, and desalination. She especially enjoys helping clients navigate strategic planning and communication during project development to set projects up for successful implementation.

Project Highlights:

Merced Subbasin GSP Implementation – Managing GSP implementation, which includes organizing and facilitating GSA and stakeholder coordination meetings, pursuing of grant funding, developing plans to address data gaps and assess ongoing groundwater consumptive use, and supporting development of an allocation framework and demand reductions.

Sac Regional Harvest Water – Overseeing development of a framework for groundwater accounting for the Harvest Water conjunctive use program.

City of Antioch Brackish Water Desalination Project – Serving as an extension of City staff, Samantha helped shepherd the project through planning and design, representing the City in permitting negotiations and reviewing environmental, water resources, design, and permitting deliverables and is now assisting in developing operating guidelines and ensuring environmental compliance during construction.

San Francisco Public Utilities Commission Wastewater Enterprise Regulatory Support – Providing ongoing strategic support on a variety of regulatory compliance issues for the San Francisco Public Utilities Commission's (SFPUC) Wastewater Division.

Toby Fedder | Water Rate Analysis and Forecasting

Availability: 15%

Toby has over 25 years of experience in the civil/environmental engineering and financial management industries. He is the National Practice lead for Woodard & Curran's utility financial management consulting efforts and presently serves on several professional association committees, specifically, the AWWA's Finance Accounting and Management Controls Committee and the NEWWA Finance Committee, and the WEF Utility Management Committee. He is an instructor at the NEWWA Water Ratemaking Course and a contributing Author and/or Editor on two AWWA Manuals of Practice related to utility financial management. He has completed financial assessments on many utilities, including life-cycle costing, rate setting, capital plan projections, asset valuation and funding plan development.

Project Highlights:

Eastern San Joaquin Groundwater Authority, CA – Eastern San Joaquin Groundwater Sustainability Plan Preparation. Technical Lead on outlining potential financing plan for GSP implementation, including discussions of costs sharing across multiple entities with variable groundwater availability. Duties include leading a discussion of financing options with both Eastern San Joaquin representatives and stakeholders discussing the mitigation of financial impacts while balancing financial capacity and needed investment for compliance with SGMA requirements.

North of River Sanitary District (NORSD), CA – Industrial Discharger/Pretreatment Fee Support. Under new permit conditions, NORSD was required to initiate a substantial pretreatment program for certain customer classes. Working with technical staff in the Los Angeles office, we assisted NORSD in the development and defense of new annual administrative charges for the various calls of industrial dischargers to the collection system. Work included the development of a modeling tool to assist in the allocation of administrative budgets, the assessment of probable costs associated with administering the pretreatment program, and the projection of future costs and revenues associated with different fee options available to the utility, allowing the utility to make informed decisions as it decides the most appropriate way to recoup new costs to the system.

City of Sacramento, CA – Groundwater Assets Financial Planning. As part of a larger technical assessment of groundwater sources used by the Sacramento water system, Woodard & Curran prepared a financial tool to estimate the probable costs of upgrading individual assets while allowing for modifications to assumed construction timetables. This tool allowed for the optimization of the asset renewal program, ensuring that adequate groundwater supplies would be available at all times while optimizing the cost efficiency of the overall program.

SECTION 5

Quality Control Process

Quality Control Process

Approach to Addressing and Completing Tasks Assigned

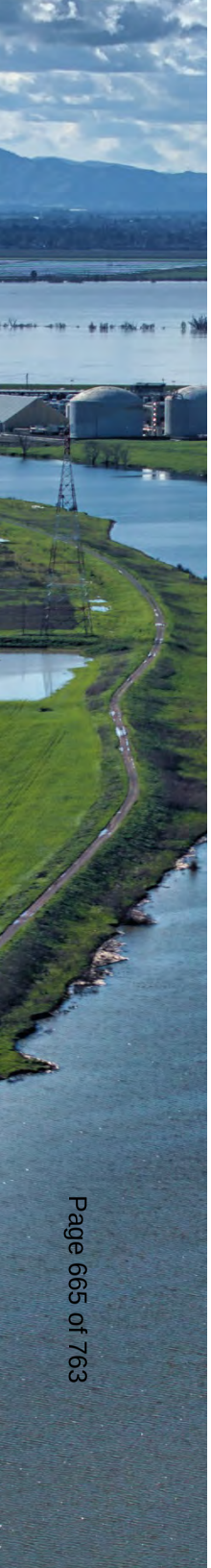
Woodard & Curran's team has substantial experience performing on-call services and is prepared to meet MWDOC's fluctuating need for a range of services. Our Principal-in-Charge and contract manager, Persephene St. Charles, will be MWDOC's primary contact. As Woodard & Curran's National Practice Leader for Water Resources, Persephene brings direct knowledge of each team members expertise and availability. She will work with MWDOC determine specific technical and management needs for each task order and will assign the PM that is best suited for the role. She will also assign a qualified QA/QC team member to provide comprehensive review and ensure quality deliverables. Our PM will then work directly with MWDOC to develop and implement the task order scope to meet MWDOC's technical needs within the assigned time-frame and budget.

Each of the proposed team members has sufficient availability to accommodate task orders under this contract. In addition, our task leads are supported by our team of 120 water resource professionals throughout California to support MWDOC's specific needs, including those with a limited timeframe for completion.

Management Tools

Woodard & Curran's mission statement reads "To deliver to our clients and the community a continually expanding range of high-quality consulting engineering, science, and operations services." To support this commitment, we have created a Project Management Framework (PMF) and a Total Quality Management (TQM) Program.

The PMF manages each phase of a project according to a set of Best Management Practices including tools for project managers from project planning to project close-out. The Framework and Best Practices are available electronically via Intranet to all our staff. Included in our project framework library are tools for following the best practices, such as recommended outlines for work plans, templates for agendas, QA/QC review requirements, and guidelines on project communications with clients. All of our Project Managers receive in-house training on best management practices.



The TQM Program's mission is to identify and establish quality initiatives that continue to improve the quality and value of the services we provide to our clients. One of the key quality control tools of the TQM, used throughout the project execution, is the Technical Advisory Team (TAT) Review. At critical stages of a project, we draw from technical experts throughout the company to review and comment on the design. This is the equivalent of an internal peer review, with the result being a rigorous vetting of preliminary design and a thorough review of final design by an engineer with construction expertise, prior to completing Contract Documents to ensure constructability.

The TAT consists of senior personnel, with oversight from the project's Principal-in-Charge, who are familiar with the subject matter but are not part of the project team. As appropriate, meetings are held during each phase of the project at critical stages to review and critique the project team's efforts. In general, TAT meetings are held at the Concept Development stage; at initiation of Report Preparation, Plans, and Specifications; and 80% Design Completion. All TAT meetings are open to client participation and in fact, clients are encouraged to attend to see the process at work and provide input. Prior to issuing Contract Documents and stamping by a licensed Professional Engineer, we complete a final comprehensive review.

Monthly Invoicing and Reporting

Woodard & Curran uses several management tools to ensure that high quality deliverables are submitted on time and within budget. We have implemented an integrated business solutions software (Deltek) which enables our project manager to track project costs, schedule, quality control, and earned value for each project in real time. With this information readily at hand, we can proactively implement any adjustments needed to manage cost and schedule.

Persephene will create monthly progress reports for each task to communicate work completed and upcoming work for the next month; budget status including total budget, budget spent during the month, total spent to date, and budget remaining; estimated percent complete by task or subtask; and schedule status and project issues. During monthly invoicing, our accounting staff exports project detail reports, and converts information into each client's required invoicing format.

Communication Tools

We know that proactive communication within our team and with MWDOC is critical to our success. Effective communication helps keep projects on schedule and costs under control. Our team has the required tools to make sure that we can communicate effectively via multiple modes of technology, including telephone/cellular service, video conferencing, email, and fax.

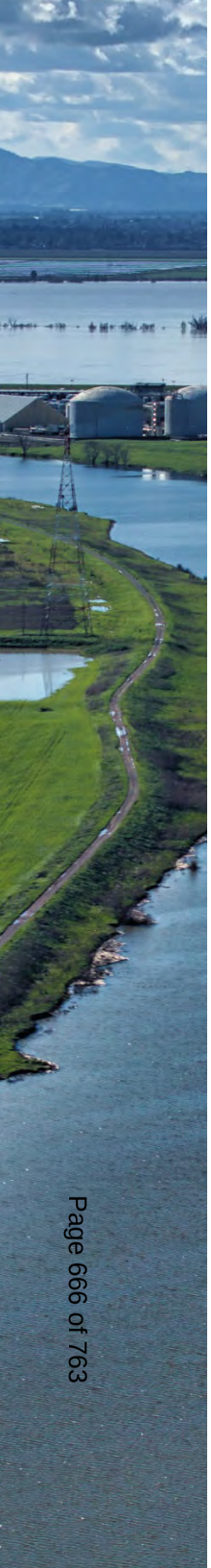
Woodard & Curran's video conferencing capability is a powerful tool that supports clear, efficient communication throughout the project team. We can conference staff, clients, and other partners with videoconferencing or webcam technology from multiple sites. The video conferencing system allows Woodard & Curran to share content such as presentations or documents with other participants without obscuring the video feed. These capabilities allow for productive, collaborative meetings no matter where the participants are sitting. We are also available to speak in-person whenever the need arises or at scheduled meetings.

Quality Assurance/Quality Control

Woodard & Curran employs a "quality-first" culture that emphasizes the importance of quality assurance and quality control (QA/QC) from the start of a project through to the final deliverable.

Step 1 – STAR Workshop

Senior Technical Approach Review (STAR) Workshops are held at the outset of our projects to identify any potential project issues and identify and implement measures to avoid those issues. The intent of STAR Workshops is to bring together the project team and other internal and external senior technical experts beyond the project team to review the project scope, schedule, and technical challenges.



Step 2 – Project Work Plan

The Project Work Plan will be developed at the start of the project, identifying team roles and responsibilities, QA/QC procedures and responsibilities, applicable design standards, and the overall team communications strategy. This document, memorializing those facets of the project, is provided to the District management team.

Step 3 – Robust Communication

Frequent communication between our Project Manager and the MWDOC management team, including the kick-off meeting (Workshop 1), bi-weekly conference calls and monthly progress meetings will be used as the primary tool to identify and resolve issues and provide clear direction for next steps. This communication will make sure that our team's activities stay aligned with MWDOC's management team, a critical component of delivering a quality product. A second workshop will be held around the time when the Draft Preliminary Design Report is complete.

Step 4 – QC Every Work Product, Every Time

Woodard & Curran requires technical review of all work products before they are submitted. Upon receiving notice to proceed, Project Managers are required establish a QA/QC Plan with our integrated business solutions software, Deltek, that identifies all scoped deliverables, as well as the QC Reviewer, and the dates on which QC will take place for each deliverable. This ensures that the QA/QC process is incorporated into the project schedule at the outset. Our policy requires a "cold-eye" review from an independent, (non-team) technical expert, providing a detailed and impartial assessment of the technical accuracy and overall quality of document, as well as confirming that the approach employed in executing the project is appropriate and satisfies the scope of work.

Step 5 – QC Coordinators

"Trust but Verify" - Woodard & Curran Project Managers are responsible for the successful completion of their projects and for adhering to the requirements of the Project and QA/QC Plans. Woodard & Curran QC Coordinators routinely meet with Project Managers through informal check-ins and more formal audits to confirm that budgets and schedules are being managed proactively, technical concerns are being addressed, and that QC reviews are being completed and documented.

Step 6 – Principal-in-Charge "Client Check-Ins"

Our Contract Manager, Persephene St. Charles, will schedule periodic check-ins to monitor MWDOC's assessment of our performance as this project unfolds. These check-ins will be conducted every few months, and are separate (and not billable) from regularly scheduled project meetings. This external interaction complements the internal activities of our QC Coordinators.

SECTION 6

Insurance Certificate

WOOD&CU-01 VSANTOSUOSSO

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 3/10/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Ames & Gough 859 Willard Street Suite 320 Quincy, MA 02169	PHONE (A/C, No, Ext): (617) 328-6555	FAX (A/C, No): (617) 328-6888
	E-MAIL ADDRESS: boston@amesgough.com	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Continental Casualty Company (CNA) A, XV	20443
INSURED	INSURER B : Continental Insurance Company A(XV)	35289
Woodard & Curran, Inc. 41 Hutchins Drive Portland, ME 04102	INSURER C : American Casualty Co of Reading, PA A(XV)	20427
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$ 1,000,000
	CLAIMS-MADE X OCCUR			6014561812	2/23/2020	2/23/2021	DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 500,000
							MED EXP (Any one person)	$ 15,000
							PERSONAL & ADV INJURY	$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$ 2,000,000
	POLICY X PRO-JECT X LOC						PRODUCTS - COMP/OP AGG	$ 2,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
	X ANY AUTO			6014561843	2/23/2020	2/23/2021	BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	HIRED AUTOS ONLY / NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
B	X UMBRELLA LIAB X OCCUR						EACH OCCURRENCE	$ 1,000,000
	EXCESS LIAB CLAIMS-MADE			6014561826	2/23/2020	2/23/2021	AGGREGATE	$ 1,000,000
	DED X RETENTION $ 0							$
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X PER STATUTE / OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N	N / A		WC676061262	2/23/2020	2/23/2021	E.L. EACH ACCIDENT	$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
A	Professional Liab			114135520	2/23/2020	2/23/2021	Per Claim/Aggregate	1,000,000
A	Pollution Liab			114135520	2/23/2020	2/23/2021		1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

If AI box is checked, GL Endorsement Form# CNA75079XX, Auto Endt Form# SCA23500D to the extent provided therein applies and all coverages are in accordance with the policy terms and conditions.

Drone Coverage is included under the General Liability Policy #6014561812 with $1M per occ/$2M agg and coverage flows up to Umbrella.

CERTIFICATE HOLDER

Sample Certificate

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Michael Keleher

SECTION 7

Firm Qualifications

Firm Qualifications

Woodard & Curran has extensive experience delivering services for a wide range of projects: from small-scale work to large, complex, multi-service contracts. On the following pages, we have included a description of our services as well as representative projects that demonstrate our proposed team's capabilities in the areas MWDOC is requesting. We've taken special care to organize projects to best fit the categories within the RFQ, and have included several projects that address multiple categories of services. Our team has been directly involved in some of the statewide water efforts of greatest impact to MWDOC, including the Delta Conveyance Project, Colorado River Basin drought management, and associated impacts to local and regional water management efforts.

In addition to the capabilities requested by the RFQ, we would like to highlight our integrated approach projects which will help MWDOC address specific project needs as well as provide support in taking a big picture view of some of the most pressing issues the agency may be facing such as resiliency, sustainability, climate change, or environmental stewardship. We incorporate the considerations that are important to you as our client into every project.

Water and Environmental Planning/Management (Bay-Delta Activities)

The Bay-Delta infrastructure is outdated and at ever-increasing risk of failure due to climate change, sea level rise and seismic events. The Delta Conveyance Project (DCP) will develop new diversion and conveyance facilities in the Delta necessary to restore and protect the reliability of SWP water deliveries south of the Delta. The DCP is currently 88% subscribed, and Metropolitan Water District (MWD) and other partners are doing their homework on financial participation for future phases. Understanding the alternatives and associated benefits and costs for each party will be critical to future funding decisions.

Woodard & Curran team is directly involved in the DCP environmental documentation scoping process and alternatives analysis as the lead for the groundwater and hydrologic assessment. This process will provide critical information on the benefits of the DCP and the benefits and cost implications for each SWP contractor on the options for protecting the region's investment in the SWP against water quality threats from sea level rise, seismic risks, and environmental constraints. With our understanding of the technical and policy complexities of the DCP, our team can serve as partners to MWDOC to evaluate the implications of this work, provide educated input on key administrative or legislative proposals, and inform its member agencies on key activities and the project progression.

California Department of Water Resources – Delta Conveyance Project EIR

Services Included: Bay Delta water quality and water management, environmental management, Delta Conveyance Project issues.

Woodard & Curran is leading everything groundwater related in the DCP EIR – model development, modeling analysis, and writing the groundwater chapter of the EIR/EIS. Our team is working with DWR to define the DCP alternatives and evaluate the potential implications of each option. WeUpon completion of the model development, W&C will conduct model simulations of project alternatives imposed on Existing Condition and Future No Action baselines to assess the impact of project operations on: groundwater levels and recharge, groundwater flow patterns and storage, and stream aquifer interaction.

We are leveraging the existing California' Central Valley Simulation Model (C2VSim) developed by our team for DWR and developing an independent, standalone model, Delta Groundwater Model (DeltaGWM) for the Delta region. The model is an integrated surface water and groundwater model that simulates water movement through the linked land surface, groundwater, and surface water systems. Development of a Delta region model includes mapping all the relevant data from the larger C2VSim model to the DeltaGWM grid, as well as generation of new boundary conditions, with special consideration given to surface processes such as surface water diversions, imports, and exports, inflow from rim watersheds, and streams along the model boundary. Additionally, improved data including evapotranspiration, stream geometry, soil parameters, stratigraphy, and local water use were incorporated into the model to improve model performance and calibration.

San Luis & Delta-Mendota Water Authority, CA – Northern & Central Delta-Mendota Region Groundwater Sustainability Plan Preparation and Subbasin Coordination

Services Included: SWP Operations, Bay-Delta Water Management

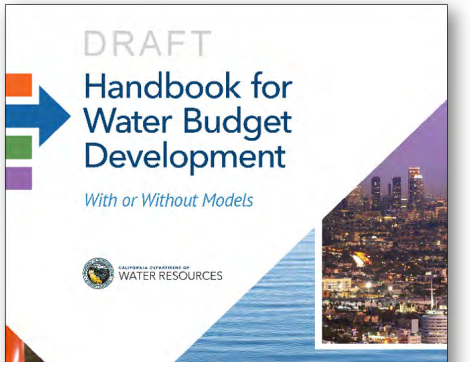
Woodard & Curran led the project team in developing the Northern & Central Delta-Mendota Region Groundwater Sustainability Plan (GSP) and associated support studies. The project required detailed understanding of Central Valley Project operations, impacts to CVP and SWP infrastructure, and understanding of the interrelationships between groundwater and surface water. The GSP was completed on schedule and submitted to DWR in coordination with five other GSPs prepared for the Delta-Mendota Subbasin. As part of this larger program and in addition to preparation of the GSP for the Northern and Central Delta-Mendota Regions, Woodard & Curran assisted SLDMWA in coordinating development of six Subbasin GSPs, prepared the Common Chapter linking the six GSPs to the Subbasin level, led public workshops on behalf of all Subbasin GSP Groups, developed the required Subbasin Data Management System, and prepared subbasin-wide data collection and mapping efforts (including preparation of groundwater-dependent ecosystem mapping, subbasin-level water budgets and subbasin-wide monitoring networks).

East Bay Municipal Utility District (EBMUD), CA – Water Supply Management Plan 2040

Services Included: SWP Conveyance, Climate Resiliency

The Water Supply Management Program 2040 provided a strategic, long term plan to ensure East Bay Municipal Utility District's (District) ability to meet future demands under a variety of hydrologic conditions. The plan considered the long-term implications of climate change through perturbation of hydrologic records, utilizing a bottom-up approach to evaluate climate change impacts on key water infrastructure, and considering system reliability of raw water infrastructure, including the seismic reliability of the Mokelumne Aqueducts and the ability to meet short-term water demands following a serious seismic effect. Also incorporated into this program were established and new plans for conservation and water recycling; programs specific to reducing demands during severe droughts; and recommendations to develop new supplies to ensure that the District can meet customer demands when supplies from its existing source of supply, the Mokelumne River, are not sufficient.

The resulting plan recommended projects that will meet future water demands, reduce economic impacts to the District during dry periods, and ensure the ability of the District to meet its customers' base demands in times of emergency. A programmatic EIR of the WSMP 2040 was prepared following completion of the plan.



California Department of Water Resources – Water Budget Framework Project

Services Included: SWP Conveyance, Climate Resiliency

Woodard & Curran is working with DWR in developing a water budget framework for watershed-based water budget. The framework can be used by local agencies to gain a deeper understanding of hydrogeologic characteristics and conditions of our groundwater basins through increased monitoring, data analysis, hydrologic modeling, alternatives evaluation, and early implementation of management actions. It provides insight into the relationship between increasing reliance and overuse of groundwater and associated impacts, such as subsidence and infrastructure impacts, groundwater quality degradation, increased sea water intrusion from groundwater levels in the Bay Delta, and stream depletions impacting natural ecosystems. The draft handbook is a comprehensive technical reference that systematically presents existing information on various methods and data sources for developing water budgets. Our team members led the completion of the Tulare Lake Hydrologic Region Water Budget Pilot and resolved three million acre-feet of difference in agricultural demand estimation between two of DWR's water resources model, the California Central Valley Simulation (C2VSim) and California Simulation of Evapotranspiration of Applied Water (Cal-SIMETAW). We developed the common vocabulary for total water budget and developed recommendations for IWFM enhancements and C2VSim enhancements to achieve consistency with the common vocabulary. Currently, we are working with DWR staff to developing computational methods for basin reliability index. As part of the project, our team members are also facilitating in-house capacity building for DWR by embedding DWR staff in this project.

Water Reliability Planning

Our Woodard & Curran teams have supported water agencies throughout California in navigating many of the challenges MWDOC is facing - shifting hydrology in the Northern Sierras and Colorado River Basin could create significant stress on the SWP and CRA by the middle of this century, sea level rise future impacts in SWP exports through the Delta, changing water demand patterns, regulatory hurdles for new and potential future supplies, and balancing water management needs and financial implications. We have selected project examples highlighting our range of services within the water reliability topic area- from large multidiscipline projects to small-scale tasks.

Metropolitan Water District of Southern CA (MET) – Resources Vulnerability Assessment

Services Included: Climate Change Planning, Seismic Risk Assessment, Analysis of Bay-Delta Water Quality and Water Management Issues,

Woodard & Curran prepared the preliminary research and assessment of water supply vulnerability in anticipation of the METs 2020 Integrated Resources Plan Update. The assessment used research vulnerability analyses already completed by MET staff as well as other local, regional, and federal agencies who impact MET, and identified data gaps that may need additional study. Woodard & Curran conducted a broad investigation of other planning documents that provided information on uncertainties that could impact MET's and its member agencies supplies, such as demographics, regulations, seismic events, political decisions, and climate change. Additionally, Woodard & Curran identified relevant vulnerabilities for MET resources and characterized and assessed, qualitatively but based on technical information, the magnitudes of those vulnerabilities.

Santa Ana Watershed Project Authority – Program Management for the Santa Ana River Conservation and Conjunctive Use Program

Services Included: Water Banking, Economic Analysis

The member agencies of SAWPA selected Woodard & Curran to provide Program Management services for its proposed Santa Ana River Conservation and Conjunctive Use Program (SARCCUP). SARCCUP is a cooperative effort between Orange County Water District, Eastern Municipal Water District, Inland Empire Utilities Agency, San Bernardino Valley Municipal Water District, and Western Municipal Water District, which are the member agencies of SAWPA. The Program focuses on banking up to 180,000 AF of wet year water in multiple groundwater basins and providing the extraction facilities and linkages to allow up to 60,000 AFY of banked water to be utilized by all five agencies during dry water year conditions. The $100 million Program is being funded by a combination of $55 million in Proposition 84 grants and $45 million in local funding ($9 million from each of the five participating agencies). The Program also includes in-stream conservation efforts (arundo removal) and environmental habitat enhancements for the endangered Santa Ana Sucker.

Los Angeles County Department of Public Works – Los Angeles County Water Plan

Services Included: Demand Forecasting, Climate Change Planning, Seismic Risk Assessment, GIS, Economic Analysis, Analysis of Water Quality and Water Management Issues

Woodard & Curran is working with LACDPW staff to develop a regional plan for sustainable water resource management in Los Angeles County. The plan will establish a consistent vision for collaborative water management and specific actions to be implemented to achieve this vision. Our team is leading all aspects of the planning process, including technical analysis, stakeholder coordination and outreach, work-group facilitation, plan development, and planning portal implementation. We are leading the evaluation of challenges and opportunities associated water supply, water quality, resiliency, affordability- including many of the same issues MWDOC is facing, such as Bay Delta reliability concerns and effective integration of new water supplies. To reach consensus on the plan, we are facilitating coordination with agencies throughout the County to establish measurable targets and identify specific actions to meet these targets. We are also developing a planning portal to be integrated with DWR and other databases to track progress.

