MEETING OF THE BOARD OF DIRECTORS OF THE
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
Jointly with the
PLANNING & OPERATIONS COMMITTEE
December 3, 2018, 8:30 a.m.
Conference Room 101

P&O Committee:
Director Osborne, Chair
Director Tamaribuchi
Director Yoo Schneider

Staff: R. Hunter, K. Seckel, J. Berg,
H. De La Torre, K. Davanaugh

Ex Officio Member: Director Barbre

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. 2018 WATER RELIABILITY FOLLOW-UP ANALYSES WITH CDM-SMITH

2. WATER LOSS CONTROL SHARED SERVICES BUSINESS PLAN

DISCUSSION ITEMS

3. PLANNING & RESOURCE DEVELOPMENT DEPARTMENT OVERVIEW

4. METROPOLITAN AND WATER ISSUES DEPARTMENT OVERVIEW

5. 2018 ORANGE COUNTY WATER RELIABILITY STUDY

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. MET SHUTDOWN SCHEDULE

7. STATUS REPORTS

   a. Ongoing MWDOC Reliability and Engineering/Planning Projects
   b. WEROC
   c. Water Use Efficiency Projects
   d. Water Use Efficiency Programs Savings and Implementation Report

8. REVIEW OF ISSUES RELATED TO CONSTRUCTION PROGRAMS, WATER USE EFFICIENCY, FACILITY AND EQUIPMENT MAINTENANCE, WATER STORAGE, WATER QUALITY, CONJUNCTIVE USE PROGRAMS, EDUCATION, 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
December 19, 2018

TO: **Board of Directors**

FROM: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

Robert Hunter, General Manager

Staff Contact: Karl Seckel

SUBJECT: **2018 Water Reliability Follow-up Analyses with CDM-Smith**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee: (1) acknowledge the nature of these two authorization requests as sole source requests for work by CDM-Smith because CDM-Smith has completed the prior work on the OC Water Reliability Study, (2) authorize the General Manager to enter into an Agreement with CDM-Smith for "As Needed Water Resources Planning Assistance" at a cost not to exceed $65,000, and (3) acknowledge an additional authorization under the General Manager's authority for assistance from CDM-Smith to conduct additional work and provide assistance to MWDOC staff in developing recommended terms and conditions for the Strand Ranch Extraordinary Water Supply analysis at a cost not to exceed $16,640, with such terms and conditions to be shared with the Board and the member agencies.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

Two additional authorizations are required for follow-up work related to the Water Reliability Study.

Budgeted (Y/N): Yes	Budgeted amount: $81,640	Core ✓	Choice __
Action item amount: $81,640	Line item: 02-21-7010		
Fiscal Impact (explain if unbudgeted):			

1. Complete additional analysis on the Strand Ranch Integrated Water Banking Program using the results of the study and bring back a proposal for consideration by our Board and Member Agencies. The proposal from CDM-Smith is attached.

2. Staff to work through the list of the Reliability Study implications to share with the Board and Member Agencies. The working list of items is as follows and is augmented by the proposal from CDM-Smith, as attached. The authorization request is for "As Needed Water Resources Planning Assistance" at a cost not to exceed $65,000. As assistance is requested from CDM-Smith under this contract, staff will prepare Task authorizations to be submitted for information to the Board to keep the Board apprised as to which items are being worked on. The overall list of follow-up items for staff and CDM-Smith is provided below:

   - Evaluation of the Carson IPR Project - Is it a beneficial project? Who pays and who receives the benefits? Is it good for OC? Is it good for MET at $1600 per AF? What does SOC pay and what benefits do they receive? Should there be any specific performance terms for agencies receiving the water during allocation situations?
   - Use of MET storage - What does it look like in our modeling? Does MET need more put and take capacity? What is the split between the SWP and CRA side of MET and how do these work independently when either the SWP or the CRA are constrained in any particular year and have low flows?
   - New 400,000 AF reservoir - Further quantification required of the need, operation and benefits of the conceptual project.
   - Changes to MET's WSAP - The Reliability Study identified areas of conflict between local supply development and improvements or benefits under a MET allocation. Can the WSAP be improved to allow agencies to significantly improve their drought protection? Extraordinary supplies seem to be the holy grail of drought protection. How can these opportunities be opened up for agencies that want to make such investments? Should MET offer drought protection for a price? Should local projects get more of a credit under the WSAP? Do we want to remain under a "share the pain" allocation system, or is it time to go down another path?
   - MET Emergency Storage - What level of storage should MET be providing for emergency situations including for concurrent outages of the CRA, SWP and LAA?
   - Operational issues associated with new projects - These include a large gamut of concerns from operational issues associated with adding new projects within MET and OC. These include issues with water moving different directions in systems, getting approval from MET for introducing local sources in the MET system, long residence times during low demands or during periods of certain operations, chloramine residual decay, and water quality issues from blending various sources of water. Issues can also include the stranding of assets (MET and local) and the base-loaded integration during low demand winter months. MWDOC is looking at hydraulic and water quality modeling to help on some of these issues.
   - Stranding of MET assets - How much "roll-off" of MET supply is anticipated? How to incorporate into planning? What are the operational and financial implications?
   - Future MET rate structure - What changes are needed or what changes can be anticipated?
   - MET TDS Issues for the long run
     - How TDS control issues are working on the CRA? Can additional measures be implemented?

    - Feasibility of lowering the TDS via RO of a portion of the CRA flows? Is this the most cost effective way of managing TDS for the groundwater basins and recycling? What are the hidden costs of TDS to plumbing and other?
    - TDS for groundwater basins with respect to replenishment water?
- Quagga control with respect to replenishment water?
- Improved Groundwater Basin Management & MET Programs - How to provide better drought and emergency protection by conjunctive use and MET programs. Historically, there have been problems with developing effective MET groundwater programs. The recent drought allocations and having the groundwater basins at low storage levels are situations that should be discouraged in the future. How can we help to make progress on this? Should we convene a working group of the groundwater basin managers?
- MET's 2020 IRP Update - initial thoughts for the process include:
    - Use of scenario planning to incorporate a more adverse climate change future for MET as a planning technique
    - Get MET to take a close look at recent and future demand projections as these are what drives the investments at MET.
    - More clarity/specificity as to what the plan is moving forward. What opportunities there are for MET and local investments, and deciding how these opportunities should be worked out.
    - Looking at the issue of MET agencies rolling off the system or decreasing their dependence on MET (how can we develop an overall "low cost plan for Southern California" by working together) - this was part of the origin for MET's first IRP, but we have gotten away from that.
    - Need for changes in MET’s LRP program and MET’s WSAP to provide opportunities for improved drought protection by the member agencies.
    - More definitive forecast of LRP projects to be included
    - More clarity between WUE investments and what they will bring - separate from recycling and local projects (the last couple of IRP's have had these all grouped together)
    - More definitive evaluation of benefits that could accrue from improved groundwater management issues within MET
    - Resolution of the Los Angeles Aqueduct as a "local project"; it should stand on its own and not be included with other local projects.
    - Targeting projects to provide specific reliability benefits in certain areas of MET
    - Consider the need for additional surface storage in Southern California to deal with both emergency supplies and the capture of additional wet year water

Attached are the two proposals by CDM-Smith:

600 Wilshire Blvd, Suite 750
Los Angeles, CA 90017
tel: 213-457-2200

November 27, 2018

Karl Seckel, Assistant General Manager
Municipal Water District of Orange County
PO Box 20895, Fountain Valley, CA 92708

Subject: Letter Proposal for Providing As-Needed Water Resources Planning Services

Dear Karl:

As requested, CDM Smith has prepared this letter proposal for providing as-needed water resources planning services to the Municipal Water District of Orange County (MWDOC). These services would be provided only at the request of MWDOC.

As-Needed Water Resources Planning Services

The water resources planning services listed below are meant to illustrate of the types of consulting assistance CDM Smith can provide to MWDOC, if requested:

- Cost-benefit evaluations of Orange County water supply projects from multiple perspectives (e.g., if a local Orange County water agency implements the project, or MET implements the project, or other parties implement the project).
- Analysis of proposed or recommended changes in MET LRP and Water Supply Allocation Plan in the cost-effectiveness of new Orange County water supply projects and reliability impacts to MWDOC's member agencies.
- Additional modeling of climate change impacts, such as using different global climate models or sensitivities of climate modeling.
- Water demand analysis, such as updates in MWDOC region water demand forecasts and estimating potential "bounce-back" from extraordinary water conservation or demand curtailments imposed during droughts.
- Assistance with MWDOC's recommendations for MET's future updates of its Integrated Resources Plan, such as advocacy for scenario planning and explicit analysis of potential climate change impacts.
- Updates to the OC Reliability Study and its modeling tools. This would include further examination of the costs and benefits of an additional MET regional reservoir located in Southern California to help capture wet year supplies and carry-over these supplies for dry periods. It could also include extracting further data and statistics of out the reliability modeling with respect to MET's use of storage. These efforts might also include making additional runs concerning the Drought Contingency Plan agreements among the Lower Colorado River Basin States for sharing of future water shortages as the negotiations begin to cover the period from 2026 onward.

Billing Rates

The proposed billing rates that will be used for the reminder of Calendar Year 2018 and the full Calendar Year 2019 are shown in Table 1. We request that for subsequent years an adjustment to these billing rates equal to CPI is made.

Table 1. Proposed Billing Rates

Billing Category	2018/2019 Billing Rate ($/Hour)
Sr. Vice President (Dan Rodrigo)	$300
Vice President (Lanaya Voelz)	$250
Water Resources Engineer	$170
Assistant Water Resources Engineer	$150
Graphic Artist/GIS	$110
Word Processor	$95
Finance/Administrative	$115

Annual Contract Capacity

CDM Smith is proposing a recurring annual contract capacity of $65,000. We believe this is sufficient to address many of the upcoming consulting needs for water resources planning that MWDOC has been discussing with its Board and member agencies in recent months.

When a request is made for consulting services by MWDOC, CDM Smith will provide an estimate of cost to complete the effort and MWDOC approval before starting work. CDM Smith will prepare quarterly progress reports for MWDOC indicating work completed and annual contract capacity remaining for each year that the contract is in place.

Please feel free to contact me if you have any questions or need further information.

Sincerely,

Dan Rodrigo
Sr. Vice President and Project Manager
CDM Smith Inc.

cc: Lanaya Voelz, CDM Smith

600 Wilshire Blvd, Suite 750
Los Angeles, CA 90017
tel: 213-457-2200

November 27, 2018

Karl Seckel, Assistant General Manager
Municipal Water District of Orange County
PO Box 20895, Fountain Valley, CA 92708

Subject: Updated Cost Estimate for Strand Ranch Water Transfer Program

Dear Karl:

Based on our call on October 19, 2018 with you, me, Rob and Harvey, CDM Smith has revised its cost to conduct a full economic study of the Strand Ranch Water Transfer Pilot Program (Strand Ranch Pilot) with IRWD and to assist MWDOC in its negotiations with IRWD. Based on the discussions from this call the following was determined: (1) CDM Smith would only evaluate the pilot program, under both draft terms supplied to MWDOC from IRWD, as well as modified terms to improve the economics of the program to MWDOC. Table 1 summarizes the parameters of the Strand Ranch Pilot evaluations.

Table 1. Strand Ranch Pilot Evaluation Parameters

Variables	Strand Ranch Pilot Program
Term (Total Years)	3 terms (7, 9, 11)
Annual Take (AFY)	Up to 5,000 AFY per take year
Number of Take Years in Term	2 Years in 7 1 or 2 Years in 9 1 or 2 Years in 11
Frequency of Need (Modeled)	Based on model runs with frequency of 2+ sequential years of MET Water Supply Allocations
Reserve Cost vs Take Cost Financial Evaluation	For each model run (5 in total), analyze economics based on current proposed IRWD terms. Also, for each model run analyze a specific optimal economic term for MWDOC (5 additional financial analyses)

Task 1 – Reprogram WEAP Model and Run Probability Analysis

For the purposes of this analysis, the WEAP model used in the OC Study to determine supply reliability for MET and Orange County would be reprogrammed to use MET ending period drought storage as the trigger for its Water Supply Allocation Program. This is needed as the Strand Ranch Pilot requires at least two years of sequential MET allocation periods in order to consider the water supply to MWDOC to be extraordinary and ride on top of MET allocation for full water supply benefit.

After the WEAP model is reprogramed with MET storage as the trigger for allocation, CDM Smith will run probabilities of needing water from the Strand Ranch Pilot under the different variables presented in Table 1.

Task 2 – Estimate Benefit-Cost Ratio and Iterate to Determine Best Program Terms

CDM Smith will use our OC Study cost evaluation spreadsheet, along with the simulation results from Task 1, to estimate the benefit-cost (BC) ratio for the different program configurations as as indicated in Table 1.

Task 3 – Document Findings

CDM Smith will prepare a very short technical memorandum that documents our analysis and major findings.

The total cost for these three tasks is shown in table below:

CDM Smith Staff	Billing Rate ($/Hr)	Hours	Labor Cost
Dan Rodrigo, PM	$270	40	$10,800
Andrea Zimmer, PE	$165	32	$5,280
Lanaya Voelz, PIC	$200	2	$400
Donna Koors, Admin	$120	2	$240
	Total	**78**	**16,640**

Our original estimate, as documented in our budget amendment letter to you on September 14, 2018, was for $10,410. This estimate did not include any reprogramming of the WEAP model.

Therefore, we are requesting an **additional $6,230** to complete this work.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Dan Rodrigo
Sr. Vice President and Project Manager
CDM Smith Inc.

Item No. 2

ACTION ITEM
December 19, 2018

TO: Board of Directors

FROM: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

Robert Hunter, General Manager
Staff Contact: Joe Berg, Director of Water Use Efficiency

SUBJECT: **Water Loss Control Shared Services Business Plan**

STAFF RECOMMENDATION

Staff recommends the Board of Directors adopt the Water Loss Control Shared Services Business Plan and authorize staff to plan for implementation of shared services in the Fiscal Year 2019-20 Budget, including:

1. Two water loss control staff to be funded through a combination of core and choice services (approximately 0.54 and 1.46 FTE respectively), and

2. MWDOC funding of initial equipment cost of approximately $85,400

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

In October 2015, the Board authorized staff to initiate a Water Loss Control Technical Assistance Program (Program), which included one-on-one technical support from a consultant specializing in distribution system water loss and the establishment of an Orange County Water Loss Control Work Group. This effort is intended to assist agencies in complying with Senate Bill 555, which requires all urban water suppliers to submit validated Water Balances, consistent with the American Water Works association methodology, to the California Department of Water Resources annually beginning October 1, 2017. Senate

Budgeted (Y/N): N/A	Budgeted amount: N/A	Core _X_	Choice _X_
Action item amount: N/A	Line item: N/A		
Fiscal Impact (explain if unbudgeted): If the board authorized implementation of the Water Loss Control Shared Services Business Plan, expenditures will be budgeted in the FY 2019-20 budget cycle.			

Bill 555 also requires the State Water Resources Control Board to establish a volumetric distribution system water loss standard by July 1, 2020.

For the past three years, staff has been implementing this Program in partnership with member agencies and the Three-Cities. During this time, member agencies have expressed an interest for MWDOC to provide expanded Water Loss Control Shared Services. Therefore, in February 2018, the Board of Directors authorized staff to develop a Water Loss Control Shared Services Business Plan (Business Plan). The intent of the Business Plan is to:

- Identify what shared services will be provided
- How the shared services will be provided
- Staffing, equipment, office, and warehouse needs
- Annual cost and funding methods
- Evaluation of competition providing similar services

DETAILED REPORT

Over the past nine months, staff has been developing the Water Loss Control Shared Services Business Plan with support from Water Systems Optimization, Inc. The shared services considered in the Business Plan include:

- Annual Water Balance Validation
- Customer Meter Accuracy Testing
- Distribution System Leak Detection
- Distribution System Pressure Surveys
- Distribution System Flushing

A copy of the Business Plan is provided as Attachment 1.