Irvine Ranch Water District – Water Reliability Planning

Services Included: Water Rates Analysis and Forecasting

Woodard & Curran updated the IRWD's Water Shortage Contingency Plan (WSCP) to incorporate the lessons learned during the recent California drought as well as the changes to the California Water Code under Senate Bill 606 and Assembly Bill 1668. The project also included the development of a tool used for estimating future demands and potential water savings from the use of budget-based rates during shortage conditions and the implementation of the WSCP. The tool was developed in Microsoft Excel and it is based on the use of price elasticity calculation to be applied to customer tiers in IRWD's existing rate structure, while accounting for demand hardening from future conservation.

Woodard & Curran's Demand Forecasting Tool

Woodard & Curran's demand model was designed with three things in mind:

1. Provide flexibility to work with a range of availability data
2. Address various "what if" options for growth and climate
3. User-friendly interface to support ongoing client use.

The demand model has been successfully used by utilities throughout California for a range of water planning applications

Cachuma Operations and Maintenance Board (COMB) – Cachuma Water Quality and Sediment Management Study

Services Included: Reliability Planning, Water Supply and Demand Forecasting, Water Quality Assessment, Sustainability and Climate Resiliency, Environmental Review, GIS

Woodard & Curran is working with COMB to understand and address issues of water quality and sedimentation at Lake Cachuma. These management issue concerns have arisen as a result of a number of possible stressors, including major wildfires and a historic drought. Fires have burned approximately two-thirds of the watershed since 2007, creating the potential for increased loadings of nutrients, total

organic carbon, turbidity, debris, and other treatability challenges, as well as the potential for increased sedimentation in the reservoir. The goal of the Water Quality and Sediment Management Study is to identify viable and actionable solutions through coordination with the broad range of stakeholders that manage, operate, and use Lake Cachuma. The project involves identifying management goals, collecting data, characterizing and prioritizing issues, identifying data gaps and developing a sampling and monitoring program, and developing a long-term program for water quality and sediment management for Lake Cachuma and its surrounding watershed.

Marin Municipal Water District – Water Resources Plan 2040

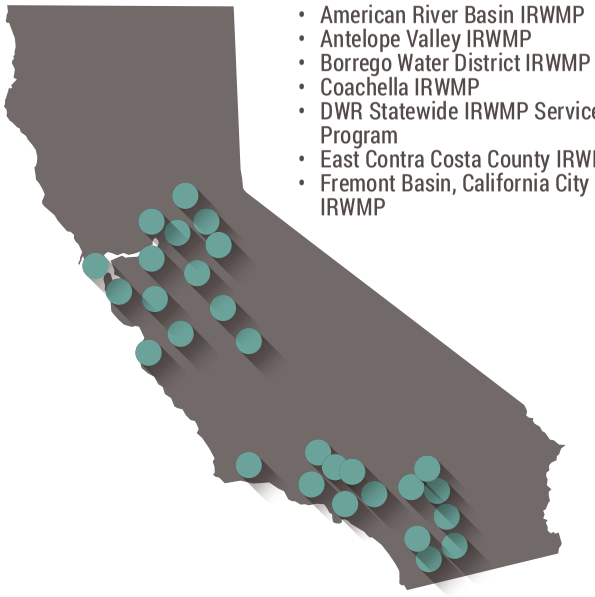
Services Included: Reliability Planning, Water Supply and Demand Forecasting, Climate Resiliency, Seismic Risk Assessment, Economic Analysis, Environmental Review, GIS

Woodard & Curran led preparation of Marin Municipal Water District (MMWD)Water Resources Plan 2040. The project involved identifying current and future demands and supply availability and assessing the District's ability to meet projected future demands given potential future disruptions caused by extended drought conditions, climate change, earthquakes, fires, and other hazards. The project was focused on determining a preferred set of actions to be taken to improve the resiliency and reliability of existing supplies and on recommending additional actions to further improve future conditions. The project team developed a GoldSim Model, reconciled District-wide supply and demand conditions, updated the UWMP, identified vulnerabilities, developed mitigation actions to address vulnerabilities and improve redundancy, and recommended a water supply portfolio.

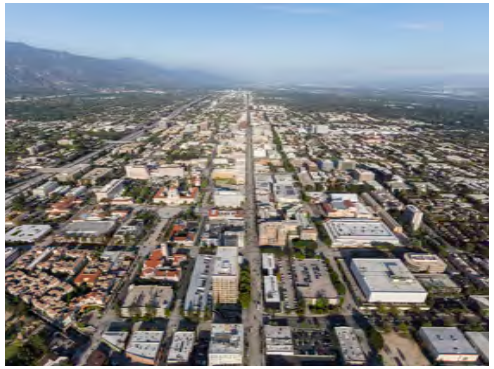
Integrated Regional Water Management Program's

We have been heavily involved in the IRWM Program statewide, at all levels. Since program inception, Woodard & Curran has worked with 28 regions across California on all aspects of IRWM program funding, development, and implementation.

The team has an unmatched success rate securing planning and implementation grant funding through the IRWM Grant Program, helping clients throughout California obtain over $636 million for water resources projects. In addition, we have a broad range of experience with other local, state, and federal programs—we have secured more than $1.5 billion in grants and loans in the past 20 years alone.



- American River Basin IRWMP
- Antelope Valley IRWMP
- Borrego Water District IRWMP
- Coachella IRWMP
- DWR Statewide IRWMP Service Program
- East Contra Costa County IRWMP
- Fremont Basin, California City IRWMP
- Hemet/San Jacinto GW Management IRWMP
- Greater Los Angeles County IRWMP
- Merced IRWMP
- Modesto IRWMP
- Mokelumne/Amador/Calaveras IRWMP
- Monterey Peninsula, Carmel Bay IRWMP
- No. Santa Monica Bay Watersheds IRWMP
- Pajaro River Watershed IRWMP
- Salinas Valley IRWMP
- San Diego IRWMP
- San Francisco Bay Area IRWMP
- Santa Barbara IRWMP
- Santa Fe Irrigation District Funding and IRWMP Support
- San Jacinto Basin IRWMP
- South Monterey Bay IRWMP Support
- South Orange County IRWMP (Soto)
- Upper Kings Basin IRWMP
- Upper Santa Margarita IRWMP
- West Basin MWD IRWMP
- Yolo County IRWM Study
- San Gorgonio IRWMP



Pasadena Water and Power – Water System and Resources Plan

Woodard & Curran led this innovative project that integrates water resources supply and water facilities master planning into a comprehensive planning process and document. Our team worked closely with the community to incorporate community values and interests by facilitating stakeholder meetings for setting goals and evaluating strategies. We completed in-depth technical analyses involving water resources modeling using GoldSIM and infrastructure assessment risk analysis. Informed by these results, we developed CIP programmatic tiers packaging and new excel-based portfolio building and decision tool that can be used by PWP in the future to adapt to changing political priorities, regulations, and physical settings.

Engineering

Marin Municipal Water District – Water System Master Plan Update

Services Included: Analysis and resolution of water distribution system and water quality issues, hydraulic modeling, GIS

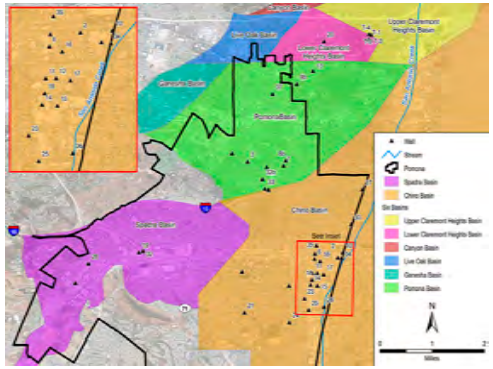
Woodard & Curran led preparation of Marin Municipal Water District (MMWD) 2015 Urban Water Management Plan and Water Resources Plan 2040. The majority of MMWD's water supply is derived from its seven local surface water reservoirs, and MMWD's current safe yield for water supply represents only about two years of average demand. Therefore, MMWD has been significantly affected by California's historic drought and is acutely experiencing the preliminary indicators of climate change. To address the long-term sustainable supply issue, Woodard & Curran prepared the Water Resources Plan 2040 to develop a cost-effective and environmentally sensitive plan for water supply resiliency. Woodard & Curran constructed a range of potential scenarios which could significantly impact MMWD's ability to access and/or utilize its water supply over an extended period of time. Woodard & Curran then evaluated how the scenarios will impact MMWD's ability to meet customer demand and the District's responses and actions to mitigate the potential impacts.

Woodard & Curran also developed hydrologic modeling to assess the probability and extent of future water supply shortages and identified and assessed innovative approaches to increase reliability, including indirect potable reuse/direct potable reuse (IPR/DPR) and water transfers. The primary analytical tool on this project was a systems model developed in GoldSim that allows MMWD to quickly evaluate the responses of the system to management decisions and project implementation. The project also included a comprehensive climate change analysis of demands and hydrology in collaboration with USGS.

Town of Windsor, CA – Water Master Plan Update

Services Included: Water, Master Planning, Sustainability and Climate Resiliency, Rate Studies, Modeling, CAD and GIS, Funding Support

Woodard & Curran updated the Town of Windsor's Water Master Plan to create a strategy that addresses future water supply requirements; provides a long-term capital improvement program supported by the latest hydraulic modeling soft¬ware; serves as the basis for the Town's rate and fee updates and impact studies; and evaluates sustainable, long-term water supplies. Our four-part project approach included (1) quantification of water demand, (2) updating the model and analyzing the water system, (3) evaluating and identifying water supply and treatment options, and (4) developing a comprehensive CIP program.



City of Pomona, CA – Strategic and Master Planning

Services Included: Water Distribution Analysis, Economic Analysis, Hydraulic Modeling, GIS, Water Quality Modeling, Water Demand and Supply Analysis

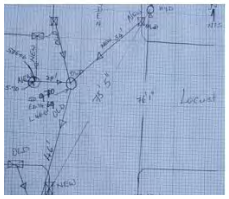
Woodard & Curran prepared a strategic plan for the City of Pomona's water and wastewater utility operations. Our selection followed successful completion in 2011 of an Integrated Water Supply Plan where we helped the City define a path forward to optimize its treatment and use of local groundwater, surface water and recycled water resources to minimize the need for more expensive and less reliable imported water supplies; as well as a programmatic approach to utility management and implementation of future capital improvements. The work included a comprehensive evaluation of the City's water and wastewater operations, including the following elements: strategic planning workshops to define goals and objectives, water resources optimization, potable water system master plan, prioritized CIP for near-term (2020) and long-term (2030). As part of the Water and Wastewater Master Plans, the Woodard and Curran team reviewed existing hydraulic models for the potable water system and sewer system, and updated the models based on current GIS files. Through this effort, the team identified several items in the GIS shapefiles that required confirmation and revision due to quality issues. The team worked with City staff to identify the issues and revise the GIS files prior to uploading them into the hydraulic models.

East Bay Municipal Utilities District, CA – West of Hills Master Plan

Services Included: Analysis of Water Distribution and Water Quality Issues, Hydraulic Modeling, GIS

Xavier led the development of the EBMUD West of Hills Master Plan and subsequent EIR. The plan was developed to form a road map of capital investment for a vast region of EBMUD's water system that provides water to approximately 2/3 of EBMUD's 1.4 million customers. It was a high-level strategic plan that considered future demands, future treatment needs, and a mix of asset classes including treatment plants, transmission pipes, and pumping plants. The sheer number of options was so large that a novel approach

to screen them was developed using Genetic Algorithms, followed by traditional methods to verify and refine results. Key steps included extensive workshops with O&M staff to ensure that needs were being met, and thorough cost estimates for various candidate projects at varying capacities. The planning effort was very successful and key elements of it are in various stages of design and construction, including the Wildcat Aqueduct in El Cerrito and Berkeley as well as several other large-diameter pipelines, Fontaine Pumping Plant replacement, and replacement of Central Reservoir in Oakland (the largest treated water storage in EBMUD's system at 150MG).



City of White Plains, NY – Storm Sewer Digitization and Modeling

Services Included: GIS

To assess the existing capacity of their City-wide stormwater infra¬structure, the City of White Plains retained Woodard & Curran to provide information needed to support future capital improvement planning for their storm sewer infrastructure and to develop the modeling tools to support the City's capital planning needs. The City did not have a GIS database for the stormwater infrastructure, so Woodard & Curran digitized approximately 2,000 paper-based sources of data that had been compiled over the decades. Despite the many sources of data and rounds of digitization, missing infrastructure data remained, and a field data collection effort was required. The City chose to use an ArcGIS Online collector application developed for use with mobile devices, and the staff were trained to record the highlighted data gaps by recording sketches, taking site photos, and entering infrastructure data. All updates were timestamped for live tracking, and all changes were seamlessly integrated into the database in real time. This completed GIS dataset was imported into SewerGems and used to model the storm sewer capacity for 1 to 100 year storms. This project was instrumental for the City to identify its current stormwater capacity and effectively plan for future capital improvements.

Delta Diablo Sanitation District – Conveyance System Master Plan Update

Services Included: Hydraulic Modeling, GIS

Woodard & Curran provided Delta Diablo Sanitation District (DDSD) an updated Conveyance System Master Plan. Woodard & Curran evaluated potential impacts from changing development conditions and defined those improvements required to serve the community through build-out.

The project involved evaluating changes to the service area, updating flow projections to establish firm recycled water supplies and confirm facility sizing for recommended improvements, InfoWorks hydraulic modeling, and development and evaluation of alternatives to address capacity/condition improvement needs. The project also included Woodard & Curran's "Model for the Optimization of Storage and Treatment" (MOST Model) so the District can optimize the use of its equalization storage basins to minimize needed conveyance and treatment improvements.

APPENDIX

Resumes

PERSEPHENE ST. CHARLES, ENV SP

CONTRACT MANAGER

Education

Masters, Geography, University of California Santa Barbara

Bachelors, Geography, University of California, Davis

Certification

Envision Sustainability Professional

Professional Associations

American Water Resources Association

California Stormwater Quality Association

Professional Profile

Persephene has 20 years of experience managing local and regional planning projects for agencies and groups focused on addressing water supply, water quality, stormwater, flood protection and watershed issues. She specializes in providing tailored solutions that meet a variety of client objectives including increasing water supply reliability, attaining multiple project benefits, protecting source water quality, engaging stakeholder and public participation, developing project partnerships and obtaining regulatory support.

Related Experience

Los Angeles County Department of Public Works, CA - Watershed As-Needed Services. Principal in charge/Contract Supervisor for $6 Million, five year contract with 20 completed task orders involving water quality studies, in house TMDL and grant admin services, IRWM program support, water resilience planning, regional water resources planning and climate change impact analysis.

Los Angeles Department of Water and Power, CA - Recycled Water Master Plan. Contract Manager of an $11.5-million contract to prepare a comprehensive recycled water master plan for the city of Los Angeles. Worked with DWP staff and the team project manager to ensure that the budget, schedule and extensive contract requirements were met and that individual project tasks teams are working together to provide the highest level of client service to the City. City audit resulted in only $1,000 in changes to invoicing over three years and contract was completed on budget.

Pasadena Department of Water and Power, CA - General Engineering Services Contract. Contract Manager and Principal–in-Charge for two consecutive master services contracts that resulted in over 20 task orders and subcontracts with over 10 firms to provide planning design and construction management services for water supply, recycled water and facility upgrade projects.

Rowland Water District, CA – As-Needed Potable and Recycled Water Hydraulic services. Principal in charge of annual contracts that provide as needed services to RWD for support on hydraulic modeling for both potable and recycled water systems.

Pasadena Water and Power, CA - Water System and Resources Plan. Project Manager for innovative project that integrates water resources supply and water facilities master planning into a comprehensive planning process and document**.** Facilitated stakeholder meetings to represent Pasadena community values and interests in setting goals and evaluating strategies. Oversaw technical analyses involving water resources modeling using GoldSIM; infrastructure assessment risk analysis and CIP programmatic tiers packaging; development of a new excel-based portfolio building and decision tool that can be used by client in future to adapt to changing political priorities, regulations and physical setting.

County of Los Angeles Department of Public Works, CA – County Resilience Plan and Water Plan. Project Manager for the development of sequential and related planning efforts led by County to assess current resilience and sustainability of water resources and future strategies and goals for enhancing resilience and sustainability to emergency, annual variability and long-term climate change impacts. Interviewed and facilitated meetings with 20 water resources agencies and non-profit groups involved with water supply, water quality, flood control and habitat/environmental responsibilities. The LA County Water Plan will provide a framework for consolidated regional water resources goals that will complement the parallel County Sustainability planning effort.

City of Pomona, CA - Strategic, Water and Wastewater Master Planning. Project Manager for the development of water and wastewater utility strategic plan involving a multi-division SWOT analysis and the development of goals, objectives, KPIs and near-term action plan. The process includes integration of a dynamic water and wastewater modeling and planning process that will allow the City to generate annual CIP updates based upon determined criteria, priorities and processes. The planning process also updates our Integrated Water Supply Plan incorporates a parallel rate study and to identify funding and financing opportunities.

Santa Barbara County Water Agency, CA - Santa Barbara County Long-Term Supplemental Water Supply Alternatives Report. Project Manager for development of a comprehensive characterization of all local, regional and inter-regional potential supplemental water supply sources that could be used to meet localized demands within Santa Barbara County. The project involved coordination with over 40 stakeholders responsible for the management of water supply in the County to examine both individual supply options as well as identify larger-scale regional programs that would leverage existing imported water infrastructure and supply to better optimize local and potentially new imported supply sources. Persephene's role was to provide overall technical direction for the project while integrating input from planning partners and the County to fully characterize supply options relative to potential supply volume, facilities needed, costs, reliability and implementation considerations.

West Basin Municipal Water District, CA - Water Resources Assessment. Technical Advisor to project team on methods to evaluate local water supply projects designed to reduce dependence on imported water from the Metropolitan Water District. The study evaluated a number of local supply options including conservation, conjunctive use, and graywater reuse to help West Basin Board members and staff better understand their future policy options as they consider the increasing cost and decreased reliability of water provided by Met.

Upper Mokelumne River Watershed Authority, CA - Upper Mokelumne River Watershed Assessment and Planning. Project Manager of a three-year Prop 13 and 50 funded watershed assessment and planning project. Tasks include management of goal development, public and stakeholder committee coordination as well as development of a watershed assessment methodology, data collection and monitoring program, creation of a tailored assessment tool/model, and watershed management recommendations/final plan based on land use, NPS, and baseline water quality analysis. Oversaw development of an extensive GIS database with a refined land use and land cover data set to perform basic vulnerability zone analyses for future users.

East Bay Municipal Utility District, CA - Upcountry Wastewater Improvements. Project Manager for the preparation of CEQA documentation for wastewater collection system upgrades and improvements at EBMUD's four Upcountry recreational areas. Collaborated with EBMUD staff to manage development of a Recycled Water Feasibility Study and Facilities Plan as well as an Initial Study and draft Mitigated Negative Declaration for a potential recycled water project at Camanche Area South Shore. Coordination with relevant permitting agencies and other stakeholders was also conducted.

SAQUIB NAJMUS, PHD, PE, PMP

TECHNICAL LEAD: BAY DELTA ISSUES

Education

Doctorate, Civil Engineering, University of California, Davis
Masters, Civil Engineering, University of Kentucky
Bachelors, Civil Engineering, Bangladesh University of Engineering

Registration

Professional Engineer - CA, 54574

Professional Associations

American Society of Civil Engineers
American Water Works Association

Professional Profile

Dr. Saquib Najmus, a recipient of the prestigious Hugo Fischer Award from the California Water and Environmental Modeling Forum, has more than 30 years of experience in water resources planning and management. Saquib is an industry leader in water budget development and integrated groundwater and surface water modeling in California. Saquib is currently the project manager for the groundwater modeling and analysis component of the Delta Conveyance Project EIR/EIS project of DWR. He is the original developer of the California Central Valley Simulation (C2VSim) model coarse grid, which is used by DWR's Bay-Delta Office in analyzing the impacts SWP and CVP operations on groundwater in the Central Valley. He has co-developed, with California Department of Water Resources (DWR), the concept of systems-based approach (land, surface water and groundwater systems) to water budget development that culminated in the "Handbook for Water Budget Development: With or Without Models" published by DWR in 2020. He has been working with the California Department of Water Resources (DWR) as a key consultant for the Integrated Regional Water Management (IRWM) and Sustainable Groundwater Management (SGM) programs since their inception. He is the consultant team project manager for the development of California's Groundwater (Bulletin 118) Update 2020, published by DWR in March, 2021. He led the consultant team in developing the Strategic Vision and Framework for Integrated Water Management (IWM) Data and Tools for DWR. Saquib wrote the "Hydrologic Modeling" chapter and "Groundwater" section of the Water Resources Planning Manual published by the American Water Works Association.

Related Experience

Department of Water Resources, CA - Water Budget Framework Project. Project Manager working with DWR in developing a water budget framework for watershed-based water budget. Led the completion of the Tulare Lake Hydrologic Region Water Budget Pilot and resolved to three million acre-feet of difference in agricultural demand estimation between two of DWR's water resources model, the California Central Valley Simulation (C2VSim) and California Simulation of Evapotranspiration of Applied Water (Cal-SIMETAW). Developed the common vocabulary for total water budget and developed recommendations for IWFM enhancements and C2VSim enhancements to achieve consistency with the common vocabulary. Currently working with DWR staff in developing computational methods for basin reliability index. As part of the project, Saquib is also facilitating in-house capacity building for DWR by embedding DWR staffs in this project.

California Department of Water Resources, CA - Groundwater Impact Analysis in Kern County for Monterey Plus-Revised Environmental Impact Report (EIR). As Project Manager, worked with DWR and local agencies to overhaul, update, and recalibrate the existing MODFLOW-based Kern Water Bank (KWB) Groundwater Model to conduct groundwater impact analyses as part of the CEQA work for the Monterey Plus Revised EIR. The technical work included review of the existing groundwater models and selection of one model for groundwater impact analysis. The model was set up and run to simulate the past and future KWB

operations and its impact on local aquifers. Woodard & Curran analyzed land use, canal seepage, surface water supply, crop acreage, groundwater pumping, and boundary conditions data for accuracy of their use in the model. Woodard & Curran performed a comprehensive groundwater impact analysis and prepared the technical sections and appendices of the Revised EIR document. An additional particle tracking analysis was conducted to support the impact analysis for migration of contaminant plumes in the Kern aquifer. The Court ruled in favor of DWR.

Department of Water Resources, CA - Sacramento Valley Simulation Model (SVSim). Project Manager working with DWR in developing an IWFM application for the Sacramento Valley with a special focus on evaluating the impacts of groundwater substitution transfers on stream depletion and providing the starting point for estimating water budgets at the scale of groundwater sustainability agency (GSA) in Sacramento Valley. Saquib came up with a new algorithm for simulating wide streams in IWFM and provided the technical details to DWR model developer for incorporating the modification. As part of the project, Saquib is also facilitating in-house capacity building for DWR by embedding a DWR staff in this project.

Department of Water Resources, CA - Groundwater Basin Assessment and Groundwater Budget Framework. Principal-in-Charge of the Woodard & Curran team who worked with DWR groundwater staff to create draft frameworks for the development of groundwater basin assessment reports and groundwater budgets, allowing for improved management of groundwater resources at the local level and assisting broader regional and statewide water planning efforts. Information developed included the goals and needs for groundwater basin assessments and groundwater budgets, a summary of their role in existing statewide and regional water planning, a summary of recent implementations of groundwater basin assessments and groundwater budgets, and a step-by-step approach to developing groundwater basin assessment reports and groundwater budgets.

Department of Water Resources, CA - IRWM Strategic Plan for Future. As Project Manager, worked with DWR on the development of the Integrated Regional Water Management (IRWM) Strategic Plan for future. The plan defined the DWR's and stakeholders' vision for the future of integrated regional water management throughout the state and defined the DWR's plans to support that vision. The plan ("Stakeholder Perspectives: Recommendations for Sustaining and Strengthening Integrated Regional Water Management") was developed in a collaborative fashion to help ensure broad participation and buy-in of internal and external stakeholders. It is now supported by IRWM Roundtable of Regions, Association of California Water Agencies, and Environmental Justice Coalition for Water.

Kern County, Bureau of Reclamation, Mid-Pacific Region, CA - Semitropic Stored Water Recovery Unit. Project Manager for analysis of the economics and potential environmental impacts of federal participation or federal funding to assist in the development of the Semitropic Stored Water Recovery Unit (SWRU). The SWRU would accept water from banking partners, recharge it into the ground, and pump it out of the ground during years when requested by the banking partners. We led the development of an impact analysis for groundwater and land subsidence and assisted with project management for the four-contractor team. The team developed an analysis of surface water availability, economic benefits, and worked toward development of an Administrative Draft EA that would analyze potential environmental impacts associated with this project.

Department of Water Resources, CA - Strategic Vision and Framework for Integrated Water Management Data and Tools. As Project Manager, worked with DWR to develop the Work Plan which includes DWR's vision for data collection, data reporting, data management and exchange, and water budget methods and their associated objectives and actions based on the input from DWR staff. The Strategic Work Plan for the Integrated Data Framework (Work Plan) includes recommendations for DIRWM and DSIWM data collection, data reporting, data management and exchange, and water budget activities. The Work Plan aims to connect the SGMP, the CWP, and other DWR programs through an integrated data framework to support achieving sustainable water management goals of the Governor's California Water Action Plan (CWAP) and the Sustainable Groundwater Management Act (SGMA). Services included collecting information on the current conditions for data, tools, and water budget methods in DIRWM/DSIWM through in-depth workshops and interviews with DWR staff. The key findings were documented, analyzed, and used as input to additional DWR staff workshops to collect information on future vision, goals, and strategies to meet the vision and goals.

LESLIE DUMAS, PE

DELTA CONVEYANCE

Education

Masters, Civil Engineering - Hydraulics/Hydrology, University of California-Berkeley

Bachelors, Civil Engineering - Hydraulics/Hydrology, Virginia Polytechnic Institute and State University

Registration

Professional Engineer - CA, C-43897

Certified Groundwater Professional (CGWP) - National Groundwater Assoc, 119931

Professional Associations

American Society of Civil Engineers

National Groundwater Association (NGWA)

Professional Profile

Leslie has 30 years of experience and is a hydrologist, water resource engineer and project manager providing hydrogeologic, hydrologic, environmental and scientific consultation for projects throughout the United States. She has managed multi-disciplinary teams on a wide variety of projects, including water resources planning, groundwater investigation, modeling, resource planning, environmental permitting, and stormwater planning. She has prepared and/or reviewed planning and environmental documentation, including CEQA Initial Studies and Environmental Impact Reports, Urban Water Management Plans, Groundwater Management Plans, and Stormwater Pollution Prevention Plans for various civil projects, and has worked extensively in the San Joaquin Valley and San Francisco Bay Area.

Related Experience

California Department of Water Resources – Delta Conveyance Project EIR. Project Lead for preparation of the Groundwater chapter of the Delta Conveyance Project EIR. Preparing analyses relating to groundwater-related impacts associated with changes in groundwater elevations and storage, movement of groundwater plumes, and other potential impacts from the construction and operation of new intake facilities along the Sacramento River and new conveyance facilities, including a tunnel to convey water from the new intakes to the existing SWP Banks Pumping Plant.

San Luis & Delta-Mendota Water Authority, CA – Northern & Central Delta-Mendota Region Groundwater Sustainability Plan Preparation and Subbasin Coordination. Project Manager responsible for overseeing the Woodard & Curran team preparing the Northern & Central Delta-Mendota GSP and for working with SLDMWA in coordinating the development of six GSPs for the Delta-Mendota Subbasin. The project required detailed understanding of Central Valley Project operations, impacts to CVP and SWP infrastructure, and understanding of the interrelationships between groundwater and surface water.

Stanislaus County, CA – Stanislaus Multi-Agency Regional Storm Water Resources Plan. Principal-in-charge overseeing preparation of the Stanislaus County Storm Water Resources Plan (SWRP) covering the entire county, encompassing portions of the Modesto, Turlock and Delta-Mendota Groundwater Subbasins, and includes projects that focus on storm water capture and reuse, water quality management, and drainage upgrades.

East Bay Municipal Utility District (EBMUD), CA - Water Supply Management Plan 2040. Assistant Project Manager for preparation of the Water Supply Management Plan (WSMP) 2040. Led water resources modeling tasks and conducted drought planning and climate change analyses. Coordinated with the District's Office of Water Recycling to identify and scope potential recycled water projects for inclusion in the WSMP. Coordinated with the District's Water System Improvements Division to identify and scope potential supplemental supply projects for inclusion in the WSMP. Supported the preparation of environmental documentation (EIR) following completion of the WSMP document.

Contra Costa County, CA - Phase II East County Water Supply Management Study. As Task Manager, evaluated potential for groundwater supplies and conjunctive use in eastern Contra Costa County. Prepared appropriate sections for study report.

City of Rohnert Park, CA - Human Marker Water Quality Study. Project Manager developed and implemented surface water sampling and monitoring program to evaluate the potential impacts of leaking sanitary sewers on local surface water bodies. Developed water quality sampling plan, including evaluation of parameters to be analyzed and the appropriate type of human marker analysis. Coordinated sampling activities and evaluated analytical data.

Cities of Modesto and Turlock, CA - North Valley Regional Recycled Water Project. As Project Engineer, provided technical support to the cities of Modesto and Turlock in the formulation of the North Valley Regional Recycled Water Project, a project to divert tertiary-treated wastewater effluent (recycled water meeting Title 22 levels for reuse) from the two city plants for delivery to Del Puerto Water District for agricultural irrigation. The recycled water would be used for irrigation of a variety of agricultural crops and would augment existing Central Valley Project and groundwater supplies. Alternatives evaluated for conveyance to DPWD included direct conveyance (via pipeline), use of the San Joaquin River, and use of the Delta Mendota Canal.

Turlock Groundwater Basin Association, CA - SGMA Planning Document. Task Manager as part of a larger team preparing a planning document for development of a Groundwater Sustainability Plan (GSP) for the Groundwater Sustainability Agencies (GSAs) in the Turlock Groundwater Subbasin. Woodard & Curran is tasked with focusing on identification of a Data Management System for data collection, analysis and management, and for outlining modeling requirement for development of a basin-wide water budget.

Amador Water Agency (AWA), CA - Integrated Regional Water Management Plan. As Project Engineer, worked with a broad group of stakeholders (including water agencies, water district, county, irrigation district, and several local cities) in preparing an Integrated Regional Water Management Plan (IRWMP) for Amador County and the Mokelumne and Calaveras River watersheds. Prepared and developed consensus for IRWMP goals and objectives and project prioritization process and developed methodology for collection and management of project data.

Upper Mokelumne River Watershed Authority, CA - Integrated Regional Water Management Plan. As Project Manager, worked with a broad group of stakeholders (including water agencies, water district, county, irrigation district, and several local cities) in preparing an update to the Integrated Regional Water Management Plan (IRWMP) for the Amador County and the Mokelumne and Calaveras River watersheds. Developed and implemented outreach program, including participation by a Regional Participants Committee, in addition to revising regional boundaries, vision, goals and objectives and project prioritization process for updated IRWMP. Prepared climate change analysis sections for inclusion in the plan.

Town of Windsor, CA - Water Master Plan, Engineer's Report and CIP Updates. Task Manager for preparation of the water supply analyses portion of the Water Master Plan. The analysis preparation resulted in the development of a larger strategy for developing an off-river water supply for the Town. Provided several Capital Improvement Plan (CIP) Updates for water supply projects, including preparation of an Engineer's Report in support of the CIP.

San Luis & Delta-Mendota Water Authority, CA - SGMA Program Guide. Project Manager responsible for overseeing the Woodard & Curran team preparing a program guide for compliance with the Sustainable Groundwater Management Act of 2014 (SGMA) for SLDMWA on behalf of the multiple Groundwater Sustainability Agencies (GSAs) in the Delta-Mendota Groundwater Subbasin. The program guide focused on initial activities required for preparation of a Groundwater Sustainability Plan (GSP), including data collection and management, modeling and plan preparation, providing the GSAs with a roadmap for GSP preparation.

FRANK QIAN, PE

WATER MANAGEMENT

Education

Masters, Environmental Engineering, University of California, Berkeley

Bachelors, Civil & Environmental Engineering, University of California, Berkeley

Registration

Professional Engineer - CA, 85686

Professional Associations

American Society of Civil Engineers, Member

California Water and Environmental Modeling Forum, Member

Professional Profile

Frank Qian's work focuses on water resources engineering and hydrologic modeling. His experience includes setting-up water resources models and software such as a MODFLOW, Integrated Water Flow Model (IWFM), macro-scale hydrologic model (VIC), and the integrated surface water and groundwater model (SacIWRM). He also has advanced programming experience in MATLAB, serving as a graduate student instructor for University of California, Berkeley's (UC Berkeley) engineering MATLAB course.

Frank has experience working for UC Berkeley's Environmental Fluid Mechanics and Hydrology Group and MWH Global on a variety of engineering design and research projects. He has experience designing and operating environmental simulations, maintaining and running various laboratory analysis equipment, data analysis, programming, data summarization, report writing, and editing.

Related Experience

Department of Water Resources, CA – Water Budget Framework. As Project Engineer, established mapping between California Water Plan and C2VSIM water budget components and identified inconsistencies between the two. Using the C2VSIM, CWP data was incorporated to develop a more updated and consistent version of the model for analysis of the Tulare Lake hydrologic region. The revised model was used to develop a water budget of the Tulare Lake hydrologic region. Water budget components were defined to be consistent with local understanding and a 3-D water budget schematic was developed to aid in understanding of the behavior of the components. Model components were revised and grouped into system budgets for a better physical understanding of the water system. Project involved development of water budget framework to facilitate understanding of water budget components for groundwater sustainability plans under the Sustainable Groundwater Management Act.

Department of Water Resources, CA - Water Budget Handbook and Dashboard. As Project Engineer, developed and refined a 3-D water budget schematic to aid in understanding relationship between water budget components. Frank was a primary author of the Handbook for Water Budget Development and developed mapping between IWFM and MODFLOW model outputs and the water budget schematic. The framework established in the handbook serves as the basis for the development of the companion Water Budget Dashboard, a tool for visualizing and communicating water budget data.

Sacramento County Flood Control Agency, CA – Groundwater Recharge Site Assessment. As Technical Lead, conducted a recharge feasibility analysis to determine recharge potential sites along the Folsom South Canal. The recharge analysis utilized a GIS overlay technique in which relevant characteristics of subsurface conditions are collected and ranked based on suitability for recharge. The study considered land use, hydrologic soil groups, surface slope, texture of

subsurface materials, and other hydrologic variables as well as infrastructure needs and associated costs. Recharge suitability was determined for both recharge ponds and dry wells, and a combination of potential sites that could accommodate the expected volumes of recharge were identified for further evaluation. High level cost estimates were developed for potential projects, considering both capital costs and project life O&M.

San Luis & Delta Mendota Water Authority– Delta Mendota Subbasin SGMA Program Guide and Program Management and Preparation of a GSP. Project Engineer authored sections as part of the preparation of a program guide for compliance with SGMA for SLDMWA on behalf of multiple GSAs in the basin. Woodard & Curran is now the program manager for the development of the GSP for the Northern & Central Regions of the Delta-Mendota Subbasin, and for coordinating the preparation of six Subbasin GSPs to demonstrate consistency and basin-wide approaches. Activities include basin-wide groundwater studies, HCM development, a data gap assessment, design of a monitoring network, establishment of sustainable management criteria, assessing impacts related to streamflow depletion, groundwater dependent ecosystem mapping and evaluation, and stakeholder collaboration.

Metropolitan Water District of Southern California, CA – Historic Climate Change Impact Analysis. As Project Engineer, modeled the effects of changes in temperature on unimpaired streamflows in the Central Valley of California. Frank collected and processed historic temperature and precipitation data and used the variable infiltration capacity (VIC) flow routing model to simulate streamflows at 19 locations throughout California. Resulting streamflows were processed and analyzed to see impacts to the unimpaired flows to the Central Valley.

Department of Water Resources, CA – Sacramento Valley Simulation Model. As Project Engineer, developed finite element model grid for the Integrated Water Flow Model (IWFM) of the Sacramento Valley. Frank prepared data files using GIS to import into GMS to create a model grid adhering to existing boundaries including Bulletin 118, streams, counties, and surficial geology. The automatically generated grid was then manually refined to optimize model run time. Following grid development, Frank used IWFM tools to assign stream nodes and reaches, designated model subregions, and conducted data matching to assign C2VSIM small watersheds to the Sacramento Valley.

Eastern Municipal Water District (EMWD), CA – Regional Groundwater Model Update. As Project Engineer, developed parameters for modeling subsurface flows based on groundwater elevation data and head gradients and created spreadsheets to process and compare water budgets derived from model outputs. Frank also aided in the development of a tool to compare simulated water levels at specified wells between different model runs.

South Valley Water Resources Authority – Groundwater Banking Screening Analysis. As Project Engineer, lead the initial screening of potential groundwater recharge projects across the Sacramento Valley. Evaluated water districts and entities for water rights and contracts, water sources, potential project yields, and conveyance infrastructure to determine potential partners for developing groundwater recharge projects. Conducted a GIS based assessment of recharge potential for sites in Tehama, Glenn, and Colusa counties, considering soil characteristics, land use, subsurface texture, existing infrastructure, and other site conditions, to identify locations best suited for further evaluation.

Kern Water Bank, CA – Recharge Model Assessment. As Project Manager, lead the review and assessment of the Kern Water Bank's MODFLOW based recharge model to evaluate model performance and investigate potential reasons for discrepancies between 2017 groundwater recharge response simulated the model and observed groundwater elevation data. Evaluated data to develop understanding of the relationship between recharge operations and the aquifer response. Reviewed model input data and conducted sensitivity runs to assess the relative influence of various aquifer parameters on the recharge response.

KIM CLYMA, JD

ENVIRONMENTAL

Education

Juris Doctor, Law, Lincoln Law School of Sacramento
Geographical Information Systems, American River College
Bachelors, Environmental Studies, University of California, Santa Barbara

Professional Profile

With over a decade of environmental science and planning experience, Kim thrives on finding solutions that benefit her clients, the environment, and their communities. Kim puts her multi-disciplinary background to work daily, drawing on her legal, planning, science, and GIS experience to contribute a unique perspective to any team she is on. Kim has managed and contributed to a variety of assessment, planning, design, and permitting projects across disciplines and sectors but focused on water and hydropower. Emphasizing her work on complicated multifaceted projects Kim has conducted constraints analyses, CEQA/NEPA reports (EIRs, EAs, IS/MNDs, CEs, ERs, etc.), alternative analyses, permitting strategies and applications (CWA 401, 402, 404, CDFG 1602, CVFPB Encroachment Permits, Williamson Act, local codes, FAA, FERC), technical and field studies (water quality, visual, biology, air quality, cultural, farmlands, noise), engineering environmental support, and spatial analyses. Kim's unique perspective obtained from her involvement in the realms of water and environmental law results in the production of strategic solutions, defensible documents, and unique compliance strategies.

Related Experience

Department of Water Resources, CA - State Water Contractors Water Fix Contract Amendment Environmental Impact Report. Environmental Planner involved in project scoping and development of this environmental impact report to support contract amendments to the state water contractors State Water Project contract amendments. Kim was tasked with preparation of the Hazards and Hazardous Materials as well as Geology and Soils sections of the Environmental Impact Report looking at future water operation conditions and potential impacts resulting from operations.

Department of Water Resources, CA - Oroville Dam Recreation Facilities Permitting. As Task Manager, consulted on early CEQA and permitting strategy and oversaw the completion of waters permitting packages for the Loafer Creek Boat Ramp site. Permits included Section 404 and 401 of the Clean Water Act including the 404(b)(1) alternatives analysis as well as CDFW 1602 Lake and Streambed Alteration Agreement. Ongoing tasks include facilitation of weekly permitting status calls and permit tracking for the identified emergency recreation improvement sites.

Bureau of Reclamation, CA - Upper San Joaquin River Storage Basin Investigation Supplemental Draft Environmental Impact Statement. NEPA Coordinator oversaw preparation of the Supplement to the Draft Environmental Impact Statement prepared for the Bureau of Reclamation for this new water reliability project in the San Joaquin Watershed. The supplemental review continues to support the evolving feasibility report and evaluate the new alternative for the proposed Temperance Flat Reservoir within Millerton Lake upstream of Friant Dam. Kim managed over ten key staff on development of updated technical analysis for areas such as hydrology, groundwater, socioeconomics, and fisheries resources all while assisting the Bureau of Reclamation with complying with and implementing NEPA

streamlining procedures. Supplemental review includes review of water operations, delivery, and infrastructure throughout the Central Valley including operations of the Central Valley Project and San Luis Reservoir.

Nevada Irrigation District, CA - Regional Water Supply EIR. As Project Manager, evaluated regional conveyance, storage, and treatment facilities, Kim worked with City attorneys to develop an EIR meeting CEQA and case law requirements. Complexities of the project included three agencies, protected park lands, oak woodlands, Williamson Act contracts, and critical habitat. Key resource assessments included growth, land use, cumulative impacts, alternatives, agricultural resources, noise, air quality, greenhouse gases, aesthetics, recreation, water quality, and biological resources.

City of Lincoln, CA - Wastewater Treatment and Reclamation Facility (WTRF) Phase 1 and 2 Expansion Project CEQA and State Revolving Fund (SRF) Funding NEPA. Environmental Task Manager provided environmental consulting services to the City of Lincoln to assist with the expansion of their Regional WTRF. Kim drew from over a decade of experience working with the City on various projects related to the wastewater system to work with the team to develop CEQA and Permitting Strategies that streamline approvals while meeting SRF financing requirements. Kim and team's CEQA approach provided development of a publicly circulated Addendum to the Midwestern Placer Regional Sewer Project EIR that streamlined the review process and drew from previously developed work completed by the City. The SRF compliance required completion of an interrelated interdependent indirect effects analysis through USFWS in which Kim oversaw consultation and worked to get the City credit for previous mitigation completed. The SRF package also included air quality conformity analysis, cultural/tribal resources evaluation, and the environmental checklist.

Nevada Irrigation District, CA - Regional Water Supply Project. Environmental Specialist supported development of the environmental constraints for identified potential alternatives. Kim also provided support of miscellaneous engineering requests during pre-design.

South San Joaquin Irrigation District, CA - Pressurization Feasibility Analysis. As Task Manager, provided full spectrum consulting services to assist in obtaining grant monies and preparing programmatic EIR. She prepared a comprehensive environmental compliance strategy and approach tied in to an environmental constraints analysis. Previously, Kim assisted the district with environmental and water components of their pressurized system pilot study and evaluating the feasibility of implementing a pressurized system District-wide.

Nevada Irrigation District, CA - Regional Water Supply Project Preplanning Spatial Analysis. As Assistant Project Manager prepared the geospatial analyses and cartography for the environmental review of this multifaceted infrastructure project. Assessments included evaluation of existing canal infrastructure, alternatives siting, and spatial calculations. Geospatial impact analyses were done to calculate waters of the US, stream crossings, impact corridors, cultural sensitivity, agricultural impacts, noise impacts, watershed and quality impacts, and other various resource assessments. Kim was responsible for the graphic design and all report deliverables and managed a team of four GIS and graphics specialists.

California American Water Company, CA - Capital Improvement Program Permitting Strategy. As Environmental Planner, supported development of CalAm's CIP process by preparing a permitting needs strategy. Review included federal, state, and local permitting requirements for this Public Utility regulated by the CPUC. Kim provided review and identification of potential permits required including local entitlements, CPUC, State Water Board and CEQA requirements, and potential Federal Funding and waters requirements. Kim also reviewed local utilities coordination efforts.

XAVIER IRIAS, PE

TECHNICAL LEAD: ENGINEERING

Professional Profile

Xavier has over 34 years of professional experience in the fields of water resources and engineering. He serves as the Senior Technical Practice Leader of Infrastructure and Design. Xavier's professional experience spans strategic planning, water and wastewater engineering, risk and financial management. As the former Director of Engineering for a major California water utility, Xavier has extensive experience developing and implementing capital programs and delivering complex projects while working with a variety of stakeholders through planning, design and construction.

Related Experience

City of Brentwood, CA - Brentwood Wastewater Plant Expansion. As Project Manager during construction, Xavier oversaw $50M in improvements including new basins, aeration blowers, secondary clarifier, and various upgrades to existing systems.

Pacifica, CA - Sharp Park Sewage Pump Station. Performed QC review for pump station rehabilitation. The project scope included wet well improvements, aeration improvements and a new odor control system.

Del Puerto Water District and San Joaquin River Exchange Contractors, CA – Del Puerto Canyon Reservoir Project. Performed QC review of 30% design of conveyance facilities. The project included a 300 cfs pumping plant, approximately one mile of 84" diameter steel pipe, and a tie-in to the Delta Mendota Canal.

Santa Clara Valley Water District, CA - Upper Llagas Creek Flood Control Improvements. Project manager of $150M project that makes major flood control improvements along 14 miles of channel. Elements include a large-diameter tunnel, earthwork and creek restoration, utility relocation, and large concrete box culverts. Phase 1 was awarded in July 2019 and is under construction.

Education

Bachelors, Civil Engineering, UC Berkeley

Registrations

Professional Engineer - CA, C44782

Professional Associations

American Society of Civil Engineers, Chair of California Water and Environment Committee, and Member of national Infrastructure Resilience Division.

American Water Works Association (AWWA), Trustee, Standards Council and Engineering & Construction Division

National Geospatial Advisory Committee, Former member

Water Research Foundation, Member of various Project Advisory Committees focused on infrastructure resilience

Experience prior to Woodard & Curran.

Director of Engineering and Construction, East Bay Municipal Utility District (2006 – 2019).

- Led development and implementation of biennial $1.9B Five-year Capital Improvement Program, working with client departments and the General Manager to cost-effectively address infrastructure needs and other concerns. Developmental steps included facility assessments, master planning, collaborative setting of priorities with client groups, and preparation of the capital budget. Implementation of the capital program in any given year includes completing dozens of complex and diverse multi-disciplinary projects.

- Led innovation efforts for the full life cycle of pipeline asset management, including use of new technologies and streamlined workflows to efficiently scale up renewal rates.

- Led major capital projects from concept to completion. For example, led the $71M San Pablo Dam Seismic Upgrades Project; collaborative, proactive approach with the internal stakeholders, as well as community and several federal, state and local regulatory agencies led to the project being completed early and under budget, winning major industry awards, and being accepted by the community.

- Managed a major study of EBMUD's water supply concerns in the San Francisco Delta. The study helped define EBMUD's strategic position on numerous political initiatives and was the key in EBMUD receiving $45M in Prop 84/1E funds to protect agency's water supply interests in the Delta region and continues to guide follow-on infrastructure investments and policy discussions.

- Led water demand development element of recent Water Supply Management Plan update, incorporating innovative Land-Use Demand methods and resulting in more accurate long-term water supply projections. Also led year-2050 updated projections.

- Chairs the Water and Environmental Policy Committee of the American Society of Civil Engineers (ASCE) to shape ASCE's California water policy and provide input to state legislators. The committee regularly meets face-to-face with state legislators and sponsors annual infrastructure symposia to inform elected and appointed officials of important infrastructure issues.

- Provides engineering expertise as a member and trustee on the American Water Works Association Standards Council and Engineering and Construction Division. The Standards Council is responsible for AWWA's internationally recognized standards program.

- Collaborated with other agencies to accomplish complex water and wastewater public works projects at least cost and lowest public impact. As one example, for DERWA facilities, helped obtain grant funding and then led implementation of major recycled water pipelines to cost-effectively promote recycled water use. As another example, for the Moraga Road Pipeline project worked with three affected cities, a regulatory resource agency and several concerned neighbors to improve project. The result was a $12.7M savings (cost was $12.3M versus an initial estimate of up to $25M), minimal impact or disruption, no claims, and an enhanced positive relationship with the community.

- Orchestrated drought planning for capital improvements. As part of this effort, identified and prioritized 23 projects to improve drought resilience that can be implemented as conditions evolve, giving our customers drought protection while minimizing cash outlay.