Staff will provide the Board with a brief presentation of recommendations contained in the Water Loss Control Shared Services Business Plan at the December 2018 Planning & Operations Committee Meeting. A copy of the presentation is provided as Attachment 2.

Staff recommends the Board of Directors adopt the Water Loss Control Shared Services Business Plan and authorize staff to plan for implementation of shared services in the Fiscal Year 2019-20 Budget, including:

1. Two water loss control staff to be funded through a combination of core and choice services (approximately 0.54 and 1.46 FTE respectively), and

2. MWDOC funding of initial equipment cost of approximately $85,400

Water Loss Control

Shared Services Business Plan

Staff Contact: **Joseph M. Berg**
Director of Water Use Efficiency
jberg@mwdoc.com
(714) 593-5008

Contents

Executive Summary

Background

In February 2018, the MWDOC Board authorized staff to explore offering water loss control shared services directly from MWDOC to Orange County retail agencies. MWDOC staff have developed this Water Loss Control Shared Services Business Plan for review by both the retail agencies and the Board. MWDOC's shared services would provide retail agencies flexible and cost effective access to specific water loss control technologies and expertise to improve water loss within their systems under a partnership with MWDOC, the retail agencies, and the Water Loss Control Work Group. Demand for services beyond what MWDOC is able to provide could be supplied by the private sector with MWDOC's facilitation to reduce costs through an economy of scale. MWDOC could tailor shared services to specifically meet the needs of retail agencies both large and small, with sharing of services and equipment to minimize the potential for stranded assets.

Water loss control shared services are particularly timely and appropriate because:

- Senate Bill 555 (2015) requires annual validated water loss reporting and the enforcement of water loss targets that will be established in 2020.
- Senate Bill 606 and Assembly Bill 1668 require that agencies live within an annual water supply budget that includes distribution system water loss.
- MWDOC has facilitated a Water Loss Control Work Group since 2015, and the Work Group has requested the provision of water loss control shared services.
- Through grant funding, MWDOC has recently acquired leak detection and pressure surveying equipment, and having water loss control staff would improve the effectiveness of this equipment's application.
- The Water Loss Control Work Group has provided valuable information for MWDOC staff to utilize in providing feedback to the State Water Resources Control Board to help guide compliance requirements.

Retail Agency Support

To gauge retail agency support for water loss control shared services, MWDOC staff distributed a survey asking for anticipated participation. The survey captured broad support for a variety of water loss control shared services. At least half of MWDOC's retail agencies reported that they would be "likely" or "highly likely" to access each of the proposed shared services.

Proposed Services and Pricing

MWDOC staff propose five shared services, initially priced as listed in the Table 1. Each of these costs is between half to two-thirds of the cost of the same service provided by the private sector.

Table 1: Initial shared services pricing

Shared Service	Provider	Unit Cost	
Water audit validation	MWDOC staff	$840	per validation
Customer meter testing	Outside vendor	$168	administrative fee *
Distribution system leak detection	MWDOC staff	$207	per mile
Suspected leak survey	MWDOC staff	$259	per suspected leak
Pressure survey	MWDOC staff	$3,360	per survey
NO-DES flushing	Outside vendor	$840	administrative fee *

** Unit costs for meter testing and system flushing only include administrative costs for MWDOC staff to facilitate contractor-provided shared services.*

MWDOC staff also propose that shared services be implemented in two phases to ensure that the volume of services and investment are proportional to retail agency demand. The implementation plan is mapped out in Table 2. Depending on demand for the service, MWDOC staff may evaluate the potential for customer meter testing and NO-DES distribution system flushing to be brought in-house. Should staff determine that bringing these services in-house is feasible, a full analysis will be completed and presented to the Board for consideration.

Table 2: Five-year shared services implementation plan

Shared Service	Year I FY 2019-20	Year II FY 2020-21	Year III FY 2021-22	Year IV FY 2022-23	Year V FY 2023-24
Water Audit Validation	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Customer Meter Accuracy Testing	Outside Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *Consider MWDOC Staff*	Outside Vendor or MWDOC Staff
Distribution System Leak Detection	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Pressure Surveying	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Flushing	RFP Process to Select Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *Consider MWDOC Staff*	Outside Vendor or MWDOC Staff

Proposed Staffing

To provide these five shared services to meet demand reported by retail agencies in the shared services survey, MWDOC staff propose to hire two additional staff members as defined in Table 3. Staff responsibilities and estimated time allocations are highlighted in the table on the following page. When policy support and overhead are considered, 1.81 to 2.26 full-time equivalent (FTE) employees are supported.

Table 3: Proposed water loss control shared services staffing

Position and Responsibilities	Funding Mechanism	Staffing Need (Low)	Staffing Need (High)
Water Loss Control Programs Supervisor		**1.03**	**1.19**
Level 1 water audit validation	*Core*	*0.10*	*0.14*
Customer meter accuracy testing	*Choice*	*0.09*	*0.09*
Distribution system pressure surveys	*Choice*	*0.32*	*0.44*
Distribution system flushing	*Choice*	*0.22*	*0.22*
Water loss policy development	*Core*	*0.20*	*0.20*
Overhead (holiday, sick & vacation time)	*Core*	*0.10*	*0.10*
Leak Detection Technician *		**0.78**	**1.07**
Distribution system leak detection	*Choice*	*0.68*	*0.97*
Overhead (holiday, sick & vacation)	*Core*	*0.10*	*0.10*
Total		**1.81**	**2.26**

** excludes suspected leak investigations.*

The proposed Water Loss Control Program Supervisor and Leak Detection Technician would report to the Director of Water Use Efficiency, as shown in Figure 1.

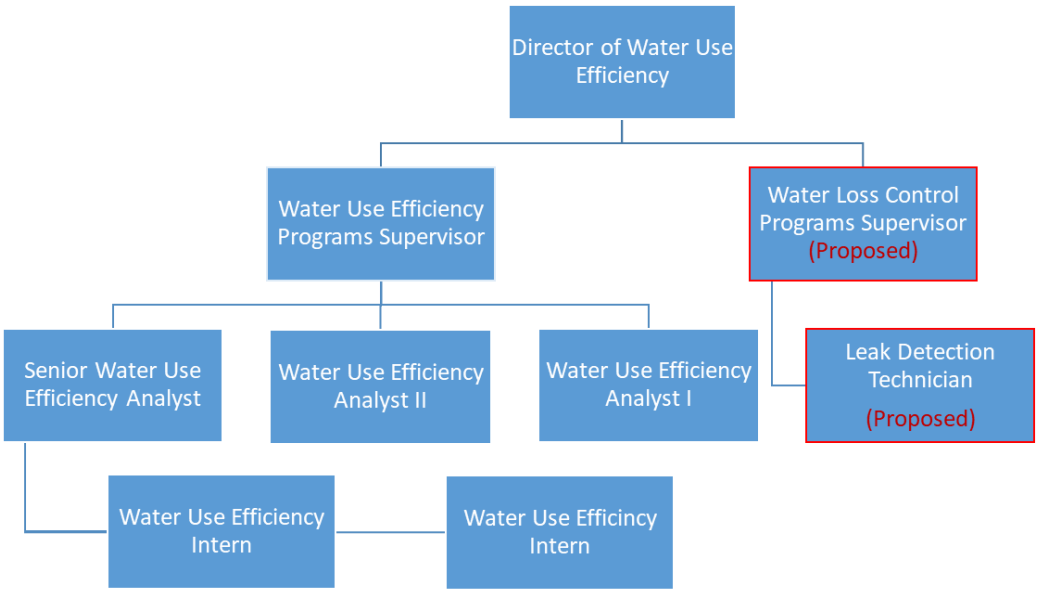


Figure 1: Water loss control shared services organizational structure

Partnerships

To support MWDOC's water loss control shared services program, partnerships with subject matter experts, state agencies, and potential funders would be developed, including:

- California Department of Water Resources
- California State Water Resources Control Board
- United States Bureau of Reclamation
- Water Systems Optimization, Inc.
- Private sector service providers
- Neighboring agencies

Contracting

Agencies choosing to access MWDOC's water loss control shared services will be required to sign a master shared services agreement and annual shared services election exhibits. This agreement will initially have a ten-year term. Annual exhibits to the shared services agreement will be used to define what shared services will be accessed each year for each agency. Exhibits will allow for annual adjustments to the types of services to be accessed, fees to be charged for services, and the addition of new shared services as they become available. This same agreement and exhibit structure have been used effectively for the last three years for MWDOC's water loss control technical assistance program.

Agencies will be asked to make their annual shared services elections in the third quarter of each fiscal year. This will allow agencies time to budget for the services within their normal budget cycle and will

allow MWDOC staff time to schedule and manage workloads in the coming year. Agencies may need to supplement their election of services partway through the year, which can be accommodated by submitting an additional exhibit defining the additional services. Supplemental exhibits will be accepted as staffing and contract services availability permit.

Water Loss Control Shared Services Opportunity

Shared Services Introduction

A shared service is the provision of a service by one part of an organization or group, where that service has previously been provided, by more than one part of the organization or group. The funding and resourcing of the service are shared, and the original supplying department effectively becomes an internal service provider. The key here is the idea of 'sharing' within an organization or group.

Shared services are more than just centralization or consolidation of similar activities in one location. Shared services can mean running these service activities like a business and delivering services to internal or external customers at a cost, quality, and timeliness that is competitive with alternatives.

The Water Loss Control Shared Services being considered by the Municipal Water District of Orange County would be a joint initiative model for shared services between MWDOC and our agencies to set up and operate shared services.

The focus of this Water Loss Control Shared Services Business Plan is for MWDOC to provide shared services to retail water agencies throughout Orange County. Retail agencies would have easy and timely access to shared services to improve water loss within their systems under a shared services partnership with MWDOC. Shared services would be scaled to the needs of both large and small agencies. The sharing of services and equipment will minimize the potential for stranded assets. Demand for services beyond what MWDOC could provide would be facilitated by MWDOC from the private sector.

Factors Driving MWDOC's Water Loss Control Shared Services

Water loss requirements for urban water suppliers began in 2014 when the Governor signed Senate Bill 1420. The bill required urban water suppliers to quantify and report on distribution system water loss in urban water management plans, beginning in 2015. Distribution system water loss must be quantified for the most recent 12-month period available, and the water loss report must be based on the water balance methodology endorsed by the American Water Works Association.

In 2015, the Governor signed Senate Bill 555, increasing the requirements for annual water loss reporting and establishing a standard for water loss. This bill requires each urban retail water supplier, beginning October 1, 2017, to submit a completed and validated water loss audit report annually. The bill requires the water supplier to post all validated water loss audit reports on its website in a manner that allows for public access to water loss audits and performance comparison across water suppliers. The bill further requires the State Water Resources Control Board to adopt rules no later than July 1, 2020 that require urban retail water suppliers to meet performance standards for the volume of water losses.

MWDOC's Current Technical Assistance Program

In October 2015, the MWDOC Board authorized staff to begin a water loss control technical assistance program. The program included two components: a standing water loss control work group and one-on-one technical assistance provided by a consultant, Water Systems Optimization, Inc. (WSO). This effort grew out of the legislative requirements of Senate Bill 1420 (2014) and Senate Bill 555 (2015) described above.

Water Loss Control Work Group

The Water Loss Control Work Group (Work Group) component of the MWDOC water loss control technical assistance program includes all retail water agencies in the county and meets every other month. The WLC work group provides a forum for knowledge and capacity building among water agency staff on water loss control for retail water agency distribution systems. The every-other-month WLC work group meeting agendas typically include:

- Regulatory updates
- Member agency information sharing
    - Meter accuracy testing and results
    - Advanced metering infrastructure
    - Leak detection
    - Revenue loss and theft recovery
- Guest speakers, including SWRCB staff
- Seminar topics
- Technical assistance updates
- Networking

WLC work group meetings are well attended by all retail agencies in the county. The average participation at each meeting over the last year was 25 to 30 staff members representing 18 to 25 agencies, and a representative from all agencies has attended at least one meeting during the duration of the program to date.

One-on-One Technical Assistance

Over the last three years, MWDOC established a comprehensive water loss control technical assistance program for water agencies throughout Orange County. The one-on-one technical assistance links retail water agency staff to a consultant, Water Systems Optimization, Inc. (WSO), specializing in water loss control. The technical assistance includes water balance compilation, component analysis of water loss volumes, distribution system leak detection, and reporting that contains recommendations for further actions to improve an agency's understanding of water loss control opportunities within their system. This program has evolved over time with the addition of sales and production meter accuracy testing in 2016, water audit validation in 2017, and the establishment of a distribution system leak detection equipment lending library in 2018. With the exception of the equipment lending library, these services are accessed by retail agencies through the "choice" program framework; on an approximately annual basis, agencies choose the services they desire and then pay for access to those services.

Since these efforts started in 2015, the level of interest from water agencies throughout Orange County for these and other water loss control services has grown. Because of its success, the MWDOC water loss control program model is being replicated by the Bay Area Water Supply & Conservation Agency on behalf of their 24 member agencies.

Development of a Water Loss Control Shared Services Business Plan

In February 2018 the MWDOC Board authorized staff to explore offering water loss control shared services directly from MWDOC to retail agencies. MWDOC staff have developed this Water Loss Control Shared

Services Business Plan for review by both the Orange County retail agencies and the Board. Before any shared services are provided (beyond MWDOC's current offering), the Business Plan must be approved by the MWDOC Board. Staff are planning to present the draft Business Plan to the Board in late 2018 and will continue to engage with agencies along the way to ensure that shared services planning attends to actual agency needs. In support of this goal, MWDOC staff developed a survey to gauge retail agency interest in shared services and expectations of funding structures. The survey results are the basis of the services and staffing plan presented in this business plan.

The water loss control shared services to be explored in this survey and possibly in the business plan include the following:

- Annual level 1 water audit validation
- Sales water meter accuracy testing (large and small sales meters)
- Distribution system leak detection
- Distribution system pressure surveys
- Distribution system flushing

The following are basic tenets of MWDOC's water loss control shared services:

- Offer shared services at a competitive or lower cost than the same services provided by the private sector
- Provide quality shared services on par with or better than the same services provided by the private sector
- Realize economies of scale for these services by providing services at a regional level that cannot be justified at many local levels
- Continue collaboration and shared learning among all agencies throughout this process
- Phase implementation of new shared services over time, starting with the services that have the highest level of interest or demand by water agencies
- Integrate program administration and data management to share results and customize program offerings to the unique conditions of each member agency

The shared services will be offered using MWDOC's established "core" and "choice" funding framework, with "core" activities funded through the MWDOC general fund and available to all agencies and "choice" activities funded by retail agencies at the level of service of their choosing. These services will be accessed through an extended-term shared services agreement. The agreement would outline the basic roles and responsibilities of MWDOC and the retail agencies. Annually, each agency would complete a shared services participation exhibit. The exhibit would identify which shared services an agency would like to access and at what level of service (e.g., the number of meters to be tested or miles of main to be surveyed for leaks). Agencies will have the choice to opt in or out of shared services annually.

Needs Assessment (Gap Analysis)

To better understand retail agency needs for water loss control shared services, staff surveyed agencies to see what shared services they would consider accessing if offered by MWDOC.[1] The survey asked agencies if they were highly likely, likely, or unlikely to access potential shared services, including:

- Annual level 1 water audit validation
- Sales water meter accuracy testing (large and small sales meters)
- Distribution system leak detection
- Distribution system pressure surveys
- Distribution system flushing

The survey also asked agencies if each of these services should be funded as a core or choice-based activity and gave agencies an opportunity to pose questions and express any specific support for or concern about these services.