CHRIS VAN LIENDEN, PE

HYDRAULIC MODELING

Education

Masters, Civil & Environmental Engineering, University of California, Davis

Bachelors, Chemical Engineering, University of California, Berkeley

Registration

Professional Engineer - CA, 75034

Professional Profile

Chris has experience in water, wastewater, and stormwater infrastructure projects, including system evaluation, modeling, and design. He is currently the operations lead for Woodard & Curran's hydraulic modeling and master planning group in California and has led hydraulic model development for a variety of project sizes and types for municipal agencies throughout California. Chris has extensive experience in data analysis and report writing, and technical software skills including InfoWorks CS and ICM, WaterGEMS, H2Omap Water and Sewer, InfoWater, InfoSewer, InfoSWMM, HEC-RAS, ArcGIS, and other analysis tools. Over the past 10 years, Chris has completed model development and master plans for Central Contra Costa Sanitary District (Central San), City of San Mateo, Town of Hillsborough, City of Roseville, Delta Diablo Sanitary District, Fair Oaks Sewer Maintenance District (San Mateo County), Novato Sanitary District, and supported many others.

Related Experience

Town of Windsor, CA – Water Master Plan Update. Project Manager for the 2019 update of the Town's Water Master Plan. The Town of Windsor needed an update to their Water Master to reflect significant changes in the location and timing of future growth, and the available of additional water supplies. As the Town is in a fire prone area, the project included an evaluation of the Town's fire pressure deficiencies and potential distribution system vulnerabilities, and identified potential improvements. Chris led the model updates, which also included an update of the Town's existing and future demands, and is using the results of the analysis to develop a 20-year CIP.

City of Anaheim, CA – Water System Model Update. QA/QC Lead for the update of the City of Anaheim's water system hydraulic model. The previous model, with more than 31,000 links and 19 pressure zones, served as the basis to update the model using the latest InfoWater modeling software. The model was updated to reflect significant changes in the GIS database, and to incorporate up-to-date well and valve structure data. Demands and diurnal patterns were updated based on recent water consumption and production data, and the model was calibrated using a combination of fire flow tests and pressure logging devices recording diurnal pressure variations. As QA/QC lead, Chris reviewed the implementation of model revisions and confirmed calibration accuracy, and reviewed the model documentation.

City of San Jose, CA – South Bay Water Recycling Strategic and Master Planning. As Project Engineer, identified vulnerabilities and developed solutions for the South Bay Water Recycling Program. Chris evaluated the distribution facilities and spoke with past and present operators to identify system vulnerabilities and develop potential solutions. Chris developed a list of distribution system related projects and activities for SBWR to bring the reliability of the program up to the Level of Service goals and the expectations of its customers.

City of Pleasanton, CA - Happy Valley Water & Sewer Study. Developed a facilities plan to extend water and sewer service to a currently unincorporated portion of Alameda County. The Happy Valley Area is adjacent to the City and in need of improvements for both water and sewer service. The City wanted to investigate potential utility costs associated with annexation, and asked RMC to develop a sewer and water plan and estimate costs. Chris laid out the proposed improvements, developed estimated sewer flows and water demands, and created hydraulic profiles of the proposed sewers to determine pipeline sizing and depths. Chris used this information to estimate capital costs of the system extensions.

City of Sacramento, CA – Sewer Master Plan for Basins G304/G305. Project Engineer leading the evaluation of sewer capacity for the G304/G305 sewer drainage basins, including hydraulic model development. Trunk sewer models were developed in both InfoSewer, the City' standard software for separate sewer system, and InfoWorks ICM in order to compare results. The models were calibrated to wet weather flow monitoring data from 13 sites and used to identify capacity improvement projects to serve existing and projected future development.

City of San Jose, CA – Sanitary Sewer Master Plan, Phase II. As Project Engineer, provided ongoing support for analyses associated with the City of San Jose's Phase II Master Plan. Chris led a team to evaluate all 159 of the City's modeled sewer siphons to identify siphons with the highest risk of sediment-induced overflows. Data from the City's siphon metering program was used to estimate steady state sediment depths, and the results were compared with previous research correlating sediment depth with self-cleansing velocity. An approach for estimating sediment depth in unmetered siphons was established using a combination of available flow meter data and hydraulic modeling. The results of the modeling were discussed with City maintenance staff to identify 30 siphons with the greatest need for improvements. Solutions to address overflow risks at these siphons, by either modifying or eliminating the siphon or recommending improvements, were identified.

Central Contra Costa Sanitary District, CA – Collection System Master Plan and Model Support Services. As Project Engineer, used the District's GIS to create a new, fully connected model network in InfoWorks, and extracted almost 300 mile of trunk sewer to be used as the basis of the District's new model. Chris and the Woodard & Curran team added pump stations and other structures, and underwent quality control and validation work to ensure that the modeled system is consistent with available record drawings and survey information. The project also includes updating all modeled loads using the District's billing data, and calibrating the model using 70 flow meters installed in the 2015/2016 wet season. Chris used the model to evaluate the capacity of the District's trunk system, identify any capacity deficiencies, and propose potential improvements. Chris has continued to support the District's modeling needs in a variety of ways, including staff training, development of best practices for updating the model to reflect changes in GIS, and other assorted model requests.

City of Pleasanton, CA – Recycled Water Infrastructure Expansion – Phase 1A. Hydraulic Modeler for development of a hydraulic model of the City's proposed recycled water system and application of the model to determine pipeline sizes and potential service pressures in support of design. The City's Phase 1A expansion of its recycled water system consisted of an expedited design of 50,000 linear feet of 6-inch to 24-inch recycled water pipeline, two flow control stations, and multiple site retrofits. Chris' role was to develop the hydraulic model, simulate peak operational demand, and size the facilities. After implementation of Phase 1A, Chris has continued support by extending the model to evaluate potential new customers and a new pressure zone.

City of Roseville, CA – Roseville Recycled Water Systems Evaluation. Project Engineer updated the hydraulic model for the City of Roseville's Recycled Water System, identified infrastructure alternatives to provide service to future urban growth areas, and developed an implementation plan. Woodard & Curran completed an updated to City's Systems Evaluation for its Recycled Water system, which has undergone significant changes in organization, operations, and planning since the previous Systems Evaluation. The updated Systems Evaluation considered approaches to maximize reliability, efficiency, and flexibility to provide recycled water service to customers spread across four pressure zones and supplies from two wastewater treatment plants. The Systems Evaluation ultimately identified a phasing and implementation plan to address infrastructure needs as demands increase from an existing 400 acre-feet per year to an estimated 2,000 acre-feet per year as new developments are connected in.

ERICA WOLSKI, PE

WATER QUALITY

Education

Bachelors, Civil/Environmental Engineer, California State Polytechnic University-Pomona

Registrations

Professional Engineer - CA, 67594

Professional Associations

California/Nevada American Water Works Association

Legislative/Regulatory committee Liaison for the Inland Empire Chapter of WateReuse 2006-2007

Secretary for the Inland Empire Chapter of WateReuse 2009-2010

Professional Profile

Erica has 20 years' experience specializing in drinking water and recycled water regulatory compliance. In addition to her consulting engineering experience, she has worked for the State Water Resources Control Board, Division of Drinking Water in the field operations branch and in the Recycled Water Unit. Her project experience includes the design of water and wastewater treatment facilities, assistance with the DDW and RWQCB permitting. Erica tracks upcoming water quality regulations for emerging contaminants, such as PFAS, and microplastics, closely for Woodard & Curran and its clients and makes recommendations for how to integrate these requirements into their existing water quality monitoring plans. While working at DDW, she inspected and permitted water systems, assisted in developing drinking water and recycled water policy, and gave presentations on behalf of DDW.

Related Experience

Vallecitos Water District, CA – Evaluation of San Marcos Valley Groundwater Basin Supply Options. Project Manager reviewed the use of the basin as a source of non-potable irrigation water, source water for a drinking water desalter and for potential use for groundwater recharge and extraction of advanced treatment recycled water.

Los Angeles Department of Water and Power, CA - Headworks Direct Potable Reuse Evaluation. Ms. Wolski is the task lead for development of the Roadmap Technical Memorandum which lays out the assessments needed and proposed schedule for LADWP to construct a 1.0 mgd DPR demonstration facility and later modify it into a 1.0 to 10 mgd full scale DPR facility for discharge to the Headworks Reservoir Complex. Other assessments involved with include source water quality evaluation including for NDMA and DBP formation and integration of the advanced purified effluent into the drinking water system, including corrosion control, nitrification, disinfection residual stability and DBP formation.

Yucaipa Valley Water District (YVWD), CA - DDW Permitting and Other Regulatory Assistance. Project Engineer assisting with the permitting process for the District's water treatment plant which began operation in 2007. Erica also prepared YVWD's triennial Public Health Goal reports and fluoridation cost reporting.

State Water Resources Control Board, Division of Drinking Water, Field Operations Branch. As an Associate Sanitary Engineer, Ms. Wolski completed the following projects: 1) DDW liaison with Imperial Irrigation District (IID): IID provides untreated surface water via irrigation canals to most Imperial County water systems and operates a joint water quality monitoring program for the raw water system to reduce costs to drinking water consumers. 2) Inspected and permitted the following water systems: Carlsbad Desalination Plant (first large-scale desalination project permitted in California); multiple conventional treatment plants ranging in size from 7 MGD to over 100 MGD throughout California; and multiple groundwater systems throughout California.

West Bay Sanitary District, CA – Sharon Heights Recycled Water Program Management. The project consisted of construction of a new MBR/UV satellite facility to produce recycled water for a golf course and fill station. Erica provided technical support for permitting of the UV system and coordination assistance with DDW and the San Francisco RWQCB. Erica assisted with finding a third party witness for the bioassay and helped the design engineer and operator understand DDW's UV operating conditions and with coordination of the approval for the first and second bioassay reports submitted. The Notice of Applicability was issued in 2020 and the project has begun producing recycled water.

Santa Clarita Valley Water Agency, CA – New Drop Concept Technical Memorandum. Project Manager supporting SCV Water with development of a technical memorandum to document their tracking and verification program for avoiding a Section 1211 Water Rights Petition (Wastewater Change Petition) with the State Water Resources Control Board – Division of Water Rights. Section 1211 petitions are not needed for new wastewater flow that has never been discharged to a river. The "New Drop" program tracks wastewater flows from new developments, including infill development; estimates flow from these developments; verifies it with targeted sewer flow monitoring and generates quarterly reports for submittal to the Regional Water Quality Control Board as part of SCV Water's recycled water permit. The project uses and tracks potable water makeup at SCV Water's recycled water tanks to "use" recycled water that is sent to the Santa Clarita River to reserve it for future use.

Coachella Valley Water District (Coachella Valley Regional Water Management Group), CA - Coachella Valley IRWM Program. Project Manager for the preparation of the grant application for the Prop 1 Round 1 Implementation Grant that was submitted in November 2019. As Project Manager, helped manage staff during the grant application process, reviewed application attachments for compliance with California Department of Water Resources (DWR) Guidelines, ensured consistency between projects, and coordinated with DWR and project proponents. The grant proposal included six projects and was ranked the highest out of the grant proposals submitted in the Colorado River Funding Area.

Irvine Ranch Water District (IRWD), CA - Manning Water Treatment Plant Expansion and Upgrades. Project Engineer met with DDW during the PDR stage to familiarize DDW with the upcoming plant changes and was available throughout the permitting process to answer DDW questions and provide additional requested information. This project has been ongoing since 2005 and has consisted of various phases. The first phase included updating the operations plan for submittal to DDW, the addition of individual filter effluent (IFE) turbidimeters for Long Term 1 Enhanced Surface Water Treatment Rule compliance and the addition of a coagulation alarm. Later phases included the addition of ammonia injection to the plant to switch from free chlorine to chloramines for a distribution system residual; completion of an amendment to the 1999 Negative Declaration for CEQA compliance; and completion of a preliminary design report (PDR) for the expansion of the plant to 360 gpm without adding filters or additional disinfection capacity and expansion to 500 gpm with the replacement of the District's current on site hypochlorite generator with bulk hypochlorite feed and storage.

Carpinteria Valley Water District, CA - Carpinteria Advanced Purification Program (CAPP) Indirect Potable Reuse Project. The CAPP project will reuse up to 1.2 MGD of effluent that is currently discharge to the ocean and will treat it at a new AWPF and inject it into the Carpinteria Groundwater Basin for extraction by CVWD. Ms. Wolski has been the Project Manager for the overall program since May 2019, which includes development of the funding and financing plan, development of stakeholder outreach materials and Clean Water SRF funding application. Ms. Wolski is also the task lead for the DDW and RWQCB permitting tasks, which include preparation of the Report of Waste Discharge for the advanced treated water injection into the basin, the Report of Waste Discharge for the brine discharge to the ocean, and the Title 22 Engineering Report for DDW approval. The Report of Waste Discharge tasks include preparation of an antidegradation analysis for boron and nitrate for basin injection and an Ocean Plan Compliance Evaluation for the brine discharge to the ocean.

City of Oceanside, CA - Pure Water Oceanside) Indirect Potable Reuse Project. While in the Recycled Water Unit of DDW, Ms. Wolski attended projects meetings regarding the project and provided feedback on the proposed project and the draft Title 22 Engineering Report. Since joining Woodard & Curran in September 2018, Ms. Wolski is the task lead for completion of the Title 22 Engineering Report and Report of Waste Discharge, which are anticipated to be submitted to DDW and RWQCB in early 2020. Since January 2019, Ms. Wolski has also been assisting the City with coordinating DDW and RWQCB meetings and preparation of meeting materials and with regulatory review of the design engineer's plans and specifications.

DAWN FLORES

GIS AND MAPPING

Education

Masters, Environmental Science and Management, University of California, Santa Barbara

Bachelors, Geography, University of California, Santa Barbara

Professional Associations

California Stormwater Quality Association

Professional Profile

Dawn is a water resources planner with over 13 years' experience in water resources planning and management. She has extensive experience in GIS analysis and advanced data analysis. She has served as a company GIS lead, providing direction on best practices for mapping and spatial analyses, and developing processes and procedures to support water resources planning. Dawn has applied spatial analysis solutions to projects ranging from spatial projection of demands for use in hydraulic models to developing maps to preparing "heat maps" of nonpotable demand density to delineating watersheds. In addition, she has extensive experience in preparing maps for use in technical reports, public facing documents and presentations.

Dawn is also experienced in applying climate risk analysis to water resources planning. Dawn has conducted qualitative climate change vulnerability analyses as part of regional planning, including integrated regional water management plans and a vulnerability study prepared for the Metropolitan Water District of Southern California. She has also incorporated quantitative climate change analyses into long-range water supply planning studies. For example, Dawn is currently managing a supply reliability study being prepared for California Water Services that is incorporating climate change assumptions into modeling scenarios.

Related Experience

City of Pomona, CA - Integrated Water Supply Plan and Urban Water Management Plan. Project Planner assisted in preparation of the baseline conditions report for supply and demand, developing supply options and integrated alternatives, assessing alternatives using the Water Evaluation and Planning System (WEAP), and developing the UWMP. For the UWMP, Dawn was involved in preparing baseline demand and gallons per capita per day targets (GPCD) in compliance with SBx7-7, developing supply projects, and working closely with City staff to obtain buy-off on GPCD targets and UWMP messaging. Dawn coordinated with DWR to ensure that the GPCD targets were in compliance with DWR. An Integrated Water Supply Plan has been developed to provide Pomona with a plan to meet long-term demands through the use of the most beneficial and cost-effective supplies, has provided the basis for completion of Pomona's Urban Water Management Plan (UWMP).

Mission Springs Water District, CA - Coachella Valley Integrated Regional Water Management Program. Project Planner provided GIS support to this planning effort, including creation of maps, development of shapefiles and analysis of spatial data. Woodard & Curran worked with various agencies in the Coachella Valley to create an integrated regional water management plan (IRWMP), in addition to writing grant applications for Proposition 84 Planning and Implementation grants.

San Francisco Public Utilities Commission (SFPUC), CA - Citywide Cistern Conceptualization. GIS Specialist for an analysis of citywide underground stormwater storage was done for the San Francisco Public Utilities Commission. Dawn completed a GIS analysis of potential cistern sites compared to potential recycled water users.

City of Palmdale, CA - Recycled Water Facilities Planning Study. GIS Specialist responsible for creating and updating GIS maps to show potential recycled water options in relationship to existing and future demand. This project assesses the feasibility of alternatives for expanding recycled water use to secure a reliable future water supply.

El Dorado Irrigation District (EID), CA - Recycled Water Seasonal Storage. GIS Specialist created maps of alternative pipelines and reservoirs, and performed a terrain analysis to allow for the determination of the feasibility and cost of alignment options. This project involves the site selection and design of recycled water seasonal storage and a review of related regulations, funding resources research, and stakeholder outreach.

City of Los Angeles Department of Water and Power (LADWP), CA - Los Angeles Recycled Water Master Plan. GIS Specialist maintaining a GIS database, analyzing spatial data and creating project maps. An in-depth master plan for utilization of recycled water across the City of Los Angeles is being created.

Goleta Water District, CA – Urban Water Management Plan (UWMP). Managing development of the 2020 UWMP, including projecting demands and supplies, updating the water shortage contingency plan, and preparing supply reliability assessments.

City of Burbank, CA – Urban Water Management Plan (UWMP). Managing development of the 2020 UWMP, including projecting demands and supplies, updating the water shortage contingency plan, and preparing supply reliability assessments.

Upper Santa Ana River Watershed Integrated Regional Urban Water Management Plan (IRUWMP) – Task manager for integrated regional water management plan components of the IRUWMP, including updating components of the region description, revising goals and objectives, revising strategies, reviewing and updating projects, and preparing an implementation plan.

California Water Services (Cal Water) Bay Area Regional Water Supply Reliability Study – Project Manager responsible for preparing a supply reliability study that incorporates supplies and demands for Cal Water's four service areas located in the Bay Area.

Indio Subbasin Alternative Plan Update – Serving as support for development of demand projections, supply projections, and plan scenario development.

Airport Boulevard Sewer Consolidation Project – Project Manager responsible to overseeing development of the preliminary engineering report and IS/MND, conducting public outreach, and preparing applications for USDA and SRF funding.

City of Pomona, CA – Strategic and Master Planning. Deputy Project Manager for development of the City's 2018 Strategic Plan, Water and Wastewater Master Plans, and Integrated Water Supply Plan Update. Dawn assisted in facilitating workshops with City staff to perform a SWOT analysis, developed objectives and targets, and drafted the Strategic Plan for the water and wastewater department. Dawn was responsible for development of the Integrated Water Supply Plan (IWSP) update, which included facilitating workshops with City staff, revisions to current and projected baseline supplies, analysis of potential supply and facility options, and development of alternatives that reflect the City's desire to both increase supply independence and contribute to regional water supply security. Dawn was also responsible for development of the Water Master Plan, which included coordination with a hydraulic modeling team and software development team, coordination with City staff to obtain data and modeling criteria, development of demand projections, and development of a CIP project list.

ANDREE JOHNSON

TECHNICAL LEAD: PLANNING

Education

Bachelors, Geography & Environmental Studies, University of California

Professional Associations

Urban Water Institute, Board Member

Professional Profile

Andree has 14 years of experience managing water resources projects for agencies. She has extensive expertise in water demand forecasting, water use efficiency program planning and implementation, drought management, and water supply planning and development. She is also experienced in capital improvement planning, program budget development and management, facilitation and consensus building, and contract management and procurement.

Related Experience

Los Angeles County Department of Public Works, CA – County Water Plan Phase 1. Task leader for stakeholder coordination and work plan development for countywide water plan. Facilitated discussions with 13 water management agencies and Public Works project team to establish strategy, vision, and focal areas for plan development. Developed approach for preparing plan through an inclusive multi-agency workgroup process.

Coachella Valley Water District, CA – Indio Subbasin WY 2019-2020 Annual Report. Project Manager for preparation of Annual Report for Indio Subbasin on behalf of four Groundwater Sustainability Agencies per Sustainable Groundwater Management Act Requirements. Led analysis and report preparation to explain water use and sources, groundwater extractions, groundwater balance, and groundwater basin setting. Facilitated coordination and meeting with GSAs for development and review of report content.

Bay Area Water Supply and Conservation Agency, CA – As-Needed Water Resources Support. Expert advisor for long-term water supply planning, demand forecasting, drought management, and water conservation program implementation.

City of Poway, CA – 2020 Urban Water Management Plan. Project Manager for preparation of 2020 Urban Water Management Plan. Preparing water demand forecast, water reliability analysis, water shortage contingency plan, and other plan sections. Coordinating public noticing and public hearing process.

City of Millbrae, CA – 2020 Urban Water Management Plan. Project Manager for preparation of 2020 Urban Water Management Plan. Preparing water demand forecast, water supply estimates, water reliability analysis, shortage contingency plan, and other plan sections. Coordinating public noticing and public hearing process.

Orange County Water District, CA – Facilitation of Joint Agency Working Group on Annexations. Facilitator for a working group of Orange County Water District (OCWD) and its 19 member agencies to establish an agreement for potential annexation of additional lands into the OCWD service area. Perform analysis of

annexation policies and financial impacts and water supply impacts to OCWD's member agencies. Lead bi-weekly forums to discuss the annexations and associated issues.

Municipal Water District of Orange County, Poseidon Resources, CA - Huntington Beach Desalination Project Delivery Integration and Analysis. Lead analyst for a series of studies evaluating methods, costs, and institutional arrangements for integration of desalinated water into Orange County's water supply. Analyzed demand patterns and system operations for each of the 19 agencies interested in participating in the project to determine potential desalinated water purchase amounts and operational delivery patterns through existing and proposed facilities. Examined "wheeling" issues associated with the use of existing facilities for conveyance of desalinated supplies and prepared cost estimates. Identified institutional arrangements for water exchange agreements and evaluated the potential reliability impacts.

Indio Water Authority, CA – Water Master Plan Update. Project Analyst for preparation of Water System Master Plan Update. Developed water supply and demand forecasts and allocated geographically for integration with hydraulic model. Analyzed average day, maximum day, peak hour usage, and diurnal demand patterns. Assessed existing and long-term supply capacity.

California Department of Public Health, Drinking Water Infrastructure Needs Survey and Assessment (2007 and 2011). Project manager for EPA survey to assess the 20-year capital project needs for 170 California drinking water utilities to determine California's allocation from the national Drinking Water State Revolving Fund. Led completion of surveys for each utility analyzing capital projects including new supply needs, replacement projects, and refurbishment projects for all drinking water infrastructure. Coordinated with client, two subcontractors, EPA, and 12 internal team members.

California Avocado Commission, CA - Water Industry Liaison. Project Analyst for identification of water supply, water quality, and water pricing issues related to Metropolitan Water District. Tracked water supply conditions and prepared monthly reports. Represented client at monthly Metropolitan WD Board and Committee meetings. Analyzed financial and water supply impacts to client for scenarios to modify or phase out Interim Agricultural Water Program.

Mesa Water, CA – Water Policy Representation. Represent a retail water agency at its imported water agency, groundwater management agency, and regional forums. Track and inform client on industry activities and water resource and policy issues and perform institutional, technical, financial and policy analysis. Advocate the interests of Mesa Water's adopted policy positions at the regional level and among other retail agencies. Work closely with Mesa Water Board of Directors and management as well as other agencies' managers and elected officials on the development of sound water policies.

Bay Area Water Supply and Conservation Agency, CA –Urban Water Management Plan Member Agency Support. Agency Project Manager for supporting member agencies in UWMP development. Prepared common language on water supply projects, shortage allocations, and water supply availability. Calculated agency allocations. Developed process for annual water supply and demand assessments.

Bay Area Water Supply and Conservation Agency, CA – Regional Demand and Conservation Projections Project (2014 and 2020). Client Project Manager for development of 25-year water demand and conservation savings projections for 26 retail water agencies and regional overall, using a combination of end use modeling and econometric modeling. Developed and managed implementation of scope and budget. Let coordination efforts with member agencies and external stakeholders.

BRIAN DIETRICK, PE

SUPPLY PROJECT DEVELOPMENT AND ANALYSIS

Education

Masters, Civil/Environmental Engineering, Loyola Marymount University

Bachelors, Civil/Environmental Engineering, Duke University

Registrations

Professional Engineer - CA, 54920

Professional Associations

Water Environment Federation

California Water Environment Association

American Society of Civil Engineers

CA WateReuse, Los Angeles Chapter

Professional Profile

Brian has 29 years of experience and specializes in facilities planning and integrated planning for recycled water, water resources, and wastewater projects. He has experience in technical planning for collection systems, distribution systems, groundwater recharge facilities, integrated regional water management plans, urban water management plans, and environmental impact and regulatory compliance reports. Brian's design experience includes recycled water pipelines, large-diameter trunk sewer relief and replacement projects, sewer force mains, and sewer rehabilitation. He is also experienced in funding, cost estimating, industrial waste discharge, and public outreach. In addition to his engineering planning and design experience, Brian has served as a faculty lecturer at Loyola Marymount University for graduate level solid waste management courses.

Related Experience

Eastern Municipal Water District, CA - Perris North Basin Groundwater Contamination Prevention and Remediation Program. Program Manager for the remediation program that was developed to address areas of contamination in the Perris North Basin that have forced the shutdown of wells, threatened potable water supply wells, or have the potential to threaten contamination of existing or future water supply well sites. This multi-benefit program will prevent the spread of contamination in the Basin by extracting and treating contaminated groundwater near the source of contamination, accelerating the cleanup of contamination through the use of active treatment, and protecting areas of the Basin not contaminated by intercepting and remediating plumes before they reach potable wells. The Program includes seven new extraction wells at six new locations, with treatment facilities co-located at three of the sites. The Program also includes a network of new monitoring wells. EMWD was awarded a $45 million grant through the SWRCB's Proposition 1 Groundwater Grant Program (GWGP) to fund the $90 million program.

City of Los Angeles, CA - Recycled Water Master Plan, Long Term Concept Report. Deputy Project Manager, for three years, managing a consultant team of 12, including three subconsultant partners. Prepared scope, budget, and earned value analysis reports. Wrote and/or edited numerous technical memoranda on wastewater treatment, regional recycled water systems, regional groundwater assessment, Los Angeles River flow assessment, direct potable reuse, treatment plant opportunities, preliminary project screening, advanced treatment temperature analysis, and Central and West Coast Basin Judgment Amendments. Concept-level cost estimates and permitting/institutional issues were characterized for each of the long-term concept projects, most of which involve advanced wastewater treatment and large-scale groundwater recharge and recovery.

Santa Ana Watershed Project Authority (SAWPA), CA - Santa Ana River Conservation and Conjunctive Use Program (SARCCUP). Co-project manager for the SARCCUP program management. SARCCUP is a cooperative effort between Eastern Municipal Water District, Inland Empire Utilities Agency, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District, which are the member agencies of SAWPA. The Program focuses on banking 150,000 AF to 180,000 AF of wet year water in multiple groundwater basins and providing the extraction facilities and linkages to allow up to 60,000 AFY of banked water to be utilized by all five agencies during dry water year conditions. The $160 million Program is being funded by a combination of $55 million in Proposition 84 grants and $105 million in local funding. The Program also includes in-stream conservation efforts (Arundo removal), water use efficiency programs, and environmental habitat enhancements for the endangered Santa Ana Sucker.

Eastern Municipal Water District (EMWD), CA - Recycled Water Strategic and Master Plan. Project Manager for a recycled water strategic and master facilities master plan to set the near- and long-term course for recycled water use. The plan evaluates options to achieve zero year-round discharge as flows from four wastewater treatment plants increase from 45,000 AFY to 80,000 over 30 years. The plan focuses on options to implement over 20,000 AFY of groundwater recharge via surface spreading, 10,000 AFY of large landscape irrigation, and 10,000 AFY of agricultural irrigation. Our team has evaluated facility, policy, and phasing options to achieve the different end uses. The plan was successful in avoiding the need for new seasonal storage, limiting the need for elevated storage, and removing $70 million of projects from the previous CIP.

Antelope Valley (AV) Regional Water Management Group, CA - Integrated Regional Water Management Plan. Project Manager of the IRWMP Plan Update and the Round 2 Implementation Grant Applications. Woodard & Curran worked with the Antelope Valley Region to update its IRWM Plan, prepare an integrated flood management plan, provide support for development of a Salt and Nutrient Management Plan, and to support further disadvantaged community outreach in the Antelope Valley Region. The region sought to address groundwater adjudication lawsuits, the development of groundwater banking options, and the expansion of recycled water systems to offset further need for imported water from the Bay-Delta. The project included extensive stakeholder outreach to a wide variety of agency, nonprofit, municipal, and local citizen groups.

City of Escondido, CA - USBR Agricultural Water Conservation and Efficiency Grant Application. As Project Manager, led a team of staff in preparing all grant materials and documentation; the request was for $1.0 million in federal grant funding. Woodard & Curran assisted the City of Escondido with the completion of a Bay-Delta Restoration Program: Agricultural Water Conservation and Efficiency Grant application. This project proposed to design and construct recycled water facilities, including pipelines, a storage tank, and a pumping station to enhance recycled water supplies to agricultural and other users within the City's service area.

Las Virgenes Municipal Water District (LVMWD), CA – Preliminary Advanced Water Treatment Plant Siting Study. As Project Manager, led a team, including Associated Right of Way Services as a subconsultant, that conducted an extensive siting study for a proposed advanced water treatment plant (AWTP). The AWTP is envisioned for a future potable reuse project that will provide purified water to offset imported supplies at the District's local surface water reservoir. The study began with over 10,000 potential parcels; and using various screening criteria and a detailed comparative analysis, we narrowed down the number to nine preferred sites. The remaining preferred sites will be used for subsequent public outreach efforts and environmental documents.

Water Replenishment District of Southern California (WRD), CA – Groundwater Basins Master Plan and Programmatic EIR. As Project Manager, supported the team of Environmental Science Associates and Woodard & Curran to prepare the Programmatic EIR for the GBMP, including development of a detailed project description and impact analysis for groundwater hydrology. Woodard & Curran teamed with CH2M Hill and Environmental Science Associates to provide technical and strategic support for the development of a long-term plan for the Central and West Coast Groundwater Basins, and for the Programmatic EIR that covers the plan. Working closely with the basin pumpers and stakeholders, the Plan identified and evaluated alternatives for increasing groundwater replenishment to meet anticipated future groundwater demands as well as groundwater storage projects to maximize the benefit of local supplies and available basin capacities.

WARREN GRECO

SUPPLY AND DEMAND FORECASTING AND COLORADO RIVER

Education

Masters of Urban and Regional Planning, California Polytechnic State University, Pomona

Bachelors, Arts, Political Science, University of California, Irvine

Professional Profile

Warren brings 12 years of experience in water resources with a specialization in regional water resource planning. He has experience in integrated water resource management, water demand forecasting and conservation planning, dynamical systems models and decision support tools, climate change planning, and risk analysis. Warren has been at Woodard & Curran for four years and has prior experience for wholesale water providers and regional planning agencies in California and Arizona.

Related Experience

Metropolitan Water District of Southern California, CA - Resources Vulnerability Assessment. Planner and lead author for development of matrix and narrative to qualitatively describe uncertainties and vulnerabilities to all of the water supplies for Southern California, including sources outside of the region, such as the State Water Project and Colorado River, and local sources, such as desalination and recycled water.

Irvine Ranch Water District – Water Shortage Contingency Plan. As project manager, prepared a Water Shortage Contingency Plan for the Irvine Rach Water District that incorporated the lessons learned during the recent California drought as well as changes to the California Water Code under Senate Bill (SB) 606 and Assembly Bill (AB) 1668. The project also included estimates of likely savings by implementing different levels of change to allocations to specific customer classes, using spreadsheet tool designed for use by IRWD during implementation of WSCP stages.

Marin Municipal Water District, CA - Water Resources Plan 2040. Planner with the GoldSim modeling team simulating the District's supply system and defining future supply vulnerabilities. Woodard & Curran worked with the District to develop a Water Resources Plan 2040 to ensure that it can continue to provide reliable, high quality water to its customers for the next 25 years and beyond. The plan defines supply options needed to maintain resiliency through climate change, extended droughts, and other potential future scenarios.

City of San Diego, CA - Water Supply Vulnerability Assessment. Deputy Project Manager and Modeling Task Lead for a first-of-its-kind effort for the City to combine a sustainability assessment with a comprehensive evaluation of risks and uncertainties facing the City's water supply. The project will quantify sensitivities and vulnerabilities for each source of supply in the City's water supply portfolio, including an analysis of the supply and demand impacts from climate change, extended droughts, earthquakes, fires, and other future reliability threats.

Cachuma Conservation Release Board & City of Santa Barbara, CA - Santa Ynez River Hydrologic Modeling Services. Project Manager for hydrologic modeling services that include use of a RiverWare model and other supporting technical work to simulate daily operations and management of the three reservoirs on the Santa Ynez River, including Lake Cachuma and Gibraltar Reservoir, and their impacts under a range of operational scenarios in support of water supply and fisheries analyses.

West Valley Central Arizona Project Subcontractors, AZ - West Salt River Valley Basin Study. Planner responsible for the developing growth scenarios and demand projections using GoldSim. The Central Arizona Project worked with WESTCAPs and the U.S. Bureau of Reclamation to forecast regional water supply and demand, taking into account climate change and population growth projections, and strategies to address current and future imbalances.

Central Arizona Groundwater Replenishment District, AZ - 2015 Plan of Operations. Planner working as part of the GoldSim modeling team, developing a model for forecasting regional water supply and demand. The Central Arizona Project developed a Plan of Operations to ensure that the CAGRD can continue to meet its obligations to replenish groundwater resources in areas of Arizona where significant groundwater depletion has occurred in accordance with the state of Arizona's Assured Water Supply rules.

Cachuma Conservation Release Board, CA - Lake Cachuma Water Quality & Sediment Management Study. Deputy Project Manager for development of a program to characterize issues and identify solutions for long-term management of Cachuma lake. The project includes assessing water quality and sedimentation issues at Lake Cachuma and develop recommendations for future management actions, such as watershed and wildfire management, sampling and monitoring, modeling, treatment of lake water at the lake, and erosion and stormwater controls.

Goleta Water District, CA - Range of Total Organic Carbon in Lake Cachuma. Project Manager for analyzes the sources of TOC in Lake Cachuma and providing an expected range of future TOC levels for the Corona Del Mar Water Treatment Plant as a result of major wildfires, postfire precipitation events, and extreme low levels in the lake.

City of Palo Alto, CA - Northwest County Recycled Water Strategic Plan. Task lead developing a probabilistic model in GoldSim to complete a business analysis and risk assessment for future investments in recycled water infrastructure. The model assesses the cost-effectiveness of alternatives under different economic factors to evaluate the probability of combinations of overall risk to assess the feasibility of both non-potable and potable reuse options for the region.

San Gorgonio Region, CA - Integrated Regional Water Management Program. Deputy Project Manager for the development of the first IRWM Plan for the San Gorgonio Region. Supported region in initial set up of regional water management group and governance structure, definition of regional boundary, stakeholder advisory committee and public involvement as well as DWR coordination and communication. Planning process included development of overall IRWM plan to meet local and DWR needs as well as three related technical planning efforts: development of an integrated watershed and groundwater model in advance to support basin understanding and SGMA compliance, a regional water reliability assessment that generated project concepts to enhance future supply and a regional recycled water study that identified opportunities to work collaboratively on increasing beneficial use of resources and improving water quality.

Municipal Water District of Orange County, CA - Orange County Water Use Efficiency Master Plan. Planner with MWDOC hosting a series of workshops and assisting in the development of a spreadsheet tool for analyzing the cost effectiveness of conservation investments, and in writing final report. MWDOC developed this plan to define how Orange County will comply with the state's 20% by 2020 requirements and achieve Orange County's share of the Metropolitan Integrated Resources Plan goal for water use efficiency.

SAMANTHA SALVIA, PE

WATER MANAGEMENT POLICIES AND PRACTICE

Education

Masters, Environmental and Water Resources Engineering, Stanford University

Bachelors, Philosophy, Politics, and Economics, University of Oxford

Bachelors, Civil Engineering, Old Dominion University

Registration

Professional Engineer - CA, 62425

Professional Association

ASCE

Women in Environment

Professional Profile

Samantha is a civil engineer with more than 15 years' experience in water resources project management, planning, and environmental compliance. Samantha combines a technical background in surface water and operations modeling with practical experience in water resource management issues. Her experience working in the public sector provides her an understanding of water agency and client perspectives. While a principal engineer at the Contra Costa Water District, Samantha led the District's $100 million capital project to build a new Delta intake from project planning through design. As a consultant, she has managed several water resources technical studies, permitting efforts, and environmental impact reports for complex, multi-benefit and multi-agency projects in Northern California.

Related Experience

Merced Subbasin Groundwater Sustainability Agencies - Merced Subbasin Groundwater Sustainability Plan. As Project Coordinator, Samantha is overseeing all the activities necessary to complete and submit a DWR-compliant GSP for the critically over-drafted Merced Subbasin by January 31, 2020. This includes managing the technical teams conducting groundwater modeling in support of development of water budgets, developing the Data Management System, organizing monthly GSA and stakeholder coordination meetings, implementing a robust public engagement strategy, and collaborating with the GSAs on preparing implementation plan. The goal of the GSP is to put the subbasin on a path to achieving sustainability by 2040.

San Francisco Public Utilities Commission, CA – Wastewater Enterprise Regulatory Support. Provides ongoing strategic support on a variety of regulatory compliance issues as needed for the San Francisco Public Utilities Commission's (SFPUC) Wastewater Division. The SFPUC's combined collection system is unique in its size and complexity. The goal of this work has been to assist SFPUC management and staff in aligning internal plans for asset management and capital projects with external coordination with regulators. This has included developing communication pieces for discussions with regulators on the SFPUC's Longterm Pollution Control Plan and wet weather operations and working closely with SFPUC staff in evaluating regulatory compliance options.

City of Antioch – Brackish Water Desalination Project. Samantha is serving as an extension of City Staff providing coordination and oversight on the City's most critical drinking water project. The City of Antioch's Brackish Water Desalination Project is being implemented to improve the City's water supply reliability and water quality utilizing existing infrastructure. Samantha reviews deliverables from the various consulting teams working on the project (environmental, water resources, design, and permitting), represents the City at meetings with regulatory and funding agencies, directs analyses related to Delta hydrology and water quality, and assists City staff in successfully keeping this critical Delta project on schedule.

City of Napa, CA - Napa Reservoir and Watershed Operations Master Plan. As Task Lead, oversaw the Woodard & Curran team developing a master plan that will provide short and long-term planning services for the City of Napa's service water reservoirs - Lake Hennessey & Milliken and provides water for 84,000 people. The City owns and operates two local surface water dams, reservoirs, and treatment plants vital to the City and surrounding unincorporated Napa County; and provides treated and wheel services to the Cities of Calistoga, American Canyon, and St. Helena (wholesale water). Woodard & Curran is looking at the reservoirs and watershed facilities operations to assess the current situation and thus calculate future scenarios and make recommendations. The goal is to ensure a stable and sustainable water supply for City customers. Specific tasks include flow releases from the Hennessey and Milliken dams; watershed monitoring and water quality in tributaries and reservoir analysis; recreation and management of public access around reservoirs; spillway capacity. The Master Plan will include a series of Technical Memorandums that will focus on: dams flow release; reservoir water quality; watershed monitoring, analysis and modeling; recreation uses and invasive species prevention; and dam spillway capacity.

Contra Costa Water District, CA - Alternative Intake Project. Project Manager for one of CCWD's largest capital projects, a $100-million water quality project to add a new drinking water intake in Sacramento- San Joaquin Delta. She was responsible for managing all elements of planning, design, permitting, public outreach, and land acquisition. The project included a 250 cfs intake and pump station, a large diameter pipeline, and tunnel. She directed a consultant team of over ten firms in addition to supervising CCWD staff. She formulated strategy and directed a legal team in land acquisition for the project. Samantha completed the two-year planning phase including project EIR/EIS and biological opinions in coordination with the U.S. Bureau of Reclamation while keeping the project on schedule and under budget. She managed the project through 50% design. The project began operation in July 2010.

City of Modesto, City of Turlock, Del Puerto Water District, CA - North Valley Regional Recycling Program. Project Manager for phase 2 of a Title XVI feasibility study for the North Valley Regional Recycling Program. The Program is a regional solution to address California's water crisis by making tertiary-treated recycled water available to the drought impacted west side of Stanislaus, San Joaquin, and Merced Counties for farmland irrigation. It builds on a feasibility study prepared by Woodard & Curran that evaluated delivery and conveyance alternatives for recycled water in the DPWD service area. The study evaluated the timing and availability of recycled water, conveyance options, and necessary institutional agreements and environmental requirements including assessing water rights and performing environmental studies. The third and fourth phases of the Program included completing a joint EIR/EIS, completing conceptual level engineering development, completing a joint NPDES permitting, completion of recycled water rights, local and elected officials outreach, and funding support, including pursuit of state grants and a State Revolving Fund loan.

South Sutter Water District, Palmdale Water District, San Bernardino Valley Municipal Water District, and City of Napa, CA - Garden Bar Water Supply Project. As Project Coordinator, assisted the project partners in several areas including public outreach and identifying potential additional partners. Project included a feasibility analysis for development of a new $450-million water supply project in Northern California. If implemented, the project would have developed up to 120,000 AFY of new water supplies. The work included evaluation of a new dam upstream of an existing dam to develop addition water supply and hydroelectric power generation capacity. Work focused on confirming project economic and permitting feasibility and development of agreements for potential project partners. The project included the construction and operation of a rock-fill dam, surface water storage reservoir, and hydroelectric power facilities.

RICHARD FEDDER, PE

WATER RATES

Professional Profile

Toby has over 25 years of experience in the civil/environmental engineering and financial management industries. He leads Woodard & Curran's utility financial management consulting efforts and presently serves on several professional association committees, specifically, the AWWA's Finance Accounting and Management Controls Committee and the NEWWA Finance Committee, and the WEF Utility Management Committee. Toby is an instructor at the NEWWA Water Ratemaking Course and a contributing Author and/or Editor on two AWWA Manuals of Practice related to utility financial management. He has completed financial assessments on many utilities, including life-cycle costing, rate setting, capital plan projections and funding plan development.

Related Experience

North of River Sanitary District (NORSD), CA – Industrial Discharger/Pretreatment Fee Support. Under new permit conditions, NORSD was required to initiate a substantial pretreatment program for certain customer classes. Working with technical staff in the Los Angeles office, we assisted NORSD in the development and defense of new annual administrative charges for the various calls of industrial dischargers to the collection system. Work included the development of a modeling tool to assist in the allocation of administrative budgets, the assessment of probable costs associated with administering the pretreatment program, and the projection of future costs and revenues associated with different fee options available to the utility, allowing the utility to make informed decisions as it decides the most appropriate way to recoup new costs to the system.

City of Sacramento, CA – Groundwater Assets Financial Planning. As part of a larger technical assessment of groundwater sources used by the Sacramento water system, Woodard & Curran prepared a financial tool to estimate the probable costs of upgrading individual assets while allowing for modifications to assumed construction timetables. This tool allowed for the optimization of the asset renewal program, ensuring that adequate groundwater supplies would be available at all times while optimizing the cost efficiency of the overall program.

Town of Hull, MA – Wastewater Regionalization Support. Technical Lead on the assessment of options and financial impacts associated with regionalizing wastewater services for three communities in coastal Massachusetts. The Town of Hull, which already owned and operated a WWTF, along with several surrounding communities was interested in better understanding the probable financial benefits of entering into multi-community efforts to comply with evolving NPDES requirements. The work included the construction of a financial model to assess multiple financial structures for the regional effort along with multiple meetings and public presentations.

Education

Bachelors, Civil / Environmental Engineering, University of New Hampshire

Registrations

Professional Engineer – ME
Professional Engineer – NH

Professional Associations

American Society of Civil Engineers, Member
American Water Works Association, Member - FAMC Committee
New England Water Works Association, Member - Financial Management Committee
New England Water Works Association, Member
UNE Environmental Engineering Program Advisory Board, Member - Vice Chair
Water Environment Federation, Member

Technical Expertise

Utility Management Consulting
Rate Studies and utility financial assessments
Utility Financial Modeling
Capital Funding Plan Development

Eastern San Joaquin Groundwater Authority, CA – ESJ Groundwater Sustainability Plan Preparation. Technical Lead on outlining potential financing plan for GSP implementation, including discussions of costs sharing across multiple entities with variable groundwater availability. Duties include leading a discussion of financing options with both ESJ representatives and stakeholders discussing the mitigation of financial impacts while balancing financial capacity and needed investment for compliance with SGMA requirements.

Delta-Mendota Water Authority, CA – Northern & Central Delta-Mendota Region Groundwater Sustainability Plan Preparation and Subbasin Coordination. Technical Lead on discussions and meeting with the client to develop a sustainable financing plan for GSP implementation. Duties include overseeing the development of budgets and delineation of viable financing plans for complying with SGMA requirements.

City of O'Fallon, MO – Water and Sewer Cost of Service Study. Project Manager for the completion of a water and sewer cost of service study for a utility with major investment needs. This study was completed taking into account the City's existing Capital Improvement Plans, incorporating the preliminary recommendations of a Water System Master Plan. The study examined the recent historical performance of the water and sewer rate structures, provided a projection of future operating budgets, including the budgetary impacts of expected capital upgrades, the rate impacts debt financing and cash financing the proposed capital upgrades, and used both historical consumption and non-consumption revenue data to calculate water and sewer usage charges which generate revenues sufficient to fully fund City's water and sewer operations, make needed investments, and maintain adequate reserves.

City of Lawrence, MA – AM Prioritization and Program Financing. Woodard & Curran assisted the City in reviewing it sewer asset base, identifying the areas at highest risk and consequence of failure and prioritizing the portions of the system which were most in need of renewal. Over the course of almost a decade, Woodard & Curran has supported the City in acquiring almost $90 Million in financial funding without a rate increase. These improvements have allowed the City to begin catching up on over 50 years of deferred maintenance and have ensured the long term fiscal health of the utility.

Town of Andover, MA – Comprehensive Water and Sewer Rate Evaluation and Intermunicipal Agreement (IMA) Negotiation. Technical lead in the completion of a multi-year water and sewer rate evaluation. This study developed a recommended schedule of water and sewer rates designed to generate adequate revenues and reflect the true cost of providing water and sewer service. At the completion of the study, the client was provided an easy-to-use rate model in Excel that can be readily controlled by Town staff to take into account alternative scenarios post-study. Finally, we provided assistance in the financial assessment and negotiation of an IMA for the supply of potable water, the NPV for which was in excess of $60Million.

Town of Milford, MA – DPU Rate Base Assessment and Valuation Testimony. The Town of Milford, MA is serviced by a privately held water utility which it was considering purchasing. As part of the negotiations, the Town, through its attorney, contracted Woodard & Curran to complete an evaluation of system assets and provide a professional opinion of asset values at the current time. As original construction values were no longer available, Toby led a team of engineers in evaluating system data (including pipe age and materials and treatment plant inspections) to establish values for both Replacement Cost New (RCN) and RCN less depreciation methodologies. Subsequent to the preparation of our report, Toby provided both written and in-person testimony before the Massachusetts Department of Public Utilities (DPU) in support of coming to an agreement on acquisition price for the assets.

City of Somerville, MA – Water and Sewer Cost of Service Study and Rate Model. Project Manager for the completion of a cost of service rate study and rate model for the City of Somerville. The project included identifying current and future water and sewer revenue increases needed to meet the projected $55 million annual operating expense and $200 million in capital costs over a five-year planning period. The rate model provided a solid basis for the recommendation of water and sewer rates which reflect the true cost of providing water and sewer service. The model, developed as easy-to-use MS Excel file, was transferred to the City and can be used by City staff to continually assess alternative rate scenarios and the impact of constantly shifting expectations for capital investments.

WOODARD &CURRAN

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COMMITMENT & INTEGRITY DRIVE RESULTS

Item No. 6

INFORMATION ITEM
May 3, 2019

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

FROM: **Robert Hunter, General Manager**

Staff Contact: Charles Busslinger

SUBJECT: **South Coast Water District Doheny Ocean Desalination Project 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

South Coast Water District (SCWD) continues to develop the Doheny Ocean Desalination Project. SCWD is currently working through multiple due diligence items to move the project forward including; permitting, plant sizing and siting, financing, and project delivery method. SCWD anticipates having all necessary permits by the end of the 1st Quarter of 2022 and estimates an on-line date of late 2025 or early 2026, if approved by the SCWD Board.