The survey was released to retail agencies on May 24, 2018 and was scheduled to close on June 7, 2018. Due to conference and vacation schedules, the survey was held open for two additional weeks to allow for broader agency participation. The final tally of survey participants totaled 28, including MWDOC member agencies and the cities of Anaheim, Fullerton and Santa Ana. The results of the survey are provided below.

Note that the survey results below regarding how shared services should be funded exclude the cities of Anaheim, Fullerton and Santa Ana, as they are not subject to MWDOC's core/choice framework and would be charged directly for access to all shared services.

The water loss control shared services business plan member agency survey is provided as Appendix 1.

Annual Water Balance Validation

Survey Question

If MWDOC provided annual Water Audit Validation Services, as required by SB 555, would your agency participate?

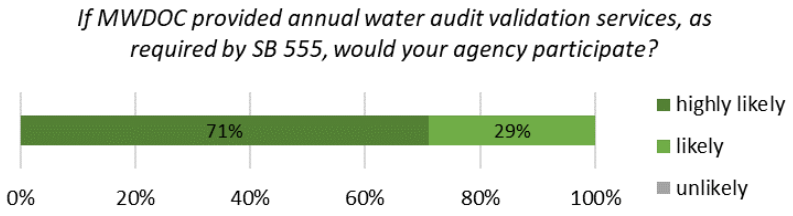


Figure 2: Survey response to water audit validation shared service

[1] Survey responses from agencies regarding Choice or Core services and Questions or concerns regarding each shared service is provided in Appendix 2.

Figure 2 shows that 71% of agencies responded that they are highly likely to participate, and the remaining 29% of agencies indicated that they are likely to participate, indicating broad support for water audit validation as a shared service. No agencies indicated that they are unlikely to access this shared service.

Furthermore, survey results in Figure 3 show 36% of agencies indicating water audit validation should be core-funded and 64% of agencies indicating it should be choice-funded.

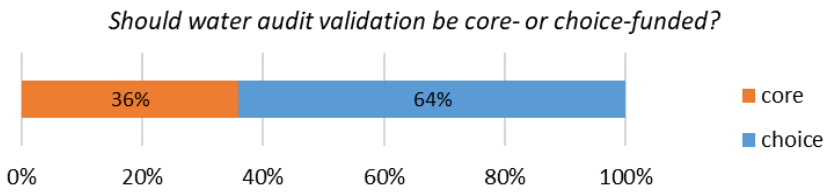


Figure 3: Survey response to funding water audit validation

Because Senate Bill 555 requires all agencies to submit a level 1 validated water audit to the California Department of Water Recourses annually, **MWDOC staff recommend that water balance validation be offered as a core MWDOC shared service utilizing in-house staff.** Annually, staff will evaluate this core or choice service. When appropriate, it will be shifted to a Choice service. If an agency requests a level 2 or level 3 validation that requires more staff time than a level 1 validation, MWDOC staff recommend that additional time be a choice activity funded by the agency.

Customer Meter Accuracy Testing

Survey Question

If MWDOC provided customer meter testing services for the following purpose, would your agency participate?

- *Independent verification in response to a customer claim of inaccuracy*
- *Testing for new meters*
- *Statistically-based testing across all meter sizes*

The survey results suggested broad support for MWDOC to provide customer water meter testing for the trio of purposes, with statistically-based testing across all meter sizes garnering the most support (see below).

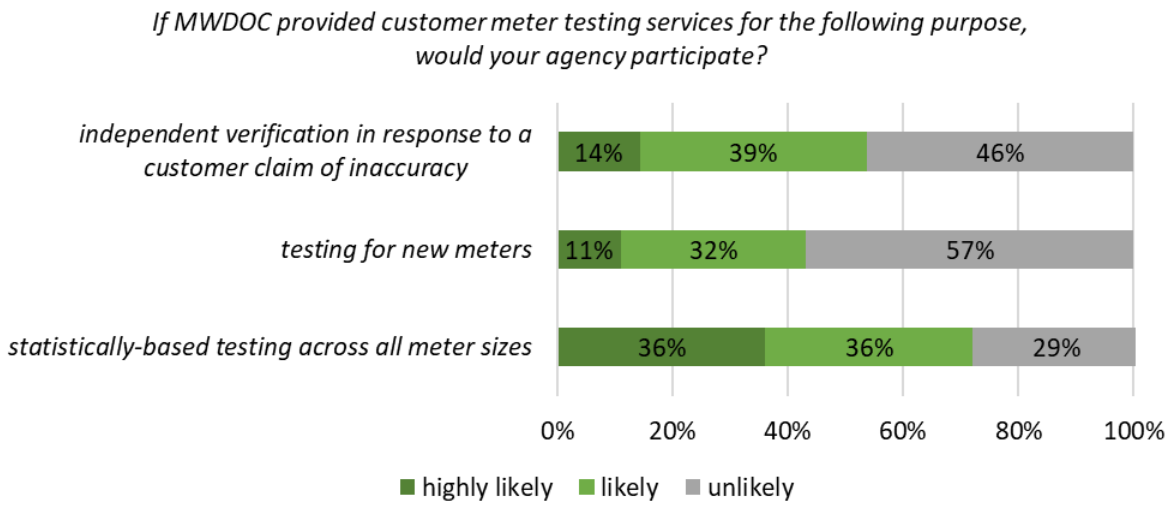


Figure 4: Survey response to meter accuracy testing shared service

In terms of funding, survey results showed 7% of agencies indicating it should be core-funded and 93% of agencies indicating it should be choice-funded.

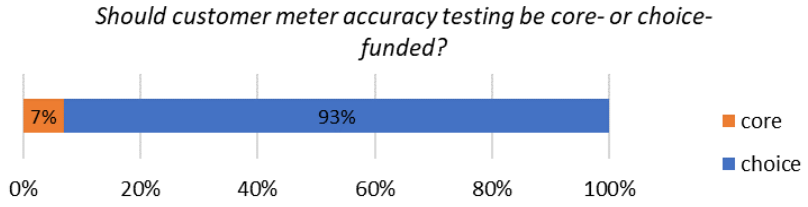


Figure 5: Survey response to funding meter accuracy testing

The survey then queried agencies about how many meters they would have tested per year on average if MWDOC provided meter accuracy testing. A total of 18 agencies provided an annual count of meters to be tested that collectively ranged from 3,100 meters per year to 4,300 meters per year.

There is support for meter accuracy testing among many of MWDOC's retail agencies. Because of the high capital cost of purchasing and warehousing small meter test equipment, **MWDOC staff recommend customer meter testing services be provided as an out-sourced, contracted shared service as is currently being done with McCall's Meters and Westerly Meter Service Company. MWDOC staff also recommend that meter accuracy testing be funded as a choice activity by agencies choosing to have meters tested.**

Distribution System Leak Detection

Survey Question

If MWDOC provided distribution system leak detection services for the following purpose, would your agency participate?

- *Partial-system or full-system leak detection services for distribution infrastructure (proactive)*

- *Distribution system leak detection to check for a suspected leak (reactive)*

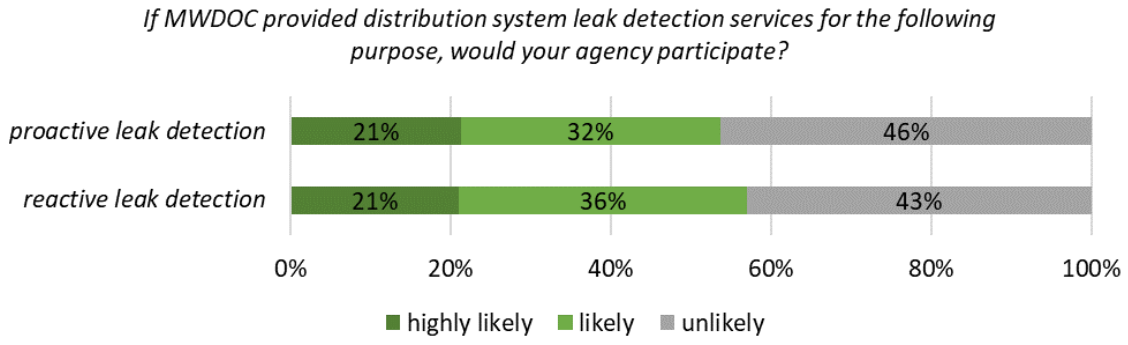


Figure 6: Survey response to leak detection shared service

The survey captured broad support for MWDOC to provide distribution system leak detection shared services, with 21% of the agencies indicating they are highly likely to participate, 32% of the agencies indicating that they are likely to participate and the remaining 46% of agencies indicating they are unlikely to participate. Agencies indicated slightly higher interest for leak detection for suspected leaks in their distribution systems than for partial-system or full-system proactive leak detection.

Most agencies (89%) prefer that distribution system leak detection be choice-funded.

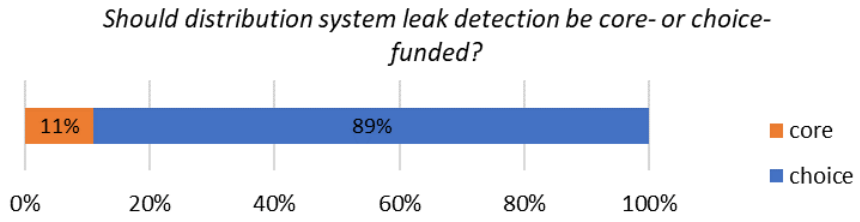


Figure 7: *Survey response to funding meter accuracy testing*

The survey also asked agencies for the miles of distribution system main they anticipate surveying if MWDOC were to provide the service. Total annual leak detection anticipated by the 15 responding agencies ranged from 510 to 560 miles per year.

There is support for distribution system leak detection among many water agencies. Because of the high mileage of distribution main to be surveyed and the fact that the required equipment has already been purchased, **MWDOC staff recommend that leak detection be provided as an in-house shared service. MWDOC staff also recommend that distribution system leak detection be funded as a choice activity by agencies choosing to have their systems surveyed.**

Distribution System Pressure Surveys

Survey Question

If MWDOC provided distribution system pressure surveys (either system-wide or for a pressure zone), would your agency participate?

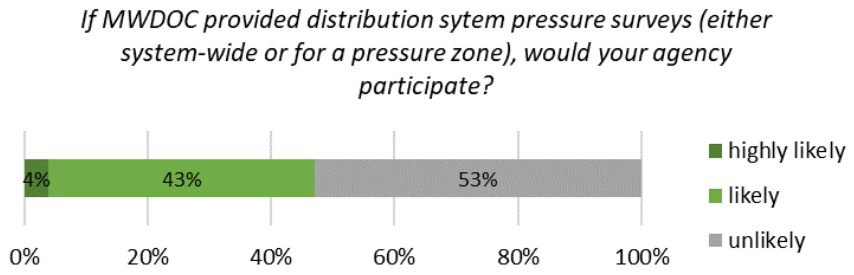


Figure 8: Survey response to distribution system pressure survey shared service

There is support for MWDOC to provide distribution system pressure survey shared services with 4% of the agencies indicating that they are highly likely to participate, 43% of the agencies indicating that they are likely to participate, and the remaining 53% of agencies indicating they are unlikely to participate.

In terms of funding, results showed 7% of agencies indicating pressure surveying should be core-funded and 93% of agencies indicating pressure surveying should be choice-funded.

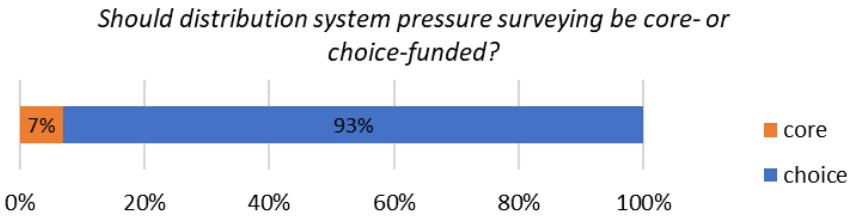


Figure 9: *Survey response to funding distribution system pressure survey*

There is support for distribution system pressure surveys among many water agencies. Because of the limited number of surveys and the fact that the required equipment has already been purchased, **MWDOC staff recommend that pressure surveys be provided as an in-house shared service. MWDOC staff also recommend that distribution system pressure surveys be funded as a choice activity by agencies choosing to have their systems surveyed.**

Distribution System Flushing

Survey Question

If MWDOC provided distribution system flushing shared services, would your agency participate?

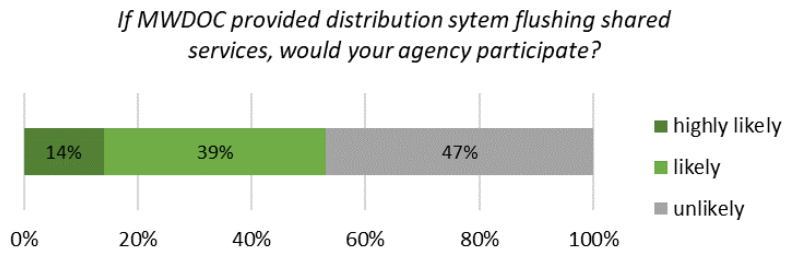


Figure 10: Survey response to distribution system pressure survey shared service

The survey reported support for MWDOC to provide distribution system flushing shared services, with 14% of the agencies indicating that they are highly likely to participate, 39% of the agencies indicating that they are likely to participate, and the remaining 47% of agencies indicating they are unlikely to participate.

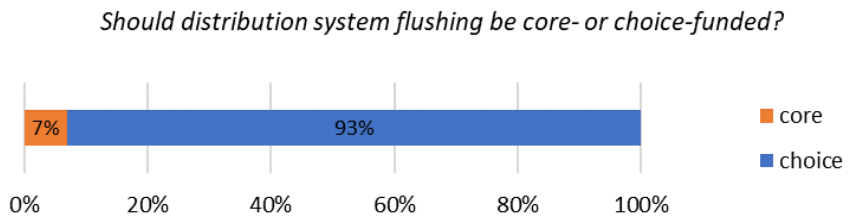


Figure 11: *Survey response to funding distribution system flushing*

In terms of funding, survey results showed 7% of agencies indicated it should be core-funded and 93% of agencies indicated it should be choice-funded.

The survey then queried agencies about how many miles of distribution main they would flush per year on average if MWDOC provided distribution system flushing services. A total of 13 agencies indicated they would likely use shared services for flushing a total of 1,900 miles per year.

There is support for distribution system flushing among many water agencies. Because of the high capital cost of purchasing and warehousing flushing equipment, **MWDOC staff recommend that this service be provide as a contract shared service using a third party. MWDOC staff also recommend that system flushing be funded as a choice activity by agencies choosing to access this service.**

Summary

In summary, the survey captured broad support for a variety of water loss control-related shared services. Most services would be funded through choice elections by participating agencies. It is important to note that participation by all agencies is not necessary to justify offering a particular shared service.

Furthermore, MWDOC's retail agencies would have the opportunity to cost-effectively reduce water loss through the shared services program. To date, most MWDOC retail agencies have compiled three

consecutive water audits to estimate and value distribution system water loss. Three years of water audit results are displayed in Tables 4 and 5 below. Though some agencies' audits present unrealistic results and not all water loss is recoverable, as a group, the audits capture significant volumes of water loss that could be recovered through proactive intervention.

At approximately $1,200 per acre-foot, the current cost of imported water is sufficiently high to justify investments to evaluate and possibly implement systematic and economically viable water loss control programs, beginning with shared services.