DETAILED REPORT

On April 22, 2021, SCWD Board held its 6th workshop on their Integrated Water Resources Plan (IWRP). As part of the development of the IWRP, SCWD is working through the District's water supply (drought protection) and system (seismic event protection) reliability needs. The final plan will layout the water supply strategies and projects that are cost-

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

effective and which include options for partnerships with other water agencies that provide mutual benefits to both SCWD and other local partners.

SCWD IWRP workshops include:

Workshop 1: August 13, 2020 - reviewed the overall scope of the IWRP effort, planning scenario methodology, and establishment of major objectives and expected outcomes of the IWRP.

Workshop 2: October 8, 2020 - discussed water supply reliability & planning scenarios, water demand forecasting and new water supply options.

Workshop 3: November 19, 2020 - an update from the Metropolitan Water District of Southern California (MWD) on MWD's Integrated Resources Plan.

Workshop 4: January 14, 2021 - included MWD's supply reliability, presented a revised SCWD water demand forecast, and determined the future water supply and system needs.

Workshop 5: February 25, 2021 - summarized and rank water supply alternatives.

Workshop 6: April 22, 2021 – worked through and ranked various project portfolios that could meet SCWD's water supply and system reliability needs.

IWRP Workshop #6

Previous workshops determined the range of water supply needs for SCWD based on scenarios of climate change impacts, water demands, and reliability of water supplies for both water supply (drought protection) and system (seismic event protection) needs.

- **System Reliability Need (seismic event protection) ranges from 2.3 to 3.1 MGD with a target of at least 2.5 MGD.**
- **Supply Reliability Need (drought protection) ranges from 1.5 to 2.5 MGD with a target of at least 3.1 MGD.**

To meet these needs SCWD is considering the following project alternatives which provide differing protection benefits (see slide below):

SCWD Project Alternatives

Alternative	Supply Yield	Drought Benefit	Seismic Benefit
Landscape Conversion Rebates	150 AFY 0.13 MGD	✓	
Recycled Water Expansion	350 AFY 0.31 MGD	✓	
Water Banking*	up to 1,000 AFY up to 0.89 MGD	✓	
Expanded Local Groundwater	120 AFY 0.11 MGD	✓	✓
Small Doheny Ocean Desalination Plant (A or B configuration)**	2,200 AFY 2.00 MGD	✓	✓
Large Doheny Ocean Desalination Plant	5,600 AFY 5.00 MGD	✓	✓
Baker Water Treatment Plant	up to 1.1 MGD		✓

* Can only be used in severe droughts.
** (A) configuration is a stand-alone facility; (B) configuration is combined with existing GRF infrastructure.

6 | scwd.org

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1. Landscape Conversion (150 AFY/0.13 MGD) - Customer conversion of turf grass with artificial landscaping and/or drought-tolerant plants.
2. Recycled Water Expansion (350 AFY/0.31 MGD) - Expansion of recycled water system to use remaining available tertiary-treated wastewater.
3. Water Banking (1,000 AFY/0.89 MGD) - Buying water banking capacity in IRWD's Strand Ranch water banking program.
4. Expansion of Local Groundwater (120 AFY/0.11 MGD) - Construction of new groundwater well to take full advantage of existing groundwater permit and treatment capacity at Groundwater Recovery Facility.
5. Doheny Ocean Desalination (2,200 AFY/2.0 MGD) - Doheny ocean desalination **sized to meet SCWD's minimum system reliability (seismic protection) needs**.
6. Doheny Ocean Desalination (5,600 AFY/5.0 MGD) - Doheny ocean desalination **sized to meet SCWD's minimum system reliability (seismic protection) needs and extra capacity for partner agencies**.
7. Baker Water Treatment Plant (1.1 MGD) – IRWD has indicated it may offer unused capacity at Baker WTP during seismic emergencies, with untreated water coming from MWD and Irvine Lake (as back-up). This offer may be for a limited timeframe as IRWD may need the capacity in the future. The details have not been fully explored to date.

(See attached Workshop #6 Presentation slides for rankings and analysis.)

The projects were scored using a methodology similar to the one used for the 2018 OC Water Reliability Study. The project alternatives were then grouped into portfolios to meet both the water supply (drought protection) and system (seismic event protection) needs. The portfolios were then ranked with the best overall portfolio score for Portfolio 5 consisting of:

- 5 MGD size Doheny Desal plant with 2.1 MGD for SCWD and the balance for partner agencies – providing both drought and seismic event protection.
- Landscape Conversion – 0.13 MGD providing drought protection.
- Recycled Water Expansion – 0.31 MGD providing drought protection.
- Baker WTP – 1.0 MGD providing seismic event protection.

Director comments during the workshop included:

- A request to add a 6th portfolio which does not include a desalination plant project.
- Observations that if MWDOC or MET would take over the desalination plant and size it at 15 MGD, then the economies of scale gained by a larger plant would drive down the per acre foot cost differential between MET and Doheny per acre-foot costs to the point the difference would largely disappear.

The following is a status update on various ongoing activities for the Doheny project:

Grants & Loans

1. State Revolving Fund (SRF) Loan – SCWD is waiting on final permits before applying.
2. DWR Grant - $10 million Construction Grant – (includes some money for design) SCWD is currently drawing on these funds.
3. US Bureau of Reclamation Grants
    a. Round 1 - 8.3 million. SCWD is currently drawing on these funds.
    b. Round 2 - $11.7 million. Final grant documents are in process.
4. Water Infrastructure Finance and Innovation Act (WIFIA) Loan – SCWD has been invited to apply and needs to submit a Letter of Intent – an extension has been granted on the application deadline to June 30, 2021.

Permitting

SCWD anticipates receipt of all necessary permits by 1st Quarter 2022.

Permit	Submission	Anticipated Receipt
NPDES/Ocean Plan Compliance	Jan 15, 2021.	Summer 2021
Coastal Development Permit	November 23, 2020	
State Parks Lease	March 2020, follow-up November 30,2020	
NEPA & USACE	November 2020	

Studies

1. Doheny/Groundwater Recovery Facility Configuration Options Study – submitted for SCWD review in January 2021. Currently under SCWD review.
2. Alternative Power Solutions Study – Currently wrapping up final SCWD review.
3. Financial and Rate Impact Analysis – on hold pending final Alternative Power Solutions study. Report is likely to be released in Mid-2021. David Moore from CEC is doing the analysis and is including all of the grants and SDG&E's new energy rates.
4. Hydrogeology Review – More information will be available at the May 2021 San Juan Basin Authority meeting with the report likely released at the June 2021 meeting.

Delivery Method

Completion of a contract for a Design Build Operate Maintain (DBOM) project delivery method is waiting for final scoping and permits.

Attachments: SCWD IWRP Workshop #6 Presentation Slides

SOUTH COAST
WATER DISTRICT
Partnering With The Community

Board of Directors

Integrated Water Resources Plan (IWRP)

Building and Ranking Portfolios

April 22, 2021

Progress to Date on SCWD IWRP

- Board Meeting #1
  IWRP background, vision statement, and objectives
- Board Meeting #2
  Planning scenarios, draft water demand forecast, and identification of project alternatives
- Board Meeting #3
  MWD presentation on status of regional Integrated Resources Plan
- Board Meeting #4
  Future water system and supply needs
- Board Meeting #5
  Scoring Alternatives

Purpose and Agenda

Purpose:

Get Board input on building and ranking portfolios (combinations of individual alternatives) for purposes of IWRP report.

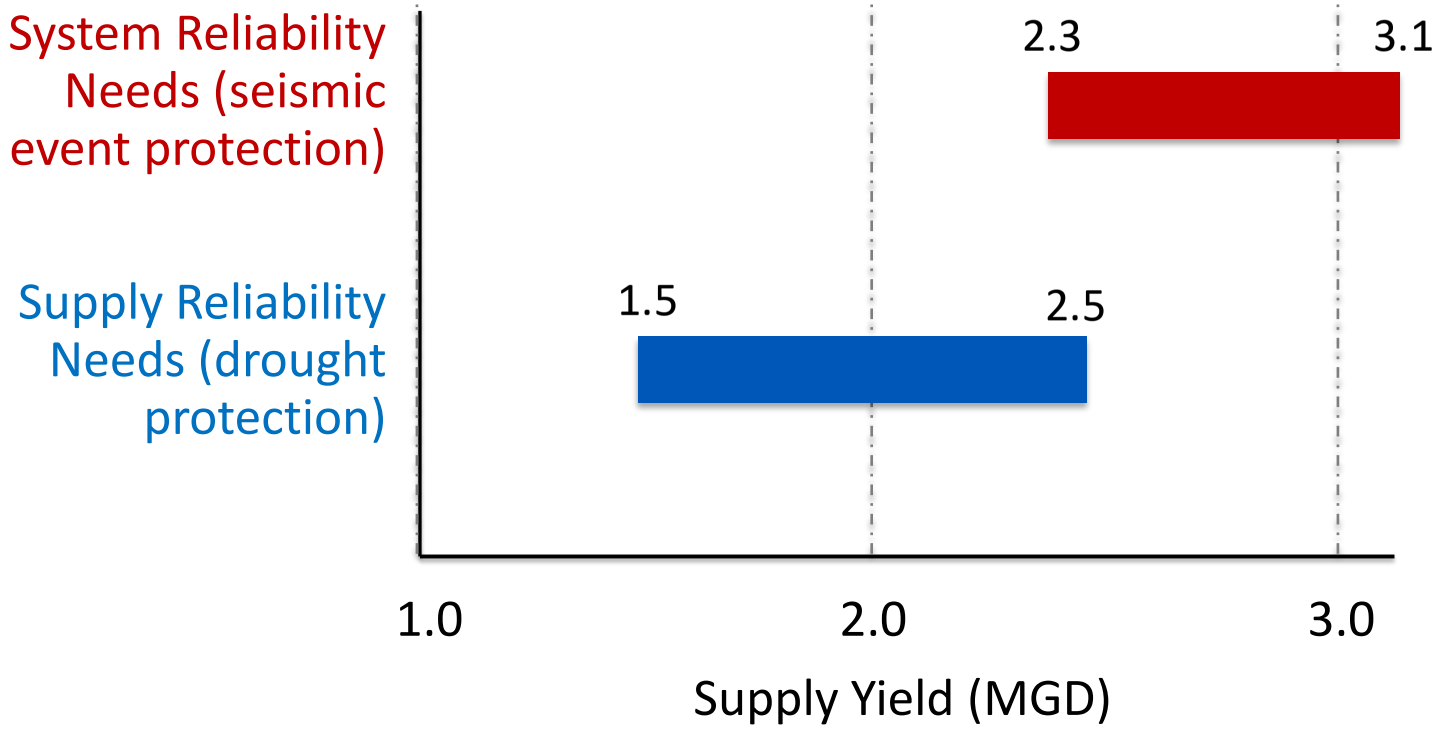
Agenda:

1) Summarize Needs and Alternatives
2) Building and Ranking Portfolios
3) Next Steps

Summarize Needs and Alternatives

Range of Needs for SCWD

Needs are based on scenarios of climate change impacts, water demands, and reliability of water supplies. **System reliability needs (for seismic event protection) are most important as supply reliability needs are further out in time.**



SCWD Project Alternatives

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Baker Water Treatment Plant	up to 1.1 MGD		✓

* Can only be used in severe droughts.

** (A) configuration is a stand-alone facility; (B) configuration is combined with existing GRF infrastructure.

Unit Cost Calculations

There are two types of alternatives: (1) base-loaded supplies, providing same amount of water every year; and (2) supplies that provide water only when needed during MWD drought allocation.

Estimating unit costs differs for each, as shown below:

Base-Loaded Supply Unit Cost (Recycled Water)

$$\frac{\text{Fixed Cost (\$0.18M)} + \text{Variable Cost (\$0.17M)}}{\text{Annual Supply (350 AFY)}}$$

= $1,010/AF

Drought Supply Unit Cost (Water Banking)

$$\frac{\text{Fixed Cost (\$0.30M)} + [\text{Variable Cost (\$1.36M)} \times 10\%^*]}{\text{Annual Supply (1,000 AFY)} \times 10\%}$$

= $4,310/AF

* Where 10% indicates expected probability of need

Scoring Alternatives

Older costs from CalAm for comparison

Doheny costs has $475/AF from MET LRP and earlier grants but is missing the recent $11.7 m BOR grant

Criteria	Scoring	SCWD Water Supply Alternatives						
		Landscape Conversion	Recycled Water Expansion	Water Banking	Expanded Local GW	Small Doheny Desal (2 MGD)	Large Doheny Desal (5 MGD)	Baker Water Treatment Plant%
Reliability	5 = both supply & system reliability 3 = system reliability only 1 = supply reliability only	1.5	1.5	**1.0**	4.0	**5.0**	**5.0**	3.0
Resiliency	5 = low risk of supply certainty 3 = moderate risk of suppl certainty 1 = high risk of supply certainty	3.0	3.0	**1.0**	2.0	**5.0**	**5.0**	4.5
Unit Cost (1)	Amortized capital cost plus annual O&M cost divided by yield ($/AF)	**$820**	$1,010	**$4,310**	$1,095	$2,610 #	$1,805	$1,305 (3)
Cost Risk (1)	5 = little stranded investment risk 3 = some stranded investment risk 1 = high stranded investment risk	**5.0**	**5.0**	**5.0**	**1.0**	**5.0**	4.0	**5.0**
Partnership Complexity (2)	5 = little/no partnerships required 3 = some partnerships required 1 = significant partnerships required	4.0	3.0	**1.0**	**5.0**	4.0	2.0	3.0
Permitting Complexity (2)	5 = little/no permitting required 3 = moderate permitting required 1 = significant permitting required	**5.0**	4.0	4.0	4.0	**3.0**	**3.0**	**5.0**

(1) Combined into a **Cost-effectiveness** criteria.
(2) Combined into an **Implementation** criteria.
(3) Assumes water is taken every year at IRWD's actual cost.

MWD Treated Water Cost to MWDOC= $1,184/AF

% IRWD may offer some Baker capacity

$2,600/AF is more expensive option. Co-locate w/ GRF may reduce

Building and Ranking Portfolios

Building Portfolios

Why Portfolios?

Evaluating different combinations of alternatives provides a more robust strategy over relying on a single alternative.

Proposed Portfolios	Alternatives Based (MGD) because System Reliability is over 60 days							New Yield for Supply Reliability	New Yield for System Reliability
	Landscape Conversion	Recycled Water Expansion	Water Banking	Expanded Local GW	Small Doheny Desal (2 MGD)	Large Doheny Desal (5 MGD)	Baker Water Treatment Plant		
Status Quo								0.00	0.00
Portfolio 1	0.13	0.31			2.00		1.10	2.44	3.10
Portfolio 2		0.31		0.11	2.00		0.99	2.42	3.10
Portfolio 3			0.50		2.00		1.10	2.50	3.10
Portfolio 4						3.10*		3.10	3.10
Portfolio 5	0.13	0.31				2.10*	1.00	2.54	3.10
							Target	**2.50**	**3.10**

With 1.9 to 2.9 MGD going to partners.

Alternatives that provide supply reliability benefits
Alternatives that provide system reliability benefits
Alternatives that provide both supply & system reliability benefits

IRWD offer of up to 1.1 MGD is not permanent. IRWD may want the capacity back after a few years

SOUTH COAST WATER DISTRICT
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Assigning Scores to Portfolios

- Qualitative scores based on weighted contribution of scores for each alternative in each portfolio.
- Aggregate unit-cost based on projected water demands and supplies, including any reduction of purchased imported water from MWD.

Criteria	Weight	Status Quo	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5
Reliability	30%	**1.0**	4.5	4.0	**5.0**	**5.0**	**5.0**
Resiliency	20%	**2.0**	4.8	4.8	4.4	**5.0**	4.8
Unit Cost ($/AF)	25%	**$1,239**	$1,525	$1,529	**$1,595**	$1,343	$1,300
Cost Risk	10%	**5.0**	**5.0**	**2.0**	**5.0**	4.0	4.0
Implementation	15%	**4.0**	3.2	3.2	3.0	**2.4**	3.2

Portfolios with Smaller Doheny Desal

Portfolios with Larger Doheny Desal

Aggregate Unit Cost - blended cost reflects the reduction in the MWD unit cost - only cost escalation above inflation. MWD estimates escalate more than inflation. These costs are brought back to today's dollars