*Table 4: Three years of apparent loss estimation**

	Year 1 Apparent Loss (AF)	Year 2 Apparent Loss (AF)	Year 3 Apparent Loss (AF)
Total	**7,314**	**7,416**	**8,056**

* Apparent loss are the nonphysical losses that occur when water is successfully delivered to the customer but, for various reasons, is not measured or recorded accurately. Types of apparent loss are meter inaccuracy and billing errors.

*Table 5: Three years of real loss estimation**

	Year 1 Real Loss (AF)	Year 2 Real Loss (AF)	Year 3 Real Loss (AF)
Total	**20,814**	**20,362**	**14,790**

* Real losses are the physical losses from the distribution system, most often leakage and tank overflows.

Solution – Shared Water Loss Control Services

The following provides a description of the methodology to be used to provide each shared service, as well as the equipment and staff necessary for successful shared service execution.

Opportunity No. 1: Water Balance Validation

Description

Level 1 water audit validation is the third-party review of a water audit through an interview and supporting documentation review. Level 1 validation aims to:

- Confirm the correct application of general American Water Works Association water audit methodology to a utility's unique distribution system
- Identify errors in water audit compilation and data validity grade selection and correct errors when possible

Additional information on the process and outcomes of level 1 water audit validation can be found in Water Research Foundation project 4639A, *Level 1 Water Audit Validation Guidance Manual* (2017).

Context

Potential

Annual water audit compilation and validation is a best practice for all water utilities. As a result, there is the potential for all MWDOC member agencies and the three cities to annually validate their individual water audits through shared services.

Regulatory Requirements

Level 1 water audit validation is an annual requirement for all California retail urban water suppliers.[2] Senate Bill 555, passed in October of 2015, directed the Department of Water Resources to collect level 1 validated water audits annually and publish a database of level 1 validated water audits online. Level 1 validated water audits are due by October 1 each year, and validation must be performed by a professional who was uninvolved in the compilation of the water audit and holds a level 1 water audit validation certificate issued by the California-Nevada section of the American Water Works Association.

Value Beyond Compliance

Level 1 water audit validation meets the requirements of Senate Bill 555, but beyond supporting compliance, level 1 water audit validation can improve the accuracy and reliability of a water audit. By engaging with a qualified level 1 validator to confirm the data sources, analysis, and methods used to compile their water audits, MWDOC's retail agencies can more confidently use the water audits' estimates of water loss to build water loss control programs. Furthermore, the level 1 validator may objectively

[2] Retail urban water suppliers are defined as systems that supply more than 3,000 acre-feet of potable water a year or serve more than 3,000 service connections. Most MWDOC member agencies qualify as retail urban water suppliers, with the current exception of Serrano Water District and Emerald Bay Community Services District.

suggest practices for improved data management and instrument maintenance to support MWDOC retail agencies in employing best practices.

Methodology

Water audit validation will be conducted at level 1, according to the methodology established in Water Research Foundation project 4369: *Level 1 Water Audit Validation Guidance Manual*.

Water audit validation aims to identify and appropriately correct for inaccuracies in water audit data and application of methodology. Furthermore, validation also evaluates and communicates the uncertainty inherent in water audit data. To accomplish these goals, MWDOC's validation shared service will follow the steps published in the Water Research Foundation *Level 1 Water Audit Validation Guidance Manual.*

1. Receive and review the water audit and supporting documentation.
2. Review performance indicators for evidence of inaccuracy.
3. Review audit inputs and data validity grades and confirm correct application of methodology in a level 1 validation interview. Adjust inputs and data validity grades if necessary.
4. Review performance indicators again for evidence of persisting inaccuracy.
5. Document results.

MWDOC's validation shared service will also employ the California-specific additional guidance developed by the California Water Loss Technical Assistance Program and subsequently taught in the Water Audit Validator (WAV) certificate course.

Validation results will be documented in a format acceptable to the Department of Water Resources. Templates for this format have been published by the California-Nevada section of the American Water Works Association on their WAV Certification webpage.

Equipment Requirements

Level 1 water audit validation does not require any specialized equipment. Staff will need:

- Computers equipped with Microsoft Office Suite software
- Email access
- Phone access
- Work stations from which to review supporting documentation and conduct level 1 water audit validation

Staff Requirements

Up to 30 level 1 water audit validations will be conducted annually, in perpetuity. The time needed to accomplish a level 1 water audit validation for a utility depends on the preparation and consistency of the water audit and supporting documentation. At minimum, coordination and scheduling requires an hour, supporting document review requires two hours, the validation interview requires two hours, and validation documentation compilation after the interview requires two hours, for a total of seven hours. For agencies whose supporting documentation and water audits require significant analysis, correction, or revision, the process may take up to ten hours per agency. Therefore, to forecast staff time demands, Table 6 shows an average level 1 validation is assumed to take seven to ten hours or 196 to 290 hours for all agencies.

Table 4: Staff time required for annual level 1 water audit validation

Annual Validations	Time per Validation	Total Time per Year
28 to 29	7 - 10 hours	196 to 290 hours (0.10 to 0.14 FTE)

The staff member(s) who performs level 1 water audit validation must hold a level 1 water audit validation certificate issued by the California-Nevada section of the American Water Works Association. To earn a certificate, the MWDOC staff member(s) must attend the California-Nevada section's two-day level 1 water audit validation class and pass the test proctored at the end of the course. Course registration is currently $2,000 per participant. The course is taught at an advanced level and assumes fluency in water audit compilation methodology as a pre-requisite.

In summary, to be qualified to level 1 validate water audits, the MWDOC staff that perform level 1 water audit validation must be fluent in water audit compilation methods and pass the level 1 water audit validation certificate test proctored by the California-Nevada section of the American Water Works Association.

Opportunity No. 2: Meter Accuracy Testing

Description

Customer meter accuracy testing enables an agency to measure a retail meter's performance and consequently the throughput that the meter fails to register. By measuring a meter's inaccuracy, an agency can understand financial loss due to meter inaccuracy and can develop a plan to manage the meter performance within their system.

Small customer meters, typically defined as meters two inches and smaller, are usually sampled from a population for testing. Test results are then extrapolated using statistical methods to represent the accuracy of the entire small customer meter stock.

Large customer meters are treated as individual assets. Large customer meters are typically tested on a fixed schedule that an agency determines based on the financial consequences of meter inaccuracy. In such a large customer meter testing program, the meters responsible for generating the most income will be tested most frequently.

Context

Potential

At the most recent count, Table 7 shows MWDOC retail agencies maintain 728,074 small customer meters (5/8 inches to 2 ½ inches) and 8,117 large customer meters (3 inches to 12 inches). It is recommended that most large meters that see significant volumes of throughput be tested on a regular schedule. Small customer meter testing schedules depend on an agency's meter accuracy statistics, meter age, revenue analysis and other factors described further below.

Table 7: 2017 orange county retail meter counts by size

Agency	5/8"	3/4"	5/8" & 3/4"	1"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"	10"	12"	Sub Total
Brea	3,051	126		8,297	126	813		78	140	200	154	30	2	13,017
Buena Park			14,788	2,461	506	764		149	49	7	4	2		18,730
El Toro WD	2,379	4,871		447	691	1,260		0	0	0	0	0		9,648
EOCWD	10	865		293	30	11		3	0	0	0	0		1,212
Fountain Valley	6,136	9,454		724	256	449		44	42	6	10	2		17,123
Garden Grove	28,635	3,250		847	656	55		115	44	0	0	0		33,602
Golden State WC	32,870	1,090		6,920	685	1,687		395	54	38	7	0		43,746
Huntington Beach	1	40,817		8,443	1,492	2,053		136	83	24	17	4		53,070
Irvine Ranch WD	74,779	11,901		14,594	5,642	8,319		333	216	42	24	8		115,858
La Habra	8,297	368		3,195	327	507		278	11	11	5	0		12,999
La Palma	4,155	24		48	31	78		10	0	1	0	0		4,347
Laguna Beach CWD	0	6,835		1,000	254	159		50	49	28	5	2		8,382
Mesa WD	17,095	2,156		2,164	930	1,163		55	35	16	8	0		23,622
Moulton Niguel WD	36,166	114		11,861	809	3,634		50	60	7	5	1		52,707
Newport Beach	16,751	4		7,251	531	1,442		42	76	32	14	1	2	26,146
Orange	0	27,529		5,922	622	1,969		61	48	16	9	2		36,178
San Clemente	0	0		16,118	354	943		32	20	12	1			17,480
San Juan Capistrano		0	6,768	3,184	568	697		7	20	9	0	0		11,253
Santa Margarita WD	0	41,047		8,098	786	2,117		42	15	2	6	0		52,113
Seal Beach	460	3,789		804	116	199		17	39	21	19	17	2	5,483
Serrano WD	1,734	329		147	6	50		0	0	1	0	0		2,267
South Coast WD	0	8,095		2,846	631	198		270	18	5	0	0		12,063
Trabuco Canyon WD	2,650	873		257	39	132		6	3	2	0	0		3,962
Tustin		0	10,111	2,979	365	594		0	51	60	0	0		14,160
Westminster	15,448	2,398		1,346	322	574		72	123	114	41	5	1	20,444
Yorba Linda WD	28	5,611		17,404	576	1,074		6	4	1	0	0		24,704
MWDOC Total	**250,645**	**171,546**	**31,667**	**127,650**	**17,351**	**30,941**	**0**	**2,251**	**1,200**	**655**	**329**	**74**	**7**	**634,316**
Anaheim	39,406			15,841	2,663	3,158	170	197	726	794	469	118		24,136
Fullerton	14806	1		14998	887	1052		112	223	141	229	63	2	32514
Santa Ana	31606	5486		4413	1422	1771		329	156	42				45225
3 Cities Total	**46,412**	**5,487**	**0**	**35,252**	**4,972**	**5,981**	**170**	**638**	**1,105**	**977**	**698**	**181**	**2**	**101,875**
Orange County Total	**297,057**	**177,033**	**31,667**	**162,902**	**22,323**	**36,922**	**170**	**2,889**	**2,305**	**1,632**	**1,027**	**255**	**9**	**736,191**

Regulatory Requirements

There are no regulations that currently mandate customer meter testing. However, the water loss regulations that will be developed through the Senate Bill 555 process assume that retail water agencies have insight into apparent loss performance, which typically requires customer meter testing.

Value Beyond Compliance

Customer meter testing equips a utility to manage its customer meter stock. By understanding the accuracy of its customer meters, a water utility will be better positioned to:

- Evaluate meter replacement cycles and study the factors affecting meter accuracy for effective meter management
- Maintain revenue generation efficiency, particularly for key large meters that register significant consumption
- Determine whether a meter technology upgrade could result in increased revenue in order to determine appropriate investment in new metering technology
- Verify the performance of newly purchased meters

Customer meter test results can also inform the estimate of apparent losses in an agency's annual water audit. By understanding customer meter performance, a utility is able determine the portion of water loss attributable to apparent loss and, therefore, the portion of water loss attributable to leakage. As a result, customer meter tests enable a utility to more accurately measure and, therefore manage, both apparent loss and real loss.

Methodology

Customer meter tests will be conducted in accordance with the methodology set forth in American Water Works Association manual M6, *Water Meters – Selection, Installation, Testing, and Maintenance*. The stipulations in manual M6 include:

- Specific low, medium, and high flow rates for each meter type and size
- Minimum test volume by flow rate and meter size
- Generally acceptable accuracy limits for new and repaired meters

M6 also enumerates test procedures for laboratory tests and field tests that MWDOC staff and/or contractors will be required to follow.

Equipment Requirements

Comprehensive customer meter testing is capital intensive. Meters two inches and smaller are often removed from service and tested on a test bench. Small meter test benches are typically stationary and housed in permanent facilities. In contrast, meters three inches and larger are tested in situ with mobile testing rigs. As a result, each size group (small or large) requires specific testing equipment.

To confirm demand for customer meter testing services and acquire the most suitable equipment to serve retail agencies, customer meter testing will be conducted in two phases: first by local private companies and then by MWDOC staff using MWDOC-owned equipment, if determined to be reasonable after additional feasibility analysis.

Phase One: Contracting with Private Companies

MWDOC currently contracts with McCall's Meters (Hemet) and Westerly Meter Service (Compton) to test customer meters. Both companies were selected through a competitive bid with input by members of MWDOC's water loss control working group and approved by the MWDOC Board of Directors. Over the past three years, ten MWDOC retail agencies have tested a substantial number of customer meters. Eight retail agencies have contracted with McCall's or Westerly, while the other two agencies have tested customer meters in-house. McCall's and Westerly have met the needs of the eight retail agencies they have served, but appear to be nearing capacity. Should additional agencies choose to have meters tested, it may be necessary to contract with a third meter testing company.

Phase Two: In-House Testing

Should more MWDOC retail agencies wish to continue with periodic testing of customer meters, during the second phase of customer meter testing, MWDOC could invest in:

- A small customer meter test bench
- A portable large customer meter tester
- A facility to house testing equipment, including the small customer meter test bench

Staff will monitor demand for customer meter testing over the next few years. If demand for meter testing increases, staff will evaluate other options for this shared service including bringing meter testing in-house.

Staff Requirements

Customer meter testing will be offered in two phases, as explained previously. In phase one, testing will be contracted with outside companies. In phase two, the costs and benefits of bringing customer meter testing in-house will be evaluated to determine whether doing so is attractive and feasible.

Phase One: Contracting with Private Companies

During the first phase, MWDOC will continue its contract with two local private meter testing companies. Retail agencies can contract a specified number of meter tests from the companies MWDOC has retained (to date, McCall's Meters and Westerly Meter Service). Each MWDOC retail agency will then individually coordinate testing, including meter delivery and the testing timeline, with the contracted testing provider. MWDOC staff will be involved in ensuring ease of contracting and tracking overall participation and results. MWDOC staff will also warehouse results to build a database and periodically analyze results to track performance and identify any observable trends.

During phase one (contracted testing service), it is estimated that MWDOC staff will spend 2 hours per retail agency promoting customer meter testing and processing the funding exhibit and 8 hours facilitating meter testing, obtaining test data, building a test database, and interpreting test results. Therefore, as shown in Table 7, a total of 10 hours of MWDOC staff time per agency has been assumed for phase one or 190 hours for 19 participating agencies.

Table 5: Staff time required for phase 1 of customer meter testing

Participating Agencies	Time per Agency	Total Time per Year
19	10 hours	190 hours (0.09 FTE)

Phase Two: In-House Testing

During the second phase, MWDOC can weigh the costs and benefits of building the capacity to test customer meters in-house. Testing customer meters in-house would allow MWDOC retail agencies to receive tailored service and collaborate with regional peers on customer meter test data analysis and application. Furthermore, as the focus on customer meter testing intensifies over the next five years, demand for customer meter testing expertise is expected to greatly outpace service availability in both Orange County and the greater Los Angeles metropolitan area. MWDOC retail agencies' compliance with regulatory requirements and ability to manage customer meters would be supported by access to high-quality, convenient customer meter testing.

To address MWDOC retail agency needs for customer meter testing in phase 2, MWDOC could hire staff to conduct customer meter testing. Staff could retrieve small customer meters from retail agencies, test customer meters on a test bench, and record and transmit test results. Customer meter testing staff should be able to:

- Comfortably lift at least 50 lbs
- Possess a driver's license

- Easily record data in Microsoft Excel
- Accurately attend to details like meter serial numbers and meter test bench conditions
- Operate simple mechanical equipment, like a mobile large customer meter testing rig

However, developing customer meter testing capacity in-house would require initial capital investment to obtain testing equipment, including a customer meter test bench and/or mobile large customer meter testing rig. MWDOC staff will monitor customer meter testing to determine whether bringing customer meter testing in-house is attractive, in which case a comprehensive analysis will be completed and presented to the Board for consideration.

Funding Mechanism

Customer meter accuracy testing would be funded by each agency per test. Test prices would align with meter sizes, with tests of larger meter costing more than smaller meter tests. Testing funding would therefore be choice-funded based on the number and sizes of meters an agency elects to test.

The acquisition of test equipment could be funded in part or in whole through grant funds. Possible grant funding sources include:

- The United States Bureau of Reclamation
- The Metropolitan Water District of Southern California
- The Department of Water Resources Integrated Water Management Program

Opportunity No. 3: Distribution System Leak Detection

Description

To identify and repair leaks, a utility must conduct distribution system leak detection. Distribution system leak detection can be performed in response to a specific suspected leak or as a proactive measure to discover hidden leaks. A range of technologies can be harnessed for leak detection, ranging from established acoustic equipment to experimental satellite monitoring. Most utilities are familiar with acoustic leak detection in which a microphone and amplification device are touched to accessible infrastructure so that a technician can listen for leak noise.

Effective leak detection depends on the skill of the leak detection technicians and the applicability of the leak detection technology to infrastructure and local conditions. Acoustic methods are generally cost-effective and successful for utilities who survey infrequently or have never performed proactive leak detection before. However, acoustic leak detection is more effective on metallic pipe than plastic pipe. Utilities with rigorous, frequent proactive leak detection programs may benefit from more advanced interventions, though cost-effectiveness varies and the rates of success of advanced technologies are not agreed upon.

Context

Potential

According to the water audit data validated in 2017, retail water agencies in Orange County maintain more than 10,000 miles of distribution main in their systems. All main pipe is susceptible to leakage, and

proactive leak detection may enable distribution system managers to reduce water loss and extend asset life.

Regulatory Requirements

Retail urban water suppliers will be required to demonstrate water loss improvement and achieve water loss performance objectives by 2027. Senate Bill 555 water loss performance standards will contribute to the water supply budget framework designed pursuant to Executive Order B-37-16.

Most MWDOC retail agencies do not currently perform proactive leak detection. Proactive leak detection will support agencies in demonstrating improvement in reducing their leakage volumes. By achieving sustainable, compliant leakage volumes, MWDOC retail agencies will meet the standards of Senate Bill 555 and more easily live within their water budgets.

Value Beyond Compliance

In addition to complying with water loss targets, proactive leak detection and repair can also reduce a utility's expenditures. Leak identification and repair avoids continued water lost to leakage, thereby saving on water purchase, treatment, pumping costs, embedded energy, and emissions. Additionally, proactively pursuing leakage can uncover leaks early in their development. Early leak discovery reduces the risk of catastrophic failure and corresponding repair costs that tend to increase with time.

Leak detection, whether reactive or proactive, also informs asset management. By engaging with infrastructure through acoustic surveying, leak noise logger deployment, or other leak detection technologies, a utility can confirm the accuracy of recorded infrastructure information. Furthermore, a leak detection survey empowers a utility to map the distribution of leakage, study leak patterns, and more effectively prioritize pipeline replacement.

Lastly, proactive leak detection demonstrates stewardship to ratepayers and stakeholders and engenders positive public perception. By showing care for supply-side infrastructure and distribution efficiency, a utility can more confidently request customer conservation during times of supply scarcity and solicit approval for capitally intensive projects.

Methodology

Leak detection will be conducted using a comprehensive acoustic survey, meaning that leak detection technicians will sound all available appurtenances regardless of spacing distances. The following protocols will be adopted for leak detection:

- **Sounding points:** physical contact and sonic leak sound amplification will occur for each hydrant, available valve, and customer service connection.
- **Sonic ground listening (hard cover):** when normal contact points are not available or cannot be created within a reasonable distance, sonic ground listening devices will be used by making ground contact directly over the pipe at intervals no greater than 6 feet when ground cover is pavement, concrete, or a similar hard surface. If excessive ambient noise precludes the effectiveness of the ground listening device in an area during daytime hours, then survey will be considered during nighttime hours. Such situations will be pre-approved with retail agency staff before any night surveying is undertaken.

- **Sonic ground listening (soft cover):** when normal ground contact points are not available and ground cover is not a hard surface, probe rods will be used at 10-foot intervals. A sound amplifier will be used on probe rods. Probe rods will be driven into the ground a minimum of 6 inches directly over the pipe where ground conditions allow.
- **Verification:** all indications of leaks found during initial survey will be verified a second time, after which the leak will be pinpointed with a computer-based leak sound correlator whenever possible. Pinpointing leak locations through interpretation of sound intensity, whether by ear, decibel metering, or comparable methods, will not be used when contact points are available for access with a computer-based leak sound correlator.
- **Situations requiring valve or appurtenance operation:** the survey equipment that will be used typically does not require valve operation during surveying and pinpointing. However, on occasion, services or valves may require operation to eliminate service connection draw noise or to change velocity noise for the purposes of leak verification. If required, any valve or appurtenance operation will need to be performed by retail agency personnel only, not by MWDOC staff.
- **Procedure for valve or appurtenance operation:** on a weekly basis, MWDOC staff will prepare a list of appurtenances that need to be operated by retail agency staff for leak verification or pinpointing. The following week, retail agency staff and MWDOC leak detection specialists will arrange for and operate valves or appurtenances for leak validation.
- **Correlator equipment:** the correlator equipment will prompt the operator to input relevant data when different pipe sizes and/or materials are encountered during a survey segment. Correlators will be capable of correlating up to at least four pipe sizes and types at once in a given span.

Equipment Requirements

At minimum, each acoustic leak detection technician will require:

- A sounding rod
- A ground microphone

Each crew will need:

- A vehicle to access leak detection sites and routes
- Safety and traffic control equipment (e.g. cones and reflective, brightly colored clothing)

Additional equipment that would allow for more comprehensive and accurate leak detection includes:

- Leak noise correlators
- Leak noise loggers
- Pipe locator

MWDOC has already acquired standard leak detection equipment with financial support from the Bureau of Reclamation. The equipment MWDOC purchased is listed in Table 8. MWDOC has not yet purchased a vehicle for leak detection, traffic control equipment, or a pipe locator.

Table 8: MWDOC leak detection equipment

Item No.	Device	Accessories	Quantity	Unit Cost	Total	Comments:
1	Subsurface LD-18 Digital Water Leak Detector		4	$ 5,355.00	$ 21,420.00	5-year Manufacturer Warranty
		Sensor w/ Magnet & Cable	4	$ 745.00	$ 2,980.00	
		40 in. Extension Rod	2	$ 69.30	$ 138.60	
		60 in. Extension Rod	2	$ 87.30	$ 174.60	
2	Zcorr Digital Correlating Logger w/8 Pods		3	$15,500.00	$ 46,500.00	5-year Manufacturer Warranty

Staff Requirements

A leak detection technician can typically accomplish 2.5 miles of leak detection per day in a residential setting. In high traffic settings, leak detection is often most successful when two technicians operate in parallel to support one another for safety and accessing infrastructure and confirming leak noise. Two technicians working together can conservatively accomplish 5.0 miles per day, though faster paces may be possible. As shown in Table 9, accomplishing 336 to 486 miles of leak detection survey would require 1,410 to 2,010 hours.

Table 9: Staff time required for acoustic leak detection

Annual Miles	Miles per Day (one person)	Total Time per Year
336 to 486 miles	10 miles per week	1,410 to 2,010 hours (0.68 to 0.97 FTE)

Funding Mechanism

Leak detection would be contracted as a choice service at a per-mile rate. Equipment has already been purchased using MWDOC and Bureau of Reclamation grant funds.

Opportunity No. 4: Distribution System Pressure Surveys

Description

Pressure is necessary to provide high-quality service and react to emergencies, but over-pressurization can result in unnecessary leakage. Managing pressure for optimal service and minimal leakage requires thorough knowledge of the distribution system's pressure profile, but many utilities only have incomplete or dated pressure data. Typically, pressure data is available only at critical points like pressure-regulating infrastructure and the highest elevation in the distribution system. This form of pressure data, though useful for identifying service failures, does not provide complete insight into pressure dynamics across a system.

To remedy this incomplete insight, it is recommended that utilities log pressure at fire hydrants throughout the distribution system. Dispersed pressure logging is particularly useful when high-frequency instruments are deployed, since high-frequency logging can identify pressure transients propagating through the distribution system.

Context

Potential

The number of pressure zones in Orange County has not been determined. However, many agencies serve between 3 and 10 pressure zones (if not more), each of which has unique pressure dynamics. Furthermore, all MWDOC retail agencies operate pressure-regulating infrastructure, including pumps and pressure regulating valves. Each piece of pressure-regulating infrastructure has the potential to malfunction, and not all malfunctions are easy to detect without pressure monitoring equipment. Therefore, logging system pressures to determine normal operations and deviations from normal can benefit all retail agencies.

Regulatory Requirements

Senate Bill 555 mandates periodic improvements to water audit data and water loss management, and Senate Bill 555 and Executive Order B-37-16 both require the achievement of specific performance. Pressure logging supports compliance with both regulations through the acquisition of more specific insight into the factors affecting water loss and water loss remediation strategies.

Value Beyond Compliance

Beyond enabling MWDOC retail agencies to comply with water audit and water loss regulations, pressure logging allows a utility to more accurately quantify average zonal and system pressures. When a utility refines its average pressure estimate using field data, water loss performance indicators that involve system pressure become more reliable. Additionally, adding pressure data to zonal management plans (for example, district metered area management) can highlight opportunities for pressure reduction or modulation that maintain service, but reduce leak frequencies and flow rates. Targeted pressure reduction not only saves water, but also saves energy consumption and corresponding emissions.

Furthermore, by logging pressure at a high frequency (four or more pressure samples per second), a utility can identify pressure transients. Pressure transients, instantaneous and damaging swings in pressure that propagate through a pipe network, can cause infrastructure damage, but are difficult to identify in the absence of high-frequency pressure data. When a utility notices frequent infrastructure failure in a certain area or installs new pressure-regulating infrastructure, high-frequency pressure logging can highlight transients that a utility may be able to eliminate with operational changes.

Methodology

The methodology used for pressure surveying depends on the survey goal. Methodology must be agreed upon with each agency before surveying begins. The methodology to be determined includes:

- Logger settings (e.g. sampling and recording frequencies)
- Logger deployment locations
- Logger deployment durations
- Analysis of data after logger retrieval

Equipment Requirements

Pressure data is typically collected with loggers attached to fire hydrants. Loggers can be categorized as standard (fewer than one pressure read every 250 milliseconds) or high-frequency (more than one pressure read every 250 milliseconds). Recording pressure in multiple locations simultaneously can allow pressure patterns and transient propagation to be observed, so a set of loggers than include high-frequency instruments provides more useful information than a single rotating logger. As a result, high-frequency loggers are more expensive.

Therefore, it is recommended that MWDOC acquires:

- 4 or more high-frequency pressure loggers
- 4 or more standard pressure loggers
- 8 or more lockboxes to prevent pressure logger theft

Staff Requirements

To conduct a pressure survey, six steps must be accomplished:

1. Choose survey locations based on planning and coordination with agency
2. Deploy loggers
3. Allow the logging period to pass
4. Retrieve loggers
5. Harvest data
6. Analyze data and communicate results

Planning and data retrieval and analysis vary in the time required, depending on survey complexity and analytic rigor. Planning and analysis can happen concurrently with logging at the next round of sites to maintain efficiency (see Figure 12). Deploying loggers typically takes one day, assuming that logger locations are close enough that total driving time does not stretch longer than a half a day. Similarly, retrieving loggers also takes a day.

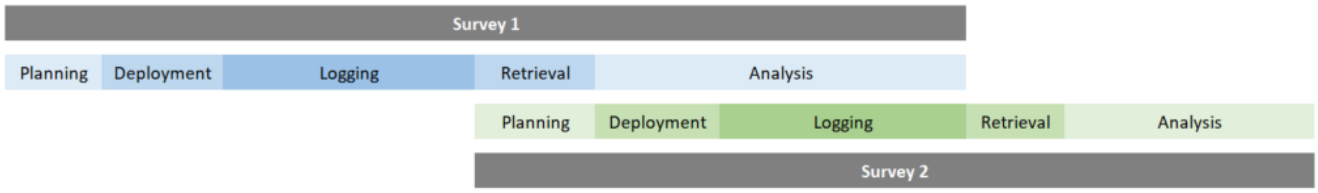


Figure 12: Pressure survey phases of work

Therefore, Table 10 shows 15 to 21 surveys will be performed. Each survey will require 44 hours for a total of 660 to 924 hours.

Table 10: Staff time required for pressure logging and analysis

Annual Surveys	Time per Survey	Total Time per Year
15 to 21	44 hours	660 to 924 hours (0.32 to 0.44 FTE)

Funding Mechanism

MWDOC has acquired pressure loggers through a Bureau of Reclamation grant and match funds from MWDOC. Additional investment in a vehicle for pressure logger deployment and retrieval will be necessary, and it's likely that the vehicle would be used for other water loss control services too (for example, large customer meter testing site visits).

Pressure surveying would be funded through choice election by agencies who contract this service. The scope of each survey, including the rigor of analysis required, would dictate an appropriate survey budget.

Opportunity No. 5: Distribution System Flushing

Description

Distribution system flushing is sometimes necessary to maintain water quality and exercise system infrastructure. Traditionally, distribution system flushing has been conducted unidirectional by opening a fire hydrant near the area of the system to be flushed and directing hydrant discharge into a storm drain. However, this method of system flushing wastes water treated to potable standards and tends to invite public criticism.

To mitigate water waste and poor public perception resulting from system flushing, a utility can flush distribution pipe using a neutral output discharge elimination system (NO-DES). A NO-DES unit connects to two fire hydrants to create a loop. Water is then pumped from one fire hydrant to the other through the NO-DES unit, which filters sediment and biofilm stirred up during flushing to remove these contaminants from the water before the water is reintroduced to the distribution system. If needed, a NO-DES unit can also add disinfectant during the filtration process to further improve water quality.

Context

Potential

According to the water audit data validated in 2017, retail water agencies in Orange County maintain more than 10,000 miles of distribution main in their systems.

Regulatory Requirements

The Safe Drinking Water Act and California Health and Safety Code require compliance with drinking water quality standards to ensure a reliable and safe drinking water supply. Often, to comply with standards set by the EPA and the state, utilities make regular, planned discharges (flushing) from their distribution system.

These discharges are regulated by Section 402 of the Clean Water Act that requires that a discharge of any pollutant or combination of pollutants to surface waters be regulated by a National Pollutant Discharge Elimination System (NPDES) permit.

Value Beyond Compliance

In addition to complying with federal and state regulations, a NO-DES unit allows a utility to more efficiently use its water. NO-DES decreases the volume of water going to waste during the flushing process, resulting in cost savings for purchasing, treating, and power to distribute or pump the water.

Further, hydrant flushing to waste is not perceived favorably by customers. Using a NO-DES unit would decrease public scrutiny, especially during drought periods when the utility is asking customers to use less water. By efficiently maintaining and operating their distribution system, the utility would demonstrate stewardship of this limited resource, gaining positive public perception.

Methodology

Flushing with a NO-DES unit will consist of the following steps, whether conducted by a third-party contractor (phase one) or in-house staff (potential phase two):

1. **Deploy**: Mobilize and set-up NO-DES truck at flushing location, between two fire hydrants.
2. **Connect**: Connect a hose from the filtering system's inlet point to one hydrant; then, connect a second hose from the filtering system's outlet point to the other hydrant.
3. **Create a loop**: Open both fire hydrants, allowing the hoses and filters to be filled. This will create a temporary above-ground loop in the water distribution system.
4. **Circulate**: A large pump on the NO-DES unit circulates water through the loop at the desired flushing velocity, scouring the water main to remove debris.
5. **Filter and purify**: Contaminants and biofilms are removed by the NO-DES filters. If needed, a small amount of chlorine may be added to increase chlorine residual during the process.
6. **Shut down**: When the entire section of water main in the targeted flush zone has been filtered and all turbidity meters are below 1 NTU, shut down the system, close hydrants, and remove hoses.