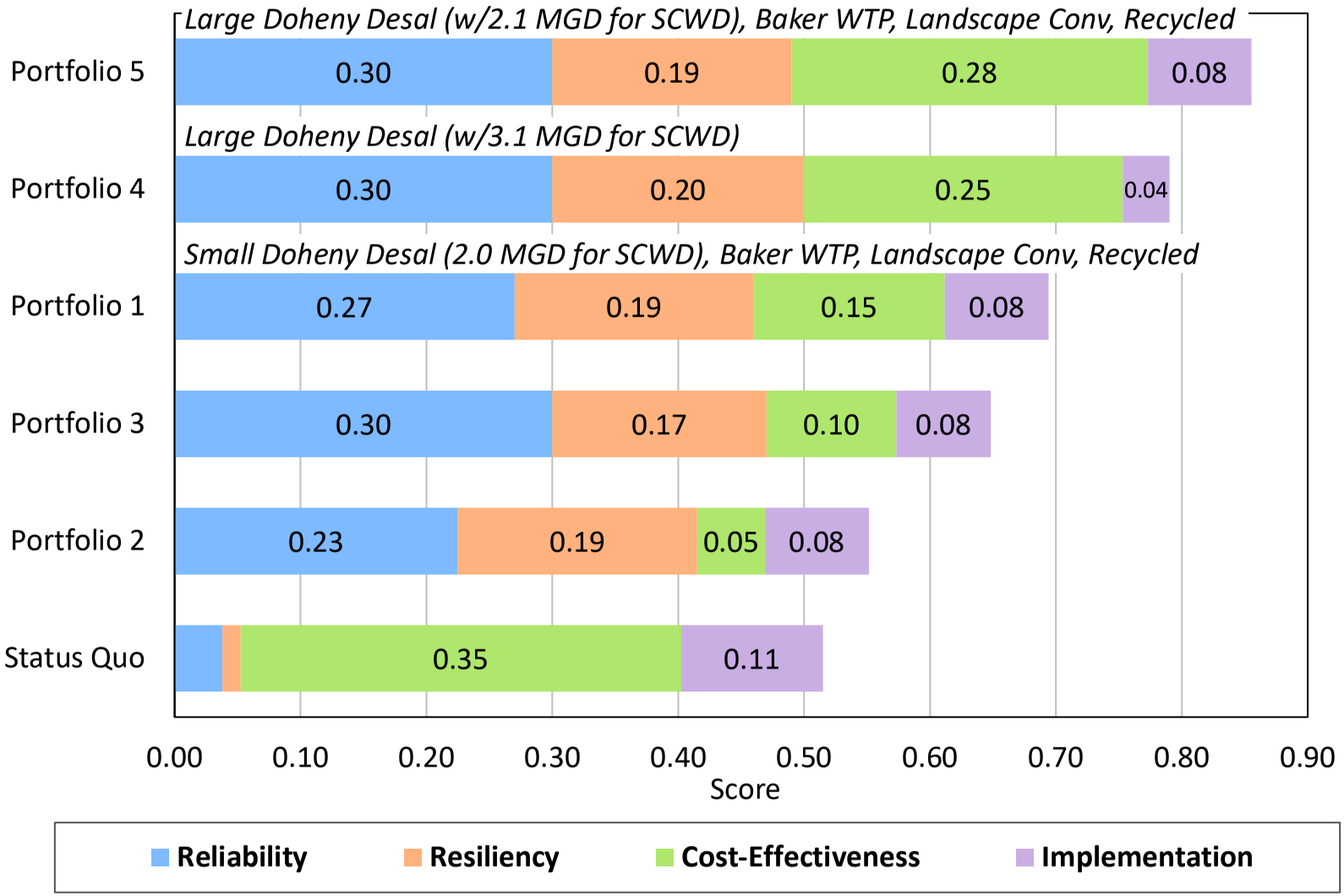
Cost risk is the downside risk

Implementation is partnership & permitting components combined

SCWD Total Potable demand is ~5,500 AFY

SOUTH COAST WATER DISTRICT
Partnering With The Community

Ranking Portfolios



SOUTH COAST WATER DISTRICT
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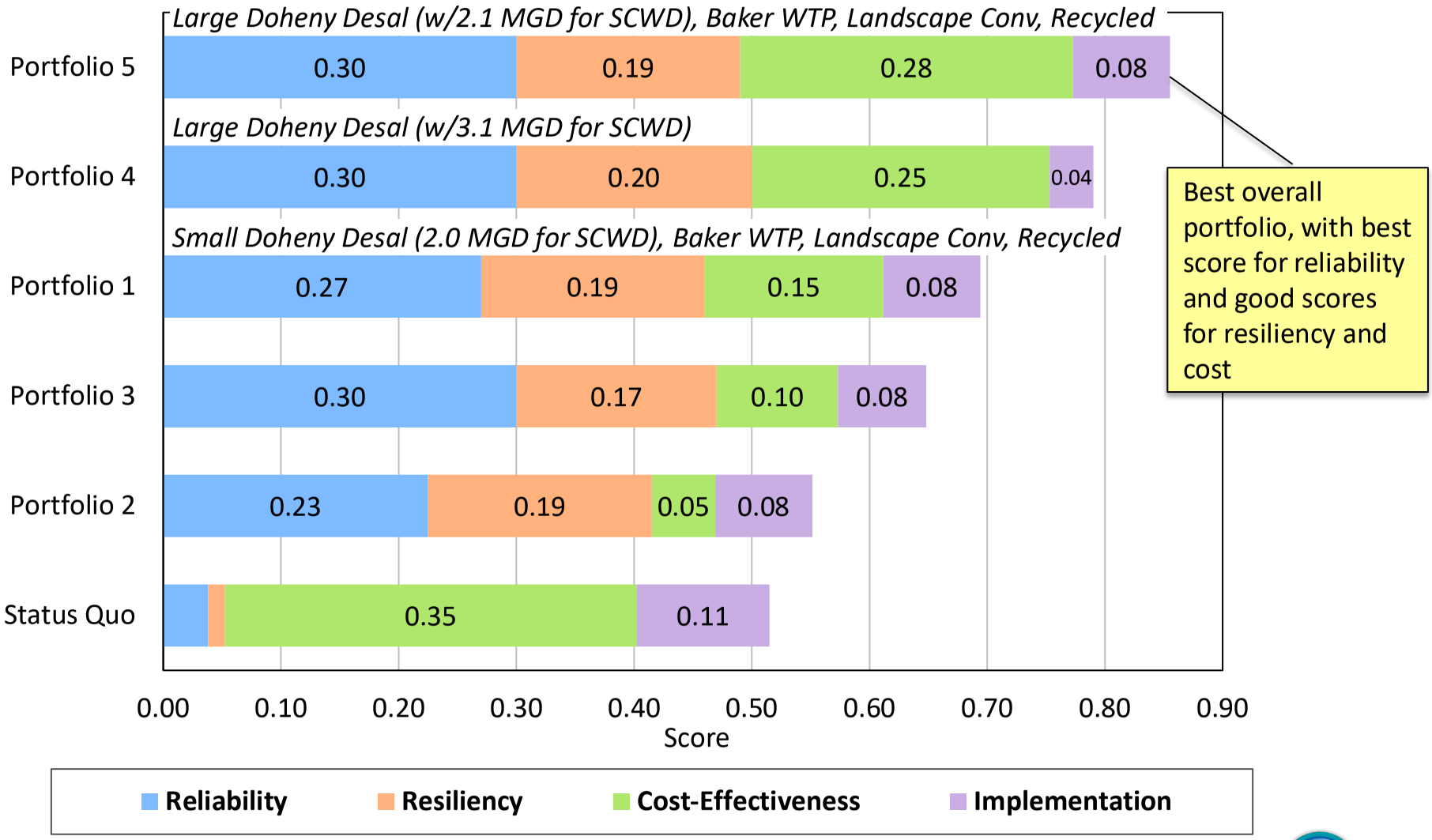
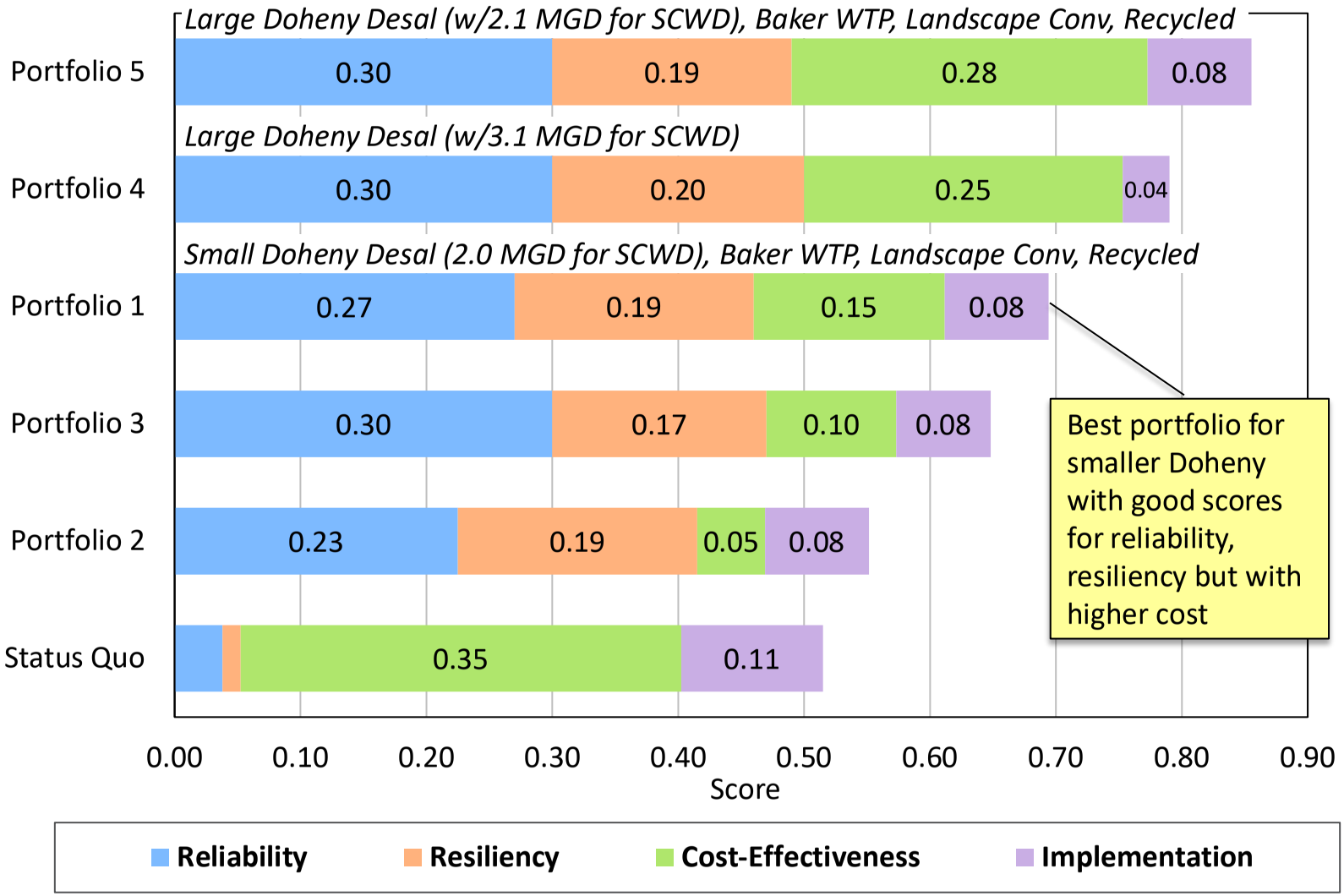
Ranking Portfolios



SOUTH COAST WATER DISTRICT
Partnering With The Community

Ranking Portfolios



SOUTH COAST WATER DISTRICT
Partnering With The Community

Highest-Ranking Portfolio #5

Components:

1. Large Doheny Ocean Desalination, with 2.1 MGD for SCWD and 3.9 MGD for partners
2. Partnership with IRWD for Baker WTP capacity of 1.0 MGD, at least for near-term (with option to renew)
3. Additional Landscape Conversions (0.13 MGD)
4. Expanded Recycled Water Customers (0.31 MGD)

Contingencies:

- If system reliability need is less than 3.1 MGD, then partnership with IRWD for Baker WTP can be reduced or terminated with little stranded cost risk.
- If partnerships for large Doheny Ocean Desalination are not successful, then smaller Doheny Ocean Desalination can be implemented with increased levels of landscape conversions, expanded recycled water, and options to reduce unit cost of Doheny (e.g., share facilities with GRF).

Next Steps

Next Steps

1) Incorporate Board Comments on Portfolio Rankings
2) Prepare IWRP Report
    - Draft Report Presented at Board Meeting #7 (May 2021)
    - Final Report Delivered to SCWD (June 2021)

Item No. 7

INFORMATION ITEM
May 3, 2019

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

FROM: **Robert Hunter, General Manager**

Staff Contact: Charles Busslinger

SUBJECT: **OC-70 Meter Accuracy Testing 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

MWDOC staff continue to work with staff from Metropolitan Water District (MET) and East Orange County Water District (EOCWD) on finalizing the investigation of the accuracy of the billing meter at Service Connection OC-70 under MET Administrative Code Section 4506 - Metering of Water. Field work at OC-70 was completed on March 23, 2021. Final testing at Utah Water Research Lab (UWRL) will occur on May 7, 2021 with a report on the accuracy of the OC-70 billing meter anticipated on May 24, 2021.

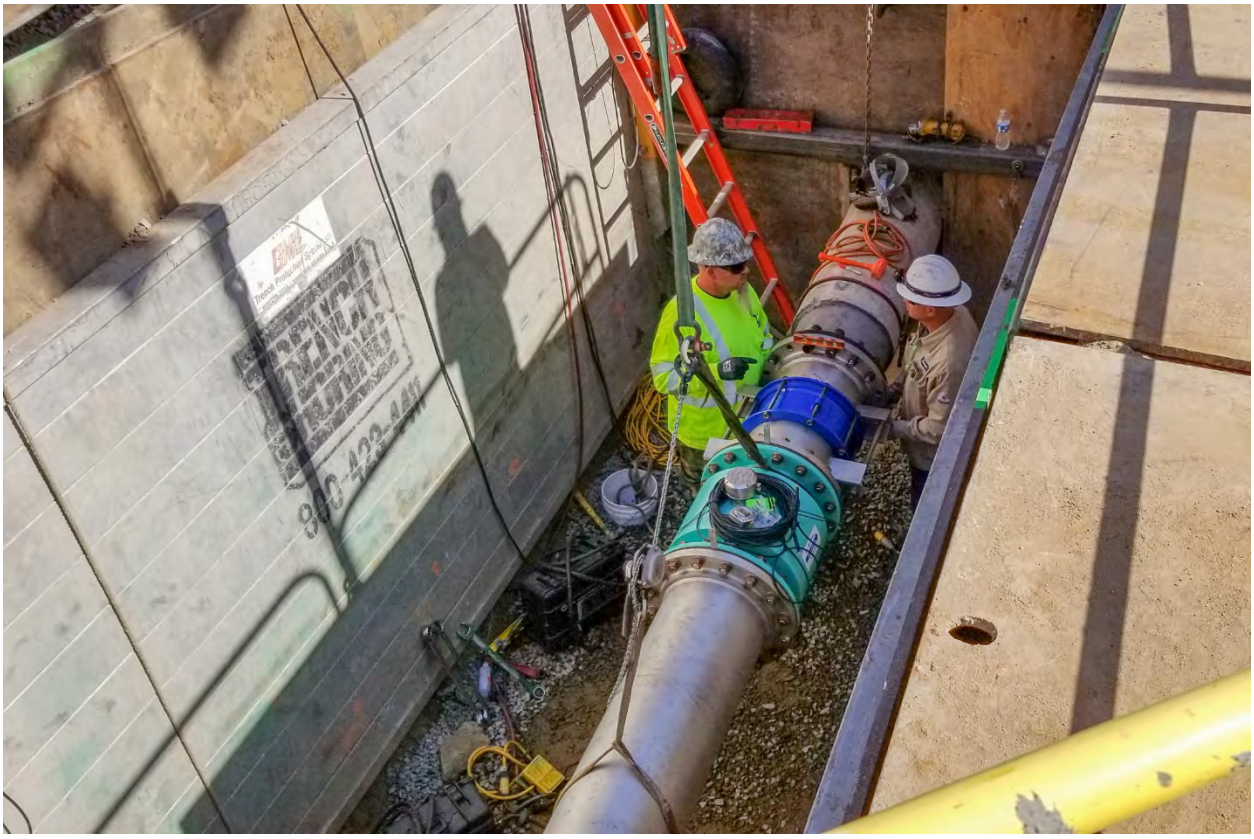
DETAILED REPORT

MWDOC, MET and EOCWD agreed to a protocol for meter testing at OC-70 using a calibrated mag meter as a reference meter to compare to the venturi billing meter. The mag meter would be installed upstream of the OC-70 facility and then compared to the existing venturi meter.

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

EOCWD provided use of a new 16-inch McCrometer magnetic flow meter to MET for this testing. The mag meter was sent to UWRL 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 mag meter was adjusted and then tested in the simulated OC-70 pipe system constructed at UWRL and measured against the NIST certified weight tank again. The mag meter was then 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, where the as-built drawings indicated a 16-inch pipe, and the actual pipe was 18-inch. This caused MET to scramble to make several adjustments in the field to allow testing to continue using EOCWD's calibrated mag meter.

Field testing at OC-70 began on March 1, 2021 and was completed on March 9, 2021. A second OC-70 shutdown was completed on March 22-23, 2021 to retrieve the mag meter and pipe spools which have been sent back to Utah Water Research Lab for final calibration verification. Final testing at UWRL will occur on May 7, 2021 with a report on the accuracy of the OC-70 billing meter anticipated on May 24, 2021.



The County of Orange Report

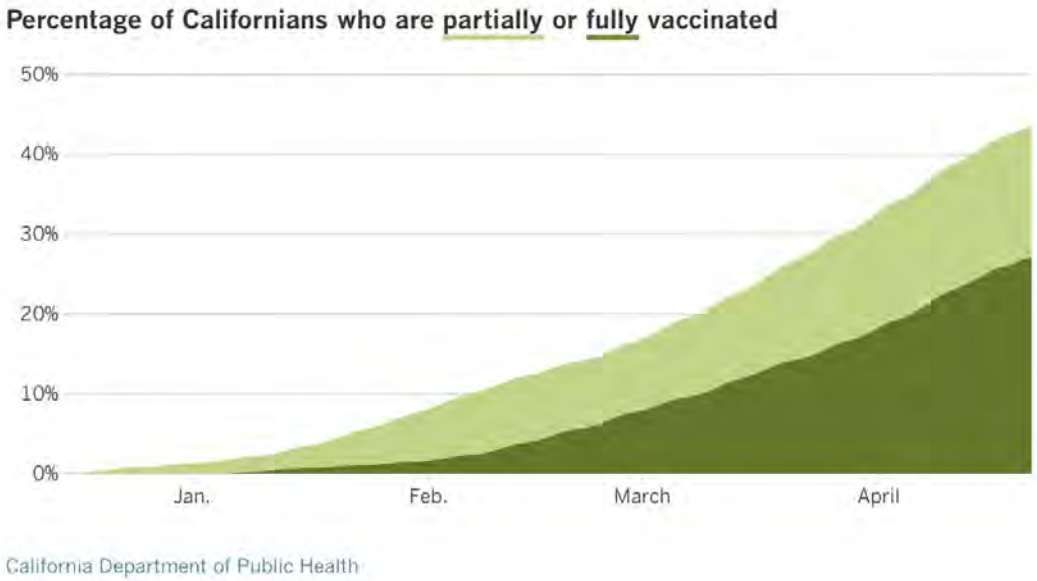
Prepared for the MWDOC P&O Committee

April 27, 2021
by Lewis Consulting Group

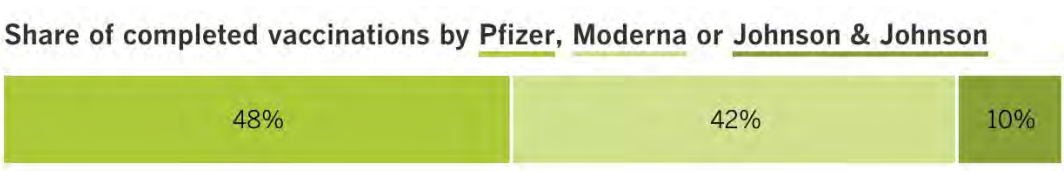
June 15th End of Tiers For Fears

Governor Gavin Newsom recently announced that his new plan is to lift nearly all COVID-19 health restrictions in California by June 15, 2021. Orange County will most certainly embrace the re-openings which will mean businesses, including bars and restaurants, will be allowed to operate at 100% capacity. However, the State will still impose a mask mandate.

The reversion to near normalcy is largely a result of the state's increasing success with vaccine distribution. As of April 25, 2021, nearly 28 million doses of vaccines have been administered in California. Over 45% of residents have received at least one dose. In Orange County, 46% of County residents have received one dose, while 32% of the County population is fully vaccinated.

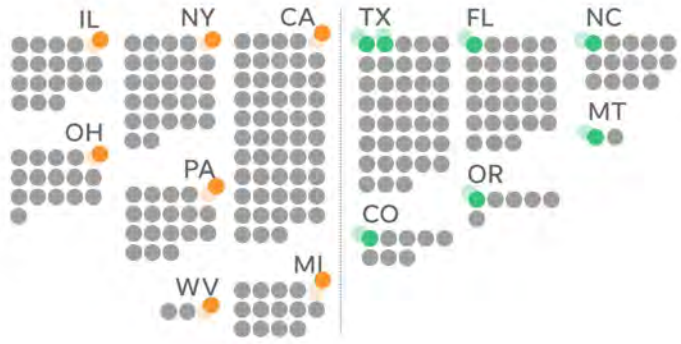


The single dose vaccine by Johnson & Johnson accounts for 10% of vaccines in California, although its use is currently suspended.



Electoral College Shift - Minor Republican Gains

Under newly released U.S. Census figures, six states gained electoral votes, including Texas [2], and seven states lost one electoral vote, including California. The net result is among states carried by President Trump, there is a net gain of three electoral votes with a corresponding net loss of three electoral votes for states carried by President Biden. Predicting shifts in the House of Representatives is much more complex due to the redistricting process in each of the 50 states.



LOSING ELECTORAL VOTES GAINING ELECTORAL VOTES

ORANGE COUNTY LAFCO EST. 1963

Cancelled

The April 14, 2021 Regular Meeting of the Orange County Local Agency Formation Commission has been cancelled. The next scheduled meeting of the Commission is Wednesday, May 12, 2021 at 8:15 a.m.

New PPIC Poll Released

The PPIC (Public Policy Institute of California) recently released the results of their most recent poll. Of great interest, this is the third consecutive poll that shows if the election was held today, Governor Newsom would survive the looming recall against him. Perhaps anger over the French Laundry scandal has subsided.

The poll of 1,174 likely voters was conducted March 14-23, 2021 and has a margin of error of +/- 3.9% with a confidence level of 95%. The poll clearly reaffirms California's reputation as progressive in their political attitudes.

Below are some of the poll questions and the results:

Overall, 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

There is an effort under way to remove Governor Gavin Newsom from office in a recall election. If a special election to recall Governor Newsom were held today, would you vote yes to remove Newsom as governor or no to keep Newsom as governor?

40% yes, remove Newsom
56% no, keep Newsom
5% don't know

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

61% YES
- 25% - yes, serious recession
- 24% - yes, moderate recession
- 10% - yes, mild recession
- 2% - yes, don't know

34% NO, not in an economic recession
5% don't know

Recently, the California legislature passed and Governor Newsom signed into law a $7.6 billion COVID relief package that includes a one-time $600 payment to qualifying lower-income Californians, as well as $2.1 billion in immediate relief for small businesses, and over $400 million in stipends for state subsidized child care and preschool. Do you favor or oppose this relief package?

75% favor
20% oppose
5% don't know

When you combine all of the taxes you pay to state and local governments, do you feel that you pay much more than you should, somewhat more than you should, about the right amount, or less than you should?

30% much more
27% somewhat more
36% about the right amount
4% less than you should
3% don't know

In general, which of the following statements do you agree with more [1] I'd rather pay higher taxes and have a state government that provides more services OR [2] I'd rather pay lower taxes and have a state government that provides fewer services?

52% higher taxes and more services
44% lower taxes and fewer services
4% don't know

Does the cost of your housing make you and your family seriously consider moving away from the part of California you live in now? "Does it make you consider moving elsewhere in California, or outside of the state?")

43% YES
8% - yes, elsewhere in California
33% - yes, outside the state
2% - yes, other
56% NO
1% don't know

Overall, do you approve or disapprove of the way that Joe Biden is handling his job as president?

65% approve
30% disapprove
5% don't know

Overall, do you approve or disapprove of the way the US Congress is handling its job?

42% approve
51% disapprove
6% don't know

As you may know, in response to the coronavirus outbreak Congress passed and President Biden signed into law a bill that would provide $1.9 trillion dollars in economic aid to businesses, individuals, and state and local governments. All in all, do you favor or oppose this bill?

73% favor
25% oppose
2% don't know

Which comes closer to your view about where the US stands in the coronavirus outbreak: [1] the worst is behind us OR [2] the worst is yet to come?

74% the worst is behind us
21% the worst is yet to come
4% don't know

Do you favor or oppose providing health care coverage for undocumented immigrants in California?

66% favor
31% oppose
3% don't know

Orange County COVID-19 Stats

ORANGE COUNTY COVID-19 STATS	AS OF 4/27/2021	AS OF 3/30/2021
CUMULATIVE CASES TO DATE	253,664	250,537
CUMULATIVE DEATHS TO DATE	4,939	4,740
DEATHS REPORTED TODAY	6	14
CUMULATIVE TESTS TO DATE	3,624,119	3,332,327
TESTS REPORTED TODAY	7,110	7,248
CASES CURRENTLY HOSPITALIZED	128 *	143 *
CASES CURRENTLY IN **ICU**	27	26
CUMULATIVE RECOVERED TO DATE	246,101 *	242,669 *

* = INCLUDES ***ICU*** CASES

Where Orange County Ranks

[as of 4/27/2021]

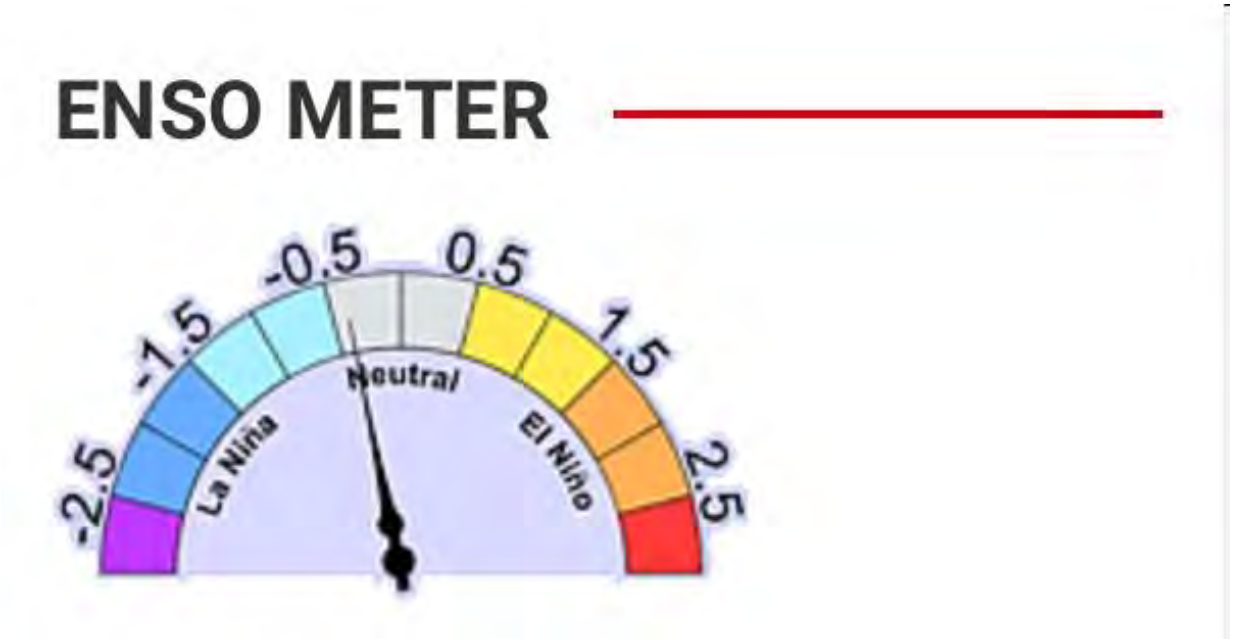
LOCATION	POPULATION	CONFIRMED CASES	DEATHS
CALIFORNIA	40,129,160	3,633,185	60,208
LOS ANGELES COUNTY	10,247,557	1,191,253	23,802
ORANGE COUNTY	**3,228,519**	**253,664**	**4,939**
SAN BERNARDINO COUNTY	2,217,398	290,394	4,572
RIVERSIDE COUNTY	2,468,145	286,724	4,401
SAN DIEGO COUNTY	3,370,418	275,541	3,692

Snowpack Again Disappoints

The Department of Water Resources conducted their April 1st measurement of the California snowpack and reported that water content is just 59% of average for this time of year. This is down from 61% as measured on March 1st. It is however an improvement from the 53% measurement from April 1, 2020. The next snowpack measurement will take place April 29, 2021.

Waning La Niña Still Leaves It's Mark

As the current La Niña weakens, it still shoulders much of the blame for California's recent parched conditions. The change in weather patterns caused by La Niña shifted plentiful amounts of rain from the Golden State to Oregon and Washington. Another interesting fact about the current La Niña is the effect on worldwide temperatures. This March the world's temperatures dropped to 1/100 of a degree below the last 30 year world temperature average. The dropping temperatures have been a lagging effect of this La Niña.



ACKERMAN CONSULTING

Legal and Regulatory

May 3, 2021

1. **Klamath Battle Continues:** The Klamath Drainage District water battle had been reported on in the past. It is starting to heat up again. The District began deliveries of water under a permit which originated in 1977 from the Oregon Water Resources Department. This water right is considered independent from "Project Water". However, the Bureau of Reclamation is contesting this decision and has ordered them to cease diversions from the River. They also advised them that Project water would not be available. The Bureau has made other threats to the District. See you in court!!

2. **San Diego Battle Continues:** The new rate structure from the San Diego Water Authority is putting farmers, particularly avocado farmers, in a bind. Fallbrook and Rainbow water agencies are trying to escape the high rates and alleged poor management decisions of the Authority. They have filed an application with the local LAFCO to leave the Authority and contract with Eastern Municipal Water District. Their cost savings would be significant. San Diego has some of the highest water rates in the US. The Authority opposes the plans as well as many member agencies in the Authority. The departure of any agency from the Authority could have the impact of raising rates on the rest of the agencies. The LAFCO acknowledges that they have no expertise in the area of water and have hired an outside consultant, Michael Hanemann, to advise them. Whatever the decision, see you in court, again!!

3. **Road Salt Threat:** Most cold areas of the US use various forms of salt to prevent accidents in ice conditions. More studies are being done due to the interaction of the salt with soils and infrastructure to produce harmful metals and solids. Most of this comes from chloride produced as a byproduct from the various reactions. Ammonium based fertilizers also produce similar conditions. In addition to the harm to water and living things, these salts can damage roads and other infrastructure. More regulation is suggested or use of alternate materials.

4. **Weed Battle Concludes:** This small town (2300) near the Oregon border had been battling and timber company and water bottling company for years. After spending over $1.5 million in legal fees, a solution has been achieved. Weed's legal standing based on their water rights was not strong, but their community was very active over the potential loss of all or most of their water supply. All parties were suing each other and the City had commenced an eminent domain action. The settlement involved Crystal Geyser buying water rights from Roseburg Forest Products and then reselling a partial right to Weed for $1.2 million. The old price the City was paying was $1 per year. Sometimes things do work out.