To ensure that this flushing methodology is compliant and reduce the administrative burden on retail agencies, MWDOC would pursue regional flushing permits from the Santa Ana Regional Water Quality Board and the San Diego Regional Water Quality Board. A regional permit has not been pursued and secured before. However, streamlined operation of a standard flushing methodology across the county is attractive for ease of permitting for MWDOC, MWDOC's retail agencies, and the regional water quality boards.

Equipment Requirements

NO-DES flushing will initially be offered as a shared service contracted with a third party. Depending on interest and cost viability, MWDOC can consider a second phase in which NO-DES flushing is operated in-house.

Phase 1: Contracting with Private Companies

For the first phase of NO-DES flushing, MWDOC will contract with a third party. A competitive bid process will allow MWDOC to select the service provider that best meets retail agency needs.

Phase 2: Offering NO-DES Flushing In-House

Staff will monitor demand for NO-DES flushing over the next few years. If demand for NO-DES flushing increases, staff will evaluate other options for this shared service, including bringing the flushing in-house.

If MWDOC determines that offering NO-DES flushing using MWDOC staff and equipment is cost-justified, MWDOC will have to purchase a NO-DES unit. A NO-DES unit (truck or trailer) is required to flush mains between 2" and 12". For mains larger than 12", two NO-DES units may be used in parallel. The NO-DES has two separate filter housings that must be replaced regularly. The first filter has an approximate life of 1 to 3 weeks, while the second filter has an approximate life of 3 to 6 weeks, depending on the condition of the distribution system.

Staff Requirements

Phase One: Contracting with Private Companies

In phase one, MWDOC will contract with a third party to accomplish system flushing. MWDOC staff time will be spent in developing and running the bid process, ensuring ease of contracting, and tracking program results. To accomplish these administrative tasks, Table 11 shows a total of 450 hours would be required for 15 agencies at 30 hours per agency.

Table 11: Staff time required for phase 1 of distribution system flushing

Agencies Participating	Time per Agency	Total Time per Year
15	30 hours	450 hours (0.22 FTE)

Phase Two: Offering NO-DES Flushing In-House

Should staff determine that bringing NO-DES Flushing in-house is feasible, a complete analysis will be completed and presented to the Board for consideration.

A NO-DES unit requires at least two technicians to operate, but three technicians are typically recommended. A two-person crew would consist of a lead worker and a maintenance worker with the following responsibilities:

Lead Worker:

- Is responsible for overall NO-DES operation
- Plans flushing routes and maps
- Calculates flow rates, pressures, and chlorine dosing
- Logs data
- Retrieves water quality samples

Maintenance Worker A:

- Operates hose burro
- Operates hydrants and valves

Maintenance Work B (optional):

- Sets up hose ramps to allow traffic to pass over hose, if necessary
- Controls traffic

Two trained technicians working together can conservatively accomplish approximately 0.75 miles per day, though faster paces may be possible. At each location, it takes approximately 1 hour to deploy the truck and 1 hour to break down the truck, with flush times ranging from 10 minutes to 2 hours. The economics of operating NO-DES flushing in-house, including staffing, will be evaluated at a later date if MWDOC staff and board choose to do so.

Summary of Solutions

In summary, it is proposed that MWDOC will offer five shared services to its retail agencies:

- Level 1 water audit validation (MWDOC staff)
- Customer meter testing (third-party contractor for initial phase)
- Distribution system leak detection (MWDOC staff)
- Distribution system pressure surveying (MWDOC staff)
- NO-DES flushing (third-party contractor for initial phase)

These services will enable MWDOC retail agencies to comply with new water loss regulations and employ best management practices in ensuring infrastructure longevity and system efficiency.

Private Sector and MWDOC Cost Comparisons

To evaluate the efficiency of shared services provision, MWDOC staff have surveyed the price points of private-sector service providers for each of the shared services that MWDOC staff recommend be operated in-house by MWDOC staff. These include Level I Water Balance Validation, Distribution System Leak Detection, and Distribution System Pressure Surveys. These services require minimal capital expenditures, of which some have already been purchased including the leak detection equipment and distribution system pressure loggers.

MWDOC staff recommends that customer meter accuracy testing and distribution system flushing be contracted externally with the private sector because of the significant expenses to purchase, warehouse, operate, and maintain required equipment. To get started at a minimal level, meter accuracy testing and distribution system flushing equipment combined could cost more than $1.5 million. As such, no cost comparisons between MWDOC and private sector providers for these two services are necessary at this time. However, MWDOC staff will monitor retail agency subscription to these services. When feasible and valuable, MWDOC staff will return to the Board to discuss the costs and benefits of bringing these services in-house.

MWDOC's costs are based on limited administrative time to coordinate and plan shared services and the estimated amount of time necessary to perform the shared service. An overhead factor of 1.693 is multiplied by the hourly rate of staff members performing the work. This factor includes expenses such as employee benefits, insurance, office maintenance, office supplies, telecommunications, computers and computer maintenance, software and software support, staff training, conference expenses, travel, and accommodations.

Water Balance Validation

MWDOC obtained cost estimates, as shown in Table 12, from five companies to provide the level 1 validation services required by Senate Bill 555. Employees of these companies have been certified by the California-Nevada section of the American Water Works Association to conduct level 1 water audit validations that meet the requirements of Senate Bill 555. The cost range across private sector providers was $2,000 to $3,000 per level 1 validation, summarized in the table below.

MWDOC's cost estimate assumes this service would be performed by the Water Loss Control Programs Supervisor and the complete validation would require a total of 10 hours to complete. The time to complete level 1 validation includes administration, data review, two-hour agency consultation, and reporting. Based on this, MWDOC's cost estimate is $840 per validation.

Table 12: Level 1 water audit validation pricing

Company	Cost of Service
MWDOC	$840
Water Systems Optimization, Inc.	$2,000 to $2,500
Woodard & Curran	$3,000
M.E. Simpson Company, Inc.	$2,200 to $2,500
CivilTEC Engineering	$3,000

Distribution System Leak Detection

Two levels of distribution system leak detection are under consideration: a systematic survey of large portions of the distribution system (up to the entire system) and/or a localized survey for a suspected leak. Leak detection shared services would be structured to allow agencies to access either approach.

Cost estimates for distribution system leak surveying were obtained from three companies. To allow for cost comparisons, prices were normalized to a survey mile, with technical approach and leak detection methodology specified. The technical approach involves acoustic listening using ground microphones and sounding rods, while the methodology is to "sound" the distribution system at all possible locations including services, meters, valves, and hydrants. Some companies provided pricing based on pipe material (metallic vs. PVC), while others provided pricing for a standard range of pipe materials. These costs also include documentation, leak validation, and reporting. Costs ranged from $275 to $400 per mile. MWDOC's cost estimate is $207 per mile. A summary of these price points is provided in Table 13.

Table 13: Leak detection pricing

Company	Cost of Service	Notes
MWDOC	$207	Per mile
Irvine Ranch Water District	$170	Per mile
Water Systems Optimization, Inc.	$400	Per mile for miles 1-50
	$350	Per mile for miles 51-100
	$300	Per mile for miles 101+
Utility Services Associates	$280	Per mile for 75% PVC and 25% metallic + $149/day mobilization
	$203	Per mile for metallic pipe + $149/day for mobilization
	$305	Per mile for PVC pipe + $149/day for mobilization
MatchPoint Water Asset Management, Inc.	$275	Per mile for 75% PVC and 25% metallic
	$1500	Per day (two-person crew, 2 to 5 miles per day)

One company, Utility Services Associates (USA), also provided a cost estimate for a suspected leak investigation. A suspected leak investigation is a localized survey for a suspected leak. This investigation will utilize the same technical approach and methodology used in the system survey. Table 14 summarizes the USA and MWDOC cost estimate for a suspected leak investigation.

Table 14: Suspected leak investigation pricing

Company	Cost of Service	Notes
MWDOC	$259	Per investigation plus mileage
Utility Services Associates	$500	Per investigation plus mileage

Distribution System Pressure Survey

Cost estimates for a distribution system pressure survey were obtained from one company. The pressure survey includes planning the survey with the retail agency, deploying and retrieving data loggers, and analyzing and reporting results. Table 15 summarizes the private sector and MWDOC cost estimate for a system pressure survey.

Table 15: Pressure survey pricing

Company	Cost of Service	Notes
MWDOC	$3,360	For an 8-logger survey
Water Systems Optimization, Inc.	$6,600	For an 8-logger survey

Conclusions

Based on this analysis, MWDOC can provide all three shared services at a lower cost than the private sector and ease the administrative burden for our agencies in securing these services. MWDOC can provide water balance validation and pressure survey shared services at about half the cost of the private sector and leak detection shared services at about two-thirds the cost of the private sector.

Should retail agencies request more services than can be provided by MWDOC staff, private sector consultants and contractors will be made available to the agencies when necessary. These consultants and contractors will act as an overflow work force to meet the demands in a timely manner.

Execution and Implementation

Target Market

As shown in Figure 13, the target market for water loss control shared services includes all 32 retail water agencies within Orange County, including all MWDOC member agencies and the cities of Anaheim, Fullerton, and Santa Ana. MWDOC has a well-established working relationship with all 32 retail water agencies.

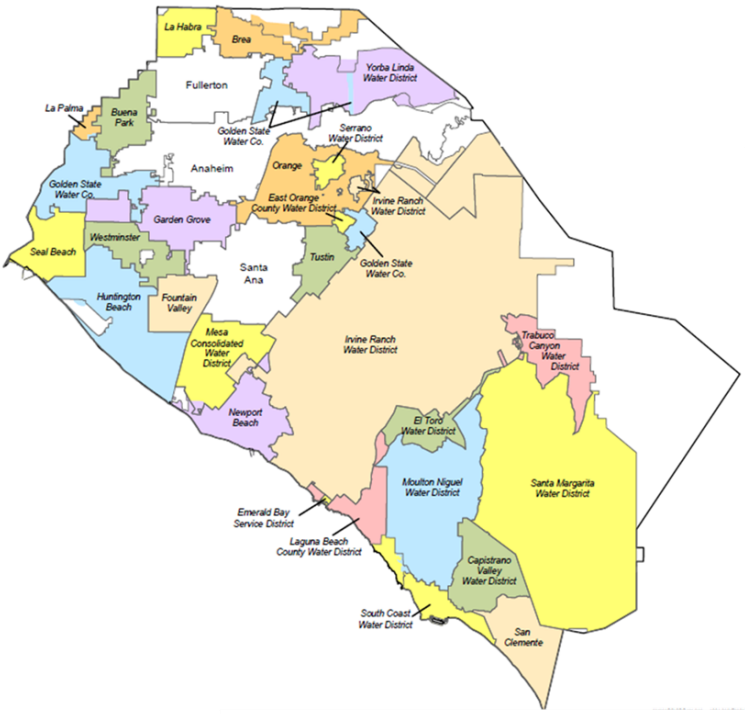


Figure 13: Shared services target market

Core and Choice Funded Shared Services

MWDOC staff are proposing to implement shared services using a combination of core and choice funding as summarized in Table 6. Core shared services would be provided to all retail agencies and would be funded by MWDOC through the general fund. Choice shared services would be funded by participating retail agencies who choose to access the shared service.

Because Senate Bill 555 requires all urban water suppliers to submit validated water audits annually to the California Department of Water Resources by October 1, staff is proposing that water audit validation be a core shared service. However, it should be noted that the time available to complete 30 validations the first year will be compressed to three months from July 1, 2019, when shared services are initiated, to October 1, 2019, when validations are submitted to DWR. As a result, contractor assistance may be needed the first year for validations to be completed on time.

It is anticipated that staff at some agencies will pursue Water Audit Validator (WAV) certification through the American Water Works Association, which will enable them to validate the water balance for their agency. However, water audit validation must be performed by a certified validator who is not involved in compiling the water balance. Currently, few agencies have the staff necessary to both compile and validate a water audit. Should enough agencies establish sufficient resources to both complete a water audit and then independently validate it, staff will reevaluate providing validation as a core service.

The remaining shared services are not mandated and would therefore be choice funded by agencies choosing to access the shared service. This ensures that agencies only pay for the shared services they choose to access.

Table 16: Shared service implementation funding and contracting structure

Shared Service	Funding Mechanism
Water audit validation	Core
Customer meter testing	Choice
Leak detection	Choice
Pressure surveying	Choice
NO-DES flushing	Choice

In-House Staff and Contractor-Provided Shared Services

Staff propose to use a combination of in-house staff and outside contractors to provide shared services as shown in Table 17. Water audit validation, leak detection and system pressure surveying will be implemented utilizing in-house staff. These shared services do not require significant capital investments for equipment and require minimal office space for staff and equipment storage. Leak detection and pressure surveying equipment has already been purchased using MWDOC and USBR grant funds. This equipment is stored in MWDOC's on-site storage vault and is secured nightly.

Customer Meter Accuracy Testing and Distribution System Flushing services require significant capital investment in equipment and warehousing. As a result, these shared services will be implemented with outside contractors. McCall's Meters, Inc. and Westerly Meter Service Company have been providing customer meter accuracy testing for the past three years. This arrangement will be continued for another two years before another competitive selection process is completed to maintain adherence to MWDOC's Administrative Code. In order to provide distribution system flushing services, staff will conduct a Request for Proposals (RFP) process to select a contractor(s). The RFP will clearly define the scope of work desired by retail agencies planning to access this shared service and specify best practices that the contractor(s) must employ. It is anticipated the RFP process, including Board authorization, will be initiated at the beginning of the 2019-20 fiscal year and conclude by fall 2019.

During the first 12 to 24 months of shared service implementation, staff will evaluate the feasibility of transitioning contractor-provided services for meter testing and system flushing to in-house provided services. The biggest challenge to overcome in making this transition is the significant capital investment for equipment, alongside with warehouse and utility yard-style facilities to house equipment.

Phased implementation will allow for an evolving understanding of retail agency demand for these services without making significant capital expenditures that could be stranded if not utilized.

Table 17: Shared service provision in phase one

Shared Service	Phase One Provider
Water audit validation	In-house (MWDOC)
Customer meter testing	Contractor(s)
Leak detection	In-house (MWDOC)
Pressure surveying	In-house (MWDOC)
NO-DES flushing	Contractor(s)

Staffing Plan and Organizational Structure

Staffing Plan

Water loss control shared services will be offered through a combination of in-house staff and contracted services. Shared services implemented with in-house staff will initially be level 1 water audit validation, distribution system leak detection, and distribution system pressure surveying. Due to the significant capital investment needed to purchase and warehouse meter accuracy testing and system flushing equipment, these services will be contracted in the first phase of shared service implementation. If at a later date MWDOC determines that customer meter testing and/or NO-DES system flushing would be appropriate to offer as an in-house service, staff will return to the Board to request authorization.

Staff completed an analysis of in-house staff needs to provide water audit validation, distribution system leak detection, and distribution system pressure surveys. Additional time is included to capture the administrative time necessary to facilitate both in-house and contractor-provided shared services. Table 18 shows that 1.81 full-time equivalent (FTE) staff are needed for a "low" level of shared services and 2.26

FTE staff are needed for a "high" level of shared services. Using the results of the Shared Services Survey, the "low" level of participation assumes that 100% of agencies designating "highly likely" and 50% of agencies designating "likely" will participate. The "high" level of participation assumes that 100% of "highly likely" and "likely" agencies will participate.