5. **Airborne Algal Bloom**: The dangerous release of toxin from algal blooms continues to expand. A recent study from Massachusetts ponds has shown the toxins are being released into air. This allows the wind to

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spread the problem beyond the water sources. These organisms called cyanobacteria, can also be produced from fertilizer runoff, untreated wastewater and are encouraged by warmer weather. Still water ponds are the most dangerous.

6. **Cheap Water Filters:** A Princeton University study has developed a device for filtering water in remote areas that may be off the conventional grid. The device looks like a small plastic container with a very smart sponge in it. The idea came from watching the pufferfish, which takes in water when it is threatened to scare its attacker. Then it releases the water after the attack is over. The sponge is a gel material which absorbs lead and pathogens and leaves pure water behind. It is reusable and cheap. It is powered by solar heat and it is not dependent on evaporation like other techniques. The gel is very porous and like a honeycomb and is called poly N-isopropylacrylamicde. The chemical reaction is difficult to explain but it happens by itself.

7. **Another Cheap Water Filter:** MIT has developed a water filter from cross sections of tree branches which takes bacteria out of water. Again, it is designed for remote areas that are off the grid or close to it. These xylem filters appear naturally in many types of trees. A cross section of a tree branch is used in the water pipe, hose or whatever is available. They are 99% effective with most bacteria like E-coli and rotavirus. They are also reusable when properly cared for. The typical device is a meter long tube with a place for the reusable filters to be changed out. The tube is put in the water source system and you are in business.

8. **Wells v Pipelines:** The National Ground Water Association just released a study comparing the cost efficiency of water wells compared to regional pipelines in city and country conditions. While there are many advantages and disadvantages to both. The study looked at the initial cost of both systems and the ongoing maintenance over time. They determined a significant cost savings from the wells systems over pipelines, particularly where very long pipelines were employed. They estimated that about 130 million Americans get their water from wells or groundwater systems.

9. **Water Harvesting**: Getting water from the air is an emerging area in water supply and many encouraging studies are coming out. The University of Texas recently developed a new process to enhance water production from the air. The key is to get water formed in large enough drops that wont immediately evaporate back into the atmosphere. The lubricant is a hydrophilic slippery liquid slippery liquid -infused porous surface (SLIPS). The surface caused water micro droplets to form larger droplets which are suitable for harvesting. Again, this process is aimed at remote areas and is much cheaper, lighter and smaller than existing systems.

10. **AI Leak Detection:** A UK firm is using AI techniques to enhance leak detection. The algorithms used are making it possible to identify leaks and to assess size. This allows water managers to prioritize leaks for further investigation and repair. Putting our time, money and effort on the big leaks makes for more and better management of our systems. This new system is 92% accurate and is being using in England and Australia and studied in US.

11. **Invasive Species Recovery:** University of California, Davis has been studying the results of aggressive eradication efforts on invasive species in California aquatic systems. In particular, an effort was made to rid

an estuary of European green crabs near Stinson Beach. This crab is a number one problem costing the shellfish industry almost $20 million per year. The effort took the population from 125,000 to 10,000. But one year later, the population was over 300,000 crabs. The effort was aimed at adult crabs. It was discovered that the adults generally feed on the younger crabs. But when the adults were removed, the kids went wild and propagated at a higher rate producing and increased overall population. The study showed that you must examine the characteristics of various species to determine what the best control methods might be. In the green crab case, gradually reducing the populations to a given amount was a better plan in preventing explosion of crabs, while still reducing the overall amount.

12. **Paradise Prepared:** A federal study in conjunction with Cal Fire showed that Paradise had actually prepared for fire event, just not one of this magnitude. They had an evacuation plan, emergency notification systems and vegetation management. However, as a result of very dry weather, lack of natural or controlled burns and natural topography, nothing was going to be effective against one of the worst fires in California history. The fire started 7 miles from town which should have been enough to provide a buffer. However, that distance actually gave the fire more time and room to intensify and do the damage it did. The report recommended further fuel setbacks and hardening of houses making them more fire resilient.

13. **Drought Beats Mosquitos:** A side benefit of the drought is reduced breeding grounds for mosquitos. Cutbacks of outdoor water use had reduced habitat for them by over 40% in LA and Orange County. This had led to less West Nile virus and other mosquito borne disease. The study done by UCLA and Davis predicted that many folks will continue their conservation efforts and controlled watering in outdoor areas, there by making it more.

Item No. 9

INFORMATION ITEM
May 3, 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 to book live, virtual water lessons for the remainder of the 2020/21 school year.

Included in this report is a preview of scheduled visits for the months of May and June 2021. MWDOC Choice School Program contractors update the shared Google Calendar so that participating member agencies are able to view the virtual sessions in their service area as they are booked. 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 (PA) has continued to work closely with K-12 Choice School Program contractors to provide Orange County students with safe, structured, and interactive water lessons that highlight Orange County water supply sources, the benefits of water conservation, and good water stewardship. MWDOC PA continues to monitor the status of the safe reopening of Orange County schools through the CA Safe Schools for All website: https://schools.covid19.ca.gov/.

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 75 live, virtual assemblies reaching 11,298 elementary school students through the MWDOC Choice Elementary School Program (grades K-2). At the time of this report, 5 additional presentations and approximately 615 students have been booked to receive the program through the remainder of the 2020/21 school year.

"Our students had SO much fun! We had over 170 kindergarten students and [the Shows That Teach staff] were super engaging and fun to watch. Our students learned about the states of matter water can be in, in a fun and meaningful way and how to be more water wise."
– Kindergarten teacher, Las Palmas Elementary, City of San Clemente

DISCOVERY CUBE OC – ELEMENTARY (3-6) AND MIDDLE SCHOOL (7-8)
To date, Discovery Cube OC has hosted 131 live, virtual assemblies reaching 5,074 elementary school students through the MWDOC Choice Elementary School Program (grades 3-6). At the time of this report, 7 additional presentations and approximately 455 students have been booked to receive the program through the remainder of the 2020/21 school year.

To date, Discovery Cube OC has hosted 21 live, virtual assemblies for 917 students through the MWDOC Choice Middle School Program (grades 7-8).

BOLSA CHICA CONSERVANCY – HIGH SCHOOL (9-12)
To date, the Bolsa Chica Conservancy has hosted live, virtual classroom presentations for 23 classes, reaching roughly 661 high school students at Brea Olinda, El Toro, Edison, and Santa Ana high schools. At the time of this report, 10 additional classes at Tustin 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.

MWDOC Education

May 2021 (Pacific Time - Los Angeles)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
2	3	4	5	6 3-6 WESTMINSTER K-2 ORANGE	7 3-6 SMWD Reilly K-2 HUNTINGTON	8
9	10 K-2 SMWD Las	11 3-6 TUSTIN Beswick	12	13 3-6 TUSTIN Beswick	14 3-7 TUSTIN Beswick	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	1 K-2 TCWD Robinson	2 K-2 SANTA ANA	3	4	5

Jun 2021 (Pacific Time - Los Angeles)

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

Item No. 10

INFORMATION ITEM
May 3, 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 from OCWD and MWDOC continue to solicit sponsorships for the 2021 OC Water Summit that will be held on Friday, October 15th at Disneyland's Grand Californian Hotel. Mesa Water will once again be the luncheon sponsor and Irvine Ranch Water District has agreed again to come in as program sponsors.

OCWD is the lead agency for this year's event that will include sessions on water supply, Contaminants of Emerging Concern (CECs), technological advancements in weather forecasting, and local resources.

The next meeting of the OC Water Summit Ad Hoc Committee is scheduled for May 24th.

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 are working with MWDOC and the member agencies regarding the survey of businesses in Orange County. CDM Smith completed initial modeling work for a water demand analysis. Preliminary results were presented to MWDOC's member agencies at the Managers Meeting on January 21, 2021. Final drafts have now been completed. This analysis serves to support the 2020 Urban Water Management Plans and also provides information for the Economic Benefits study. Wallace Walrod, economist for Orange County Business Council and sub-consultant for the Brattle Group, is leading the business survey portion of the studies. MWDOC staff has been working with Dr. Walrod on the draft business survey. Once it is ready, the draft survey will be forwarded to member agencies for review and a meeting will be scheduled to obtain member agency input on the business survey.
OC-70 Meter Testing Update	See information item in this packet.
OC Hydraulic Model	Black & Veatch has constructed and calibrated the hydraulic model using Innovyze's InfoWater modeling platform. Staff and B&V are currently working with member agencies to define potential project scopes of work.
Doheny Ocean Desalination Project	See information item in this packet.
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. SMWD will be providing an update at this meeting.
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 Desalination Project	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.

	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. 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. Continued public hearings were held on April 23, 2021 and April 29, 2021 and, if needed will continue on May 13, 2021 at 9:00 a.m. 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).
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. The Trampas Reservoir allows 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 consisted 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 was 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 – All of the pipelines that convey the recycled water to and from the reservoir have been completed. The Division of Safety of Dams (DSOD) authorized SMWD to start filling the reservoir on April 2, 2021 and the SMWD is sending water to storage at this time. 3. Pump Station Project Status – 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. As of April 2021, Trampas Reservoir is fully operational. Congratulations to SMWD. This is the final update on the reservoir.
AMP Shutdown in 2021 to Replace PCCP Sections	A section of the AMP south of OC-70 that was found to have an increased number of wire breaks in the Prestressed Concrete Cylinder Pipe (PCCP) sections of the AMP. MET scheduled a shutdown to affect repairs by installing a structural steel liner along approximately 1,000 feet of the AMP which requires a 37-day shutdown for this portion of the AMP south of OC-70. MET originally scheduled AMP PCCP relining projects to begin in about 5 years, but based on monitoring surveys, MET did not recommend that repairs to this reach wait until Fall 2021. MWDOC staff worked with member agencies to coordinate their own projects with the MET AMP shutdown. As of April 27, 2021 the AMP relining project is 85% complete. Major work completed include installation and welding of the steel liners and cement mortar lining the steel liners and grout plugs. Work in progress includes installing the concrete encasement formwork.  Contractor cement mortar lining the steel liner The AMP shutdown continues on schedule; beginning on April 4, 2021 and is expected to be complete by May 10, 2021.
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.

	MET has further delayed the relining project and has proposed new shutdown dates of September 15, 2022 through June 15, 2023. **Orange County Feeder Extension** MET is planning to reline 300-linear feet of the OC Feeder extension affecting the City of Newport Beach, IRWD and LBCWD. MET has delayed the relining project by one year and has proposed new shutdown dates of June 16, 2023 through July 10, 2023.
Meetings	
	MWDOC staff along with ABS Consulting, IDS Group and Optima RPM participated in several construction progress meetings in the month of April regarding the admin building seismic retrofit and remodel. Weekly progress meetings will continue through the completion of the project.
	Charles Busslinger, Melissa Baum-Haley, Alex Heide, and Chris Lingad held multiple interviews during the month of April with shortlisted consultants for the on-call technical services RFQ.

General Manager Report
WEROC Status Report

April 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.
- Vicki is a member of the County POD IMT coordination calls. WEROC is coordinating with special district..
- CalOSHA is reanalyzing the Emergency Temporary Standards in place for section 3205. CalOSHA is meeting with the California Department of Public Health on changes recommended CDC in order for both agencies to try to get on the same page, but there is still no resolution or updates to the COVID-19 ETS. To highlight one area of conversation is the quarantine time for someone vaccinated vs not, or the mask wearing requirements WEROC will monitor the discussions and outcomes and provide information to the agencies as it is available. Timing on when this will occur is dependent on the state announcement on 4-27-21 in relation to CDC guidance and mask wearing.
- The MWDOC Covid Plan will be updated appropriately as updated stated guidance has been released.

APRIL INCIDENTS/EVENTS

- Vicki sent out an email on 4/21 to all WEROC member agencies in regards to the Governor emergency proclamation for Sonoma and Mendocino counties in relation to

the drought and outing the bullet remarks made by the governor in regards to current and future actions in relation to the drought.

COORDINATION/PARTICIPATION WITH MEMBER AGENCIES AND OUTSIDE AGENCIES

- 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. Vicki attended the Board Meetings for Laguna Beach County and South Coast Water District who passed the agreement in the month of March. At this time, there is only 4 special district water agencies left that have not submitted their completed agreements.

- Vicki attended the State CalWARN board meeting and is assisting with the revision of the Mutual Assistance plan which has not been updated in 4 years and based on recent events, requires some changes and training.

- Vicki assisted the Orange County Sanitation District with the field exercise.. The exercise was conducted on April 28th. Vicki evaluated the EOC Operations and Coordination activities.

- Vicki attended the elected official's forum on 4/1

- Vicki attended and provided comments to AQMD Workshop #2 regarding the process and procedure development in relation to 1110.2 and 1470 which pertains to Public Safety Power and the emergency generator use.

- Vicki attended the Southern California Edison PSPS workshop for water utilities on 4/13 outlining their procedures and changes to the program.

- On 4/16 Vicki met with IRWD and received a valuable tour on the Baker Treatment Plant and talked about the South EOC project and alternatives.

- On 4/28 Vicki gave a presentation at the CalWarn Members meeting on the revised mutual assistance plan.

WEROC ASSESSMENT IMPLEMENTATION AND PLANNING EFFORTS

- Items identified for implementation within three to six months have been completed or near completation including:
- Obtain a US Bank Government Cal Card for the WEROC program and create a process document for chain of custody and use within the EOC. This project is 100% completed.

- Records and Data Management project is 80 % completed. Janine is updating the outdated documents in safety center.

- Program, Planning Maintenance and Recommendation Matrix is 100% completed as comparison of federal and state mandates in relationship to current planning continues. This matrix includes staff program and planning assignments and each member of the WEROC team. Internal planning meeting occurred to discuss and implement this matrix.

- Training and Exercise Plan is 100% completed and implemented. See Training Section of this report

- Staffing assignments and realignment of EOC roles and responsibilities is 62% completed. A survey was sent to the internal members of MWDOC to highlight current assigned roles, and potential future reassignment of roles. Once this part of the realignment of the EOC responder assignment is completed, training will begin in conjunction with the updated Emergency Operations Plan.

- The WEROC EOP is 95% completed, Management has provided second round feedback to Daniel on the plan, and he is in the process of making final changes. This plan will be done in the next month.

- WEROC is focusing on finishing these items, and beginning on other portions of the assessment report. One specific item is the WEROC EOC Project – Presentation made at 4/5 P&O, Presentation made at A&F 4/19. Board passed Option 1 at the 4/21 board meeting. Future progress on this project will be communicated as this project moves forward. Vicki and Heather Baez met with Senator Feinstein's office on 4/23 in regards to the South EOC Project. Outcomes from the meeting will be reported on as the discussion continues.

AMERICA'S WATER INFRASTRUCTURE ACT (AWIA) PROJECT

- 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.
- All Tier III agencies have begun their workshops. The Tier III agencies RRA are due June 30, 2021.
- 9 agencies workshops were conducted in the month of April utilizing various virtual platforms dependent on the agency preference.

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 (on-going). EOC OA1 Radio System power supply is out for repair as of 4/27.
- Daniel is working with agencies on implementing signal as a backup communications system (free).
- Janine updated all EOC phonebooks.
- 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 attended the Operational Area Technology committee meeting on 3/24.
- Janine continues to update member agency contact information.

TRAINING AND EXERCISES

- Daniel hosted one 800 MHz radio training in April.
- Daniel continues 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.

- Janine has completed a grant writing course. This will provide her and WEROC with additional skills sets to look for additional funding for different programs.
- Vicki has created the training and exercise plan for May-August. WEROC will be providing 12 training opportunities covering EOC functions, ICS 300, etc to member agencies during this time frame.
- During the April 27th WEROC Coordination call with member agencies, Janine provided a training on the Safety Center Applications and its uses.

Status of Water Use Efficiency Projects
April 2021

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Smart Timer Rebate Program	MWDSC	Ongoing	Ongoing	In March 2021, 137 smart timers were installed in Orange County. To date, 29,999 smart timers have been installed through this program.
Rotating Nozzles Rebate Program	MWDSC	Ongoing	Ongoing	In March 2021, 31 rotating nozzles were installed in Orange County. To date, 571,848 rotating nozzles have been installed through this program.
SoCal Water$mart Residential Indoor Rebate Program	MWDSC	Ongoing	Ongoing	In March 2021, 175 high efficiency clothes washers and 5 premium high efficiency toilets were installed in Orange County. To date, 123,519 high efficiency clothes washers and 60,699 high efficiency toilets have been installed through this program.
SoCal Water$mart Commercial Rebate Program	MWDSC	Ongoing	Ongoing	In March 2021, 5 cooling tower conductivity controllers were installed in Orange County. To date, 110,925 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 6,005 AF cumulatively.

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Turf Removal Program	MWDOC	Ongoing	Ongoing	In March 2021, 19 rebates were paid, representing $264,639 in rebates paid this month in Orange County. To date, the Turf Removal Program has removed approximately 23.4 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 1,081,785 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, 178 sites, irrigating a total of 1,654 acres of landscape, have been converted. The total potable water savings achieved by these projects is 3,646 AFY and 15,804 AF cumulatively.

Public & Governmental Affairs Activities Report
March 30, 2021 – April 27, 2021

Member Agency Relations	Public Affairs Staff: • Distributed contest results and voting invitation to member agencies. • Facilitated One-on-One meeting between member agencies and consultant for Consumer Confidence Reports (CCRs) • Produced bill insert marketing Flume Smart Home Water Monitor • Met with Digital Deployment to discuss accessibility and compliance workshop for the June Public Affairs Workgroup meeting • Met with Irvine Ranch Water District to provide information on the Wyland National Mayor's Challenge for Water Conservation Government Affairs Staff: • Hosted a legislative update meeting for member agency legislative staff where we discussed pending legislation and opportunities to work collaboratively • Presented at the MWDOC Elected Officials Forum on AB 1434 (Friedman) and encouraged participants to adopt an oppose position on the legislation and join MWDOC's coalition letter • Distributed an AB 1434 (oppose) template for member agencies to use to contact their elected officials • Sent out a reminder email to member agencies about the upcoming South Coast AQMD meeting on emergency use of generators • Sent out a reminder/deadline to join MWDOC's coalition letter to oppose AB 1434 (Friedman) • Circulated information to all member agencies about an EPA webinar training for drinking water wastewater utilities on Building Resistance and Adapting to Climate Change Impacts • Sent out a reminder for our upcoming bi-monthly grants meeting • Provided an update on our AB 1434 efforts at the MWDOC Member Agency GM meeting • Provided an overview at the MWDOC Member Agency GM meeting on AB 1296/SB 324, legislation that would expand the South Coast Air Quality Management District Board of Directors and offered to coordinate a coalition letter
Community Relations	Public Affairs Staff: • Promoted participation for Wyland National Mayor's Challenge for Water Conservation • Created and distributed April 2021 eCurrents • Met with UCCE Master Gardeners and Strategic Digital Communications contractor Hashtag Pinpoint (#P) to discuss strategies for water wise gardening tip videos • Spent a day on-set filming with UCCE Master Gardeners and #P, capturing demonstrations and visual content for eight water wise gardening videos

	Governmental Affairs Staff: • Sent out a request for certificates for MWDOC's Water Awareness Poster Contest to each legislative office in the Orange County delegation and fielded questions regarding the contest
Education	Public Affairs Staff: • Worked with #P to create and produce a promotional video for MWDOC Choice School Programs • Attended the Department of Water Resources Water Education Committee monthly meeting • Attended the Orange County Business Council's Workforce Development meeting • Attended the Metropolitan Water District of Southern California's Education Coordinators bi-weekly meetings • Met with and provided information on MWDOC Choice School Programs structure and reach to Los Angeles Department of Water and Power • Participated in monthly California Environmental Literacy Initiative Leadership Council meeting • Presented at Orange County Community Foundation Workforce Development meeting on the Water Energy Education Alliance (WEEA) • Participated in the California Environmental Literacy Initiative Career Technical Education/Green Career Education Innovation Hub workgroup meeting • Met with TalentED to discuss WEEA partnership opportunities • Met with Orange County Business Council to discuss WEEA efforts and support opportunities • Met with Orange County Department of Education and Metropolitan Water District of Southern California to discuss content for educational videos project • Completed a new MWDOC hands-on Grab-and-Go activity: "Emergency Go-Bag Challenge"
Media Relations	Public Affairs Staff: • Prepared and distributed content for social media • Met with #P to discuss social media and campaign strategies • Provided an interview for Capistrano Unified School District Insider about the 2021 Water Awareness Poster Contest

Special Projects	Public Affairs Staff: • Participated in the Orange County Water Summit Committee Meetings with Orange County Water District and MWDOC Directors Yoo Schneider, Thomas, and Seckel • Coordinated communications and recognition materials for the 2021 Water Awareness Poster Contest • Developed Garden Smart print resources for MWDOC and UC Master Gardeners partnership • Completed several website updates • Made several database contact list updates • Created working zone signs for MWDOC Water Use Efficiency department • Participated in three of four training sessions of Foundations in Excellence Academy • Participated in the Communication and Listening Skills training with MWDOC staff • Continued work to advance and strengthen the District's Search Engine Optimization • Reviewed MWDOC's Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan and made recommendations for the communications sections • Created a UWMP webpage Governmental Affairs Staff: • Hosted the monthly WACO meeting with OCWD staff • Drafted and scheduled an invite for ISDOC's Quarterly Luncheon meeting for distribution • Staffed the ISDOC Executive Committee meeting • Sent out the ISDOC letter to elected officials for distribution • Created a spreadsheet of contact names/emails for the ISDOC letter to elected officials • Prepared and sent a letter from ISDOC regarding their annual appointments to the Orange County Operational Area Board • Completed a ten-week Supervisor Academy professional training course • Sent out a reminder invite to the upcoming ISDOC Quarterly Luncheon per the direction of the ISDOC Executive Committee • Staffed the WACO Planning meeting • Sent follow-up information to SDCWA staff regarding the May program featuring their GM, Sandy Kerl

Legislative Affairs	Governmental Affairs Staff: • Attended an ACWA DC Conference Panel discussion webinar focusing on President Biden's First 100 Days • Drafted a coalition letter of opposition on AB 1434 • Completed and filed MWDOC's Quarterly Lobbying Report as required per state law • Worked with NRR on a possible federal appropriations request for funding for WEROC's EOC • Participated in the Southern California Water Coalition's Legislative Task Force meeting • Participated in the ACWA Region 10 State Legislative Committee prep call • Participated in CMUA's Regulatory Committee meeting • Participated in CMUA's Legislative Committee meeting • Attended the Met Member Agency legislative update call • Participated in the ACWA State Legislative Committee meeting • Joined CSDA's outreach efforts to obtain COVID relief funding for Orange County special districts • Coordinated with NRR on days/times to set up a meeting with Congresswoman Young Kim • Met with legislative staff at Metropolitan to discuss our concerns with AB 1434 • Reviewed and edited talking points for upcoming meetings with congressional offices • Along with Director Nederhood, Rob and NRR, met with Congresswoman Young Kim to share our legislative priorities for 2021 • Attended the ACC-OC Energy, Environment and Water Committee meeting • Drafted a coalition letter on AB 1296/SB 342 • Met with staff from Assemblywoman Laurie Davies' office and provided an overview of MWDOC • Along with NRR and Vicki Osborn, met with staff from Senator Dianne Feinstein's office to provide an overview of WEROC and our appropriations request to fund construction of an updated EOC • Participated in the ACWA Federal Affairs Subcommittee meeting on Agriculture and Infrastructure • Participated in the ACWA Federal Affairs Subcommittee meeting on Energy and Drinking Water • Attended the OCBC DC Virtual Advocacy event featuring members of Congress, including: John Garamendi, Judy Chu, Linda Sanchez, and Mike Levin; and the Executive Director of the US Chamber of Commerce • Participated in the ACWA Federal Affairs Subcommittee meeting on Water Supply

	• Along with Directors McVicker, Seckel and Yoo Schneider, and Rob, met with staff from Congresswoman Michelle Steel's office to provide an overview of MWDOC's 2021 priorities