This staffing analysis also includes time for the Supervisor to assist the Director of Water Use Efficiency with technical support for water loss control policy development and competitive selection processes necessary for contractor-provided shared services (meter accuracy testing and distribution system flushing). Knowing that the State Water Resources Control Board has a deadline to establish a water loss standard by July of 2020, the amount of time needed for policy support will be significant. Together, these activities are estimated to require an additional 0.20 FTE for the Supervisor position.

And finally, this analysis includes 0.10 FTE (per FTE) for holiday, vacation and sick time.

Table 18: Proposed water loss control shared services staffing

Position and Responsibilities	Funding Mechanism	Staffing Need (Low)	Staffing Need (High)
Water Loss Control Programs Supervisor		**1.03**	**1.19**
Level 1 water audit validation	*Core*	*0.10*	*0.14*
Customer meter accuracy testing	*Choice*	*0.09*	*0.09*
Distribution system pressure surveys	*Choice*	*0.32*	*0.44*
Distribution system flushing	*Choice*	*0.22*	*0.22*
Water loss policy development	*Core*	*0.20*	*0.20*
Overhead (holiday, sick & vacation time)	*Core*	*0.10*	*0.10*
Leak Detection Technician *		**0.78**	**1.07**
Distribution system leak detection	*Choice*	*0.68*	*0.97*
Overhead (holiday, sick & vacation)	*Core*	*0.10*	*0.10*
Total		**1.81**	**2.26**

** excludes suspected leak investigations.*

Staff is recommending two full-time equivalent employees be hired to provide water loss control shared services – one Water Loss Control Program Supervisor and one Leak Detection Technician. The primary responsibilities of the Water Loss Control Program Supervisor would be overall program supervision and administration, scheduling of services, policy development, water audit validation, pressure surveys, and water loss control work group planning, coordination, and implementation

The primary responsibilities of the Leak Detection Technician would be leak detection and assistance with pressure survey equipment deployment and recovery (when available).

Draft job descriptions for both positions are provided as Appendix 3.

Organizational Structure

The proposed Water Loss Control Shared Services will be housed within MWDOC's Water Use Efficiency Department and would be the responsibility of the Director of Water Use Efficiency as shown in Figure 14. The Water Loss Control Programs Supervisor will report to and be supervised by the Director of Water Use Efficiency and would be located at the vacant work station in the accounting department. The Water Loss Control Programs Supervisor would manage the day-to-day operations of water loss control shared services, including the Leak Detection Technician. The Leak Detection Technician is primarily a field-based employee however, any time spent working in the office would be floating at any open work station.

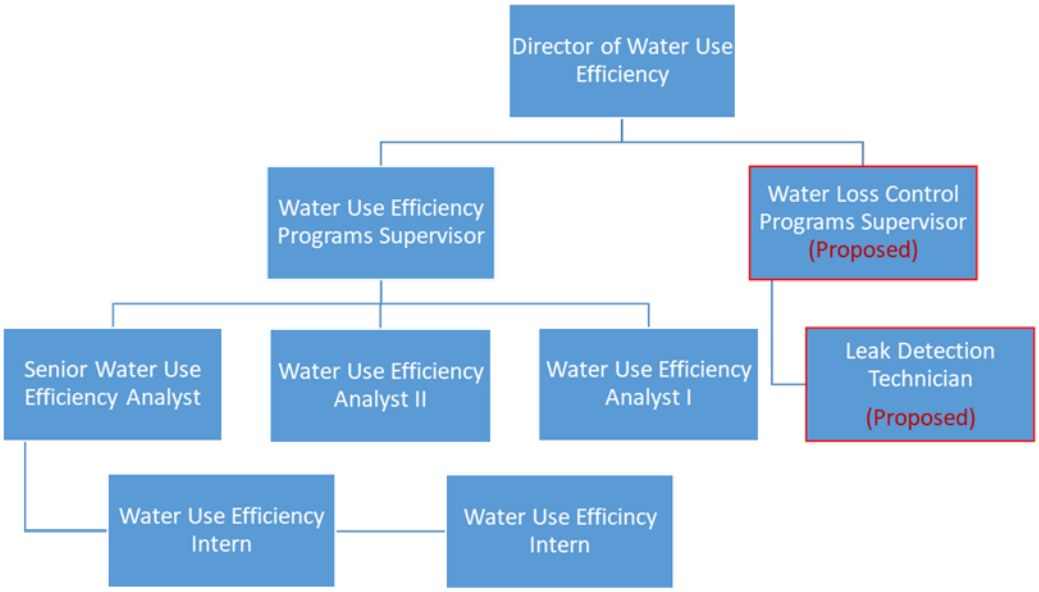


Figure 14: Water Loss Control Shared Services Organizational Structure

Physical Location

Both staff and water loss control equipment will be located at MWDOC's current Fountain Valley offices. There is currently one vacant work station in the MWDOC Accounting office area. The Water Loss Control Programs Supervisor will be assigned to this work station. The Leak Detection Technician is primarily a field-based position; therefore, limited office space would be needed, usually on Fridays. Leak detection equipment will continue to be stored in the secure vault location adjacent to the copy room.

Equipment and Training

Initial Equipment Needs

The equipment needs for shared services staff include vehicles, vehicle accessories, and safety equipment. In the past few months, Yorba Linda Water District and Irvine Ranch Water District obtained bids for the

purchase of vehicles designed to meet the needs of MWDOC's field staff. These bids ranged from $29,000 to $29,500 per truck from Chevrolet and Ford, respectively. Vehicle accessories such as cab guards, corner strobes, traffic directors, and tool boxes ranged from $1,700 to $2,000 per vehicle. Therefore, the cost for purchasing two vehicles including accessories is approximately $62,400.

Safety equipment for staff includes work gloves, rubber gloves, safety glasses, spray paint, pipe locators, traffic cones, hard hats, and ANSI Class III safety vests. In addition, two computer work stations and one laptop for field work will be needed. The initial cost for this equipment is approximately $10,400, with the pipe locators composing the majority of this expense.

Staff training will be required for level 1 water audit validation and general field operations safety. The California-Nevada section of the American Water Works Association administers the Level 1 Water Audit Validation (WAV) certificate program. Trainings are offered a few times each year. In 2018, the training and certification exam fee was $2,000 per individual. In addition, general field staff safety training will also be an important requirement for MWDOC field staff. The cost for safety training is estimated to be $2,000. The total training expense is therefore estimated to be $4,000.

Ongoing Equipment or Staff-Related Costs

Ongoing costs are anticipated to include cell phone service, auto insurance, boot allowances, uniforms, vehicle fuel, and maintenance. Some of these costs will be incurred monthly while others will be incurred annually. The annual cost for these expenses is approximately $8,600 per year.

In summary, initial vehicle, equipment, and safety costs are estimated to be $76,800, and ongoing costs are estimated to be $8,600 per year.

Shared Services Pricing

In the private sector cost comparison section above, staff estimated the cost for MWDOC to provide each in-house shared service. These fixed unit cost estimates, provided in Table 9, will be charged by MWDOC to agencies accessing shared services. Cost estimates for level 1 water audit validation, distribution system leak detection, and distribution system pressure surveys include both administrative time to facilitate the service and time to perform the service. Cost estimates for customer meter accuracy testing and distribution system flushing only include administrative time for MWDOC staff to facilitate the contractor-provided shared services. These costs will be refined annually based on actual costs incurred. This approach will provide agencies with certainty of costs to be incurred and allow agencies to budget in advance of accessing the shared service. MWDOC will fund remaining costs not covered by participating agencies, and these costs will not be included in the OCWD groundwater customer charge.

Table 19: MWDOC shared services pricing

Shared Service	Unit Cost	
Water audit validation	$840	per validation
Customer meter testing	$168	administrative fee *
Distribution system leak detection	$207	per mile
Suspected leak survey	$259	per suspected leak
Pressure survey	$3,360	per survey
NO-DES flushing	$840	administrative fee *

** Unit costs for meter testing and system flushing only include administrative costs for MWDOC staff to facilitate contractor-provided shared services.*

Promotion

MWDOC's Water Loss Control Shared Services will be promoted on an ongoing basis through a combination of core and choice services. Core services will be funded by MWDOC and will be available to all agencies. Choice services will be funded by participating retail agencies and will only be charged to those who elect to use those services at a rate proportional to the service quantity accessed.

Agencies will be asked to identify the services they plan to use during the coming fiscal year. This will be conducted in coordination with the annual budgeting process to allow time for MWDOC to plan staffing and scheduling of services and for agencies to budget for the services they plan to access. Annual shared services exhibits added to the master water loss control shared services agreement will formalize each agency's participation.

Should an agency not complete an annual shared services exhibit but decide mid-year to access shared services, they will be considered on a case-by-case basis as shared services resources are available. If shared services resources are not available that year, this agency will be scheduled for services on a first come-first served basis at the beginning of the following year.

Water Loss Control Shared Services Agreement

Agencies choosing to access MWDOC water loss control shared services will be required to sign a shared services agreement. A draft of this agreement is provided as Appendix 4. This agreement will initially have a five-year term. Annual addendums to the shared services agreement will be used to define what shared services will be accessed each year for each agency. Addendums will allow for annual adjustments to the types of services to be accessed, fees to be charged for services, and the addition of new shared services as they become available. This same agreement and addendum structures have been used effectively for the last three years for MWDOC's water loss control technical assistance program.

Agencies will be asked to make their annual shared services elections in the third quarter of each fiscal year. This will allow agencies time to budget for the services within their normal budget cycle and will allow MWDOC staff time to schedule and manage workloads in the coming year. Agencies may need to supplement their election of services partway through the year, which can be accommodated by submitting an additional addendum defining the additional services. Supplemental addendums will be accepted as staffing and contract services availability permit.

Timeline

Should the Board authorize implementation of the Water Loss Control Shared Services Business Plan, staff will initiate a five-year implementation plan as scheduled in Table 20. This process will begin by incorporating costs into the fiscal year 2019-20 (FY19-20) budget. As the new fiscal year draws near, staff will begin the recruitment process for the two new positions, with the goal of having the new staff start in July or August of 2019. This will allow staff to begin offering shared services at the beginning of FY19-20 with level 1 water audit validation, leak detection, customer meter accuracy testing, and pressure surveys offered first. NO-DES distribution system flushing will require a Request for Proposals process to select contractors to provide the service. MWDOC staff anticipate this process will be complete by the end of the calendar year to allow flushing services to begin in early 2020.

Over time, staff will monitor the type and volumes of shared services accessed by each agency. Monitoring will include documentation of actual costs so that the shared services charges to agencies are refined each year. In year-three (or sooner, as possible), staff will evaluate the feasibility of transitioning the meter accuracy testing and system flushing to in-house provided services. Ultimately, if this transition is found to be feasible, Board authorization will be required.

Table 20: Five-year shared services implementation plan

Shared Service	**Year I FY 2019-20**	**Year II FY 2020-21**	**Year III FY 2021-22**	**Year IV FY 2022-23**	**Year V FY 2023-24**
Water Audit Validation	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Customer Meter Accuracy Testing	Outside Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *consider MWDOC Staff*	Outside Vendor or MWDOC Staff
Distribution System Leak Detection	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Pressure Surveying	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Flushing	RFP Process to Select Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *consider MWDOC Staff*	Outside Vendor or MWDOC Staff

Technical Advisory Committee

The Water Loss Control Work Group (Work Group), comprised of MWDOC and retail water agency staff, has been actively engaged in water loss control activities since 2015. The Work Group meets every other month and has an extensive knowledge of water loss control practices and retail water agency needs. The Work Group has been instrumental in shaping the direction of water loss control, both in Orange County and across California. Moving forward, staff will utilize the Work Group as a technical advisory committee to identify, develop, and recommend water loss control shared services. Recommendations will be presented to the MWDOC Board for consideration.

Strategic Alliances

MWDOC's water loss control shared services can foster strategic partnerships with state agencies, neighboring retailers, and private-sector experts. These partnerships could inform state and regional policy, regional collaboration and research, and funding acquisition.

State Agencies and Policy Development

The California State Water Resources Control Board is currently establishing water loss standards that will meet Senate Bill 555 requirements. The water loss standards will then be folded into the water budget framework under development in accordance with Executive Order B-37-16, "Making Water Conservation a California Way of Life."

State Water Resources Control Board staff have solicited MWDOC's water loss analysis results to date to inform the standards setting process. However, a lack of data on the relationship between investment in water loss control and the return on that investment is hampering efforts to develop a cost-justified regulatory framework. Therefore, MWDOC is well-positioned to support retail agencies in cost-effective water loss recovery and then use the results of its program to drive the statewide conversation on water loss objectives.

Water Systems Optimization

Since 2016, Water Systems Optimization (WSO) has provided water loss technical assistance to MWDOC retail agencies. WSO has also supported MWDOC in developing shared services and equipment for its retail agencies, including contracted customer meter testing, a leak detection and pressure monitoring equipment lending library, and the possible future water loss control services described in this business plan.

WSO could be kept under contract to support MWDOC's water loss control shared services implementation by:

- Analyzing and tracking key performance indicators and return on investment
- Communicating shared services results to other key stakeholders (e.g. the Department of Water Resources and State Water Resources Control Board)
- Evaluating the technical merits of expended shared services
- Integrating MWDOC's water loss control shared services with other water loss control analysis and intervention (e.g. water audit compilation, source meter testing)
- Providing technical expertise in water loss control best practices

Private Sector Service Providers

MWDOC can partner with private sector service providers to meet short-term gaps in shared service availability, particularly if demand exceeds MWDOC staff's initial conservative forecasts. Additionally, private sector service providers can be contracted to provide capitally-intensive services like NO-DES flushing and customer meter testing, as previously described. Such partnerships would serve the dual purposes of supporting local private sector service providers while enabling MWDOC agencies to more quickly engage with water loss analysis and reduction.

Private sector service providers that MWDOC has worked with on water loss control to date include:

- Westerly Meter Testing (Compton)
- McCall's Meter Service (Hemet)

Neighboring Agencies

The MWDOC work group has facilitated knowledge transfer between Orange County agencies and neighboring agencies like the Metropolitan Water District of Southern California, the San Diego County Water Authority, and the City of Long Beach Water Department. Working relationships with neighboring agencies have allowed MWDOC to access additional data (e.g. customer meter test results) and service and product recommendations (e.g. Advanced Metering Infrastructure service providers).

Financial Plan

Staff propose that MWDOC fund all initial and ongoing equipment costs using MWDOC's general fund as a core contribution and that agencies pay for staff time associated with the shared services they access as choice services. Staff also recommend that MWDOC's core contribution be excluded from the OCWD Groundwater Customer Charge, since OCWD is not a candidate for water loss control shared services. Initial costs (for example, vehicles, equipment, and training) are required to initiate shared services. These costs include $62,400 for vehicles and accessories, $10,400 for office and safety equipment, and $4,000 for staff training. On-going costs of $10,400 per year are anticipated for cell phones, uniforms, footwear allowances, auto insurance, and vehicle fuel.

Participating agencies will then fund shared services they access on a per-unit basis, as proposed in Table 21. These unit costs include salary and wages, employee benefits and other overhead costs such as office supplies, computer maintenance, software and support, telecommunication, etc.

Table 21: MWDOC shared services pricing

Shared Service	Unit Cost	
Water audit validation	$840	per validation
Customer meter testing	$168	administrative fee *
Distribution system leak detection	$207	per mile
Suspected leak survey	$259	per suspected leak
Pressure survey	$3,360	per survey
NO-DES flushing	$840	administrative fee *

** Unit costs for meter testing and system flushing only include administrative costs for MWDOC staff to facilitate contractor-provided shared services.*

Should the initial retail agency subscriptions for shared services not fully fund the two proposed staff members, MWDOC will fund remaining costs as core activities. During this time, staff will actively promote shared services to minimize the draw of staff time on the general fund.

Grant Funding

As is done with MWDOC's Water Use Efficiency Program, every effort will be made to access grant funding to assist with implementation of water loss control shared services. Grant funds could be used for a variety of activities, including the purchase of equipment, funding shared services, and/or conducting water loss related research. Funding opportunities include local, state and federal sources such as Metropolitan Water District of Southern California, California Department of Water Resources, California State Water Resources Control Board, and the US Bureau of Reclamation Field Services or Water Smart opportunities.

To date, MWDOC staff have acquired funding for water loss control from the Bureau of Reclamation and the Metropolitan Water District of Southern California for leak detection equipment and leak detection research, respectively. The cohesion and reach of MWDOC's water loss control offerings to its retail agencies make funding more attractive to funders looking for impact, efficacy, and industry leadership.

Exit Strategy

If MWDOC embarked on offering shared services as described above and any of these services were no longer desired by retail agencies, staff would implement an exit strategy. The exit strategy will limit losses and will consider the following:

- It is more likely that an individual shared service will be discontinued rather than all shared services.
- Every effort will be made to transition in-house staff to another agency needing that individual's expertise.
- Shared services equipment will be sold, if appropriate, especially to MWDOC retail agencies.
- MWDOC will include a termination clause in professional services agreements between MWDOC and the contract service provider(s).

Appendix 1: Retail Agency Shared Services Survey

Water Loss Control Shared Services Business Plan

Member Agency Survey

Survey Background

Over the last three years, MWDOC established a comprehensive water loss control technical assistance program for water agencies throughout Orange County. This effort grew out of the legislative requirements of Senate Bill 1420 (2014) and Senate Bill 555 (2015). The program began with technical assistance, provided by Water Systems Optimization, Inc. (WSO), and included water balance compilation, component analysis, distribution system leak detection, and reporting that contains recommendations for further actions to improve an agency's understanding of water loss control opportunities within their system. This program has evolved over time with the addition of sales and production meter accuracy testing in 2016, water audit validation in 2017, and the establishment of a distribution system leak detection equipment lending library in 2018. With the exception of the equipment lending library, these services are accessed by member agencies through the "Choice" program framework; on an annual basis, agencies choose the services they desire and then pay for access to those services. During this same time, MWDOC also facilitated bi-monthly Water Loss Control Work Group meetings, open to all agencies, with the intent of furthering collaboration and understanding of broader water loss control opportunities. Since these efforts started in 2015, the level of interest from water agencies throughout Orange County for these and other water loss control services has grown.

As a result, in February 2018 the MWDOC Board authorized staff to explore offering Water Loss Control Shared Services directly from MWDOC to member agencies. MWDOC staff will be developing a Water Loss Control Shared Services Business Plan (Business Plan) for review by both the member agencies and the Board. Before any shared services are provided (beyond our current offering), the Business Plan must be approved by the MWDOC Board. Staff is planning to present the draft Business Plan to the Board later this year and will continue to engage with agencies along the way. The purpose of this survey is to help MWDOC staff understand what shared services member agencies are interested in and how they should be funded. The results of this survey will be used to establish preliminary participation assumptions that will be used in developing the Business Plan, though responses to the survey are not binding.

The potential water loss control shared services to be explored in this survey and possibly in the Business Plan include the following:

- Annual Water Balance Validation
- Water Meter Accuracy Testing (large and small sales meters)

- Distribution System Leak Detection

- Distribution System Pressure Surveys

- Distribution System Flushing

The shared services could be offered using our well established “Core” and “Choice” funding framework, with “Core” activities available to all agencies funded through the MWDOC general fund and “Choice” activities funded by member agencies at the level of service of their choosing. These services could be accessed through an extended term Shared Services Agreement. The Agreement would outline the basic roles and responsibilities of MWDOC and the member agencies. Annually, each agency would complete a Shared Services Participation Exhibit. This Exhibit would identify which shared services they would like to access and at what level of service (e.g., the number of meters to be tested or miles of main to be surveyed for leaks). Agencies will have the choice to opt in or out of shared services annually/periodically.

The following are basic tenets of MWDOC’s Water Loss Control Shared Services:

- Offer shared services at a competitive or lower cost than the same services provided by the private sector
- Provide quality shared services on par with or better than the same services provided by the private sector
- Realize economies of scale for these services by providing services at a regional level that cannot be justified at many local levels
- Continue collaboration and shared learning among all agencies throughout this process
- Phase implementation of new shared services over time, starting with the services that have the highest level of interest or demand by water agencies
- Integrate program administration and data management to share results and customize program offerings to the unique conditions of each member agency

As you are completing the survey, keep in mind that we do not have answers to all the questions that may come to mind at this time. We believe you will want to know the cost of these services prior to committing to such a program. The Business Plan will have estimated costs, but we do not have the costs outlined at this time. It is important that we fully understand all concerns you may have; therefore, we have provided space in the survey for you to ask questions or to express concerns. Please use these sections of the survey to bring this information to our attention.

Participating in this survey is completely voluntary. However, we strongly encourage all agencies to participate in order to provide us the clearest understanding of your collective views. Additionally, taking the survey does not commit your agency to any shared service.

The following provides a brief description of each shared service we are exploring within the Business Plan, along with specific questions for each shared service.

Water Audit Validation Shared Service

Senate Bill 555 (2015) requires urban water suppliers to conduct an annual water loss audit in accordance with the method adopted by the American Water Works Association Water Audit and Loss Control Program Manual M36 using the Free Water Audit Software. The Bill also requires those audits to be independently validated by a company or individual that did not contribute to compiling the audit. Furthermore, the validator must hold a Level 1 Water Audit Validator certificate issued by the California-Nevada section of the American Water Works Association. MWDOC could provide annual Level 1 Water Audit Validation services by a certified validator for water suppliers throughout Orange County.

1. If MWDOC provided annual Water Audit Validation services, as required by SB 555, would your agency participate?
    a. Highly Likely
    b. Likely
    c. Unlikely

2. Should annual Water Audit Validation be a Core or Choice funded activity?
    a. Core
    b. Choice
    c. Please share why you prefer this as a Core or Choice activity.

3. Please share any questions or concerns you may have regarding proposed annual Water Audit Validation shared services:

Sales Meter Accuracy Testing Shared Service

Sales meter accuracy testing can assess the accuracy of an agency's customer meters in order to distinguish between apparent loss and real loss in the annual water audit. Sales meter testing can also be harnessed to refine customer meter replacement schedules and confirm the performance of newly purchased meters. Large customer meter tests, particularly on high-consumption accounts, can verify accurate revenue generation on key accounts. Furthermore, some customer meter testing may be required in the future if Assembly Bill 3206 passes, though the details of such required testing have not yet solidified.

1. If MWDOC provided statistically-based Water Meter Accuracy Testing services across all customer meter sizes, would your agency access these services?
    a. Highly Likely
    b. Likely
    c. Unlikely

2. If MWDOC provided Water Meter Accuracy Testing services for new meters, would your agency access these services?
    a. Highly Likely
    b. Likely
    c. Unlikely

3. If MWDOC provided independent verification of meter accuracy in response to a customer claim of inaccuracy, would your agency access these services?
    a. Highly Likely
    b. Likely
    c. Unlikely

4. If MWDOC provided meter accuracy testing services, how many meters do you anticipate testing per year, on average?

5. Should Meter Accuracy Testing be a Core or Choice funded activity?
    a. Core
    b. Choice
    c. Please share why you prefer this as a Core or Choice activity.

6. Please share any questions or concerns you may have regarding proposed meter accuracy testing shared services:

Distribution System Leak Detection Shared Service

Acoustic leak detection identifies unsurfaced leaks using listening equipment and leak correlations. By proactively finding and repairing unsurfaced leaks, an agency can reduce real loss, avoid catastrophic infrastructure failure, minimize contaminant potential, and extend asset life. Additionally, proactive leak detection will be recognized by state regulatory agencies as a form of water loss management improvement required by Senate Bill 555. Lastly, all agencies will be required to meet water loss standards that will be published in July 2020, so proactive leak detection may be necessary to maintain compliance with impending water loss regulation.

1. If MWDOC provided partial- or full-system leak detection services for distribution infrastructure, would your agency participate?
    a. Highly Likely
    b. Likely
    c. Unlikely

2. If MWDOC provided partial- or full-system leak detection services, how many miles of distribution main do you anticipate surveying per year, on average?

3. If MWDOC provided distribution system leak detection services to check for a suspected leak, would your agency participate?
    a. Highly Likely
    b. Likely
    c. Unlikely

4. Should distribution system leak detection be a Core or Choice funded activity?
    a. Core
    b. Choice
    c. Please share why you prefer this as a Core or Choice activity.

5. Please share any questions or concerns you may have regarding proposed distribution system leak detection shared services:

Distribution System Pressure Survey Shared Service

Distribution system pressures can be logged for a variety of reasons: transient identification and mitigation, district metered area design, data collection that informs pressure optimization, and water audit pressure estimation, to name a few. Pressures are recorded at fire hydrants using high-frequency loggers that log data over a period of days to weeks and can identify pressure transients (also known as water hammers or pressure surges).

1. If MWDOC provided distribution system pressure surveys (system-wide or pressure zone), would your agency participate?
    a. Highly Likely
    b. Likely
    c. Unlikely

2. Should distribution system pressure surveys be a Core or Choice funded activity?
    a. Core
    b. Choice
    c. Please share why you prefer this as a Core or Choice activity.

3. Please share any questions or concerns you may have regarding proposed distribution system pressure survey shared services:

Distribution System Flushing Shared Service

Distribution system flushing is required to maintain water quality within the distribution system. System flushing is generally accomplished by attaching a diffuser to a fire hydrant and flushing water out of the system to convey sediment that impacts water quality. A new method of system flushing has emerged using a No-DES flushing vehicle. This vehicle not only flushes the distribution system effectively, but flush water

is filtered and recovered back into the distribution system, resulting in saved water and avoiding negative public perception by flushing into the street. To learn more about this system, go to: https://www.youtube.com/watch?v=k3KHPq6vmzk The City of Huntington Beach recently purchase a No-DES Truck that went operational on May 1st, and the City of La Habra contracted to have their system flushed in 2017 using this technology.

1. If MWDOC provided distribution system flushing services, would your agency participate?
    a. Highly Likely
    b. Likely
    c. Unlikely

2. If MWDOC provided distribution system flushing services, how many miles of distribution main do you anticipate flushing per year, on average?

3. Should distribution system flushing be a Core or Choice funded activity?
    a. Core
    b. Choice
    c. Please share why you prefer this as a Core or Choice activity.

4. Please share any questions or concerns you may have regarding proposed distribution system flushing shared services:

Appendix 2: Shared Services Survey Responses

Water Audit Validation Shared Service				
	If MWDOC provided annual Water Audit Validation Services, as required by SB 555, would your agency participate?	**Should annual Water Audit Validation be a Core or Choice funded activity?**	**Please share why you prefer this as a Core or Choice activity.**	**Please share any questions or concerns you may have regarding proposed annual Water Audit Validation Shared Services.**
City of Anaheim	Likely	Choice	The Core and Choice funding do not apply to Anaheim. Anaheim funding will be per Master Agreement between MWDOC and Anaheim.	None.
City of Brea	Highly Likely	Core	requirement of the state	none
City of Buena Park	Highly Likely	Choice	Agency should have the choice to use this service.	none
City of Fountain Valley	Highly Likely	Core	It should be a Core activity since it is required of all agencies and cost sharing through MWDOC is the most beneficial method to all agencies.	none
City of Fullerton	Highly Likely	Choice	We would most likely participate, but if something were to change, either internally here or at the state level, we would like the chance to opt out.	Would this be done by a MWDOC employee or a third party like WSO?
City of Garden Grove	Likely	Choice	It just makes sense.	None
City of Huntington Beach	Highly Likely	Choice	If an agency does not wish to participate, they should not be forced to subsidize other agencies who are.	none at this time
City of La Habra	Highly Likely	Choice	I like the freedom of choice and am willing to pay for those services that are utilized. I understand that not all agencies have the capacity to perform these additional responsibilities without additional personnel or impacting current responsibilities.	I don't have any questions. I appreciate the shared services and view them as a highly qualified extension of our workforce!
City of La Palma	Highly Likely	Choice	Though some agencies may choose to have an agency representative get certified to perform in-house validation, La Palma given its staffing level would continue to enlist the aid of MWDOC and WSO for the compilation of its water loss audit and ultimate validation.	None at this time.
City of Newport Beach	Highly Likely	Choice	I think member agencies should have the opportunity to opt in or out of the service depending on if they have someone in-house to provide these services for them. The cost of the program should not be put on those agencies opting out of the service.	No concerns
City of Orange	Highly Likely	Choice	We would like to have the flexibility of selecting the activities that fit our specific needs.	Cost
City of San Clemente	Highly Likely	Core	At least for this coming year it seems almost all agencies would benefit from validation services and thus the cost	I hope to see an economy of scale in the pricing of validation services through a

			could be shared across all of MWDOC. However, in future years, as agencies invest in getting their staff validated, it might be better served as a Choice activity.	MWDOC staff or contracted validator - along with streamlined contracting, it will help justify the cost compared to us getting an individual contractor on board at the City to do this for us.
City of San Juan Capistrano	Likely	Choice	A central common auditor would streamline the process.	The auditor needs to stick to the strict criteria of the audit requirements, and not make an extended project out of it.
City of Santa Ana	Highly Likely	Choice	It seems the best fit for Santa Ana - MWDOC relationship.	This year we are using WSO to perform and validate our FY 2017/18 audit. We anticipate using consultant services to fill this need moving forward.
City of Seal Beach	Highly Likely	Core	Since every agency/district must perform this activity, it seems natural to include this work as a part of MWDOC's services to all agencies/districts	NA
City of Tustin	Likely	Choice	Allows for equitable cost sharing and allows agencies to opt out of services they do not wish to use.	none
City of Westminster	Highly Likely	Core	Westminster has minimal staff. With only one analyst to fill out the water audit, there is no second person readily available in-house to validate. We would be required to become validators which is a large burden for a small agency.	Westminster would absolutely use this service and all aspects of the shared service are of interest to Westminster.
East Orange County W.D.	Highly Likely	Choice	Better opportunities for cost control and efficiency	I don't understand the scope of the water audit services and how or if the size of the agency affects the cost/level of effort.
El Toro W.D.	Highly Likely	Choice	Individual agencies are making choices whether or not to participate in the service. The cost should not be shared by agencies not choosing to benefit from the service.	How much time would MWDOC need to complete the validation? When would the Water Audit need to be submitted to MWDOC to provide enough time to complete the validation such that the agencies can meet the Water Audit submittal deadline?
Irvine Ranch W.D.	Highly Likely	Core	There is currently a limited number of certified and experienced data validators.	Inclusion of this as either a core or choice option should be reviewed annually as the pool and pricing for data validators grows.
Laguna Beach County W.D.	Likely	Choice	Some agencies may choose to handle this audit differently.	With the wide variation in complexity, it may be difficult to determine the work involved.
Mesa W. D.	Highly Likely	Choice	Some agencies may have an in-house certified validator.	Oh, I think this is a great idea. With MWDOC providing the validation, OC agencies will have consistency in data validation scores and our

				relative scores will reflect relative data validity.
Moulton Niguel W.D.	Likely	Core	The annual water audit validation is now a state-wide requirement.	Service must be offered at competitive or lower cost than found elsewhere.
Santa Margarita W.D.	Likely	Choice	While SMWD is pursuing certification for validation, we would prefer having a 3rd party validation. That being said, some other agencies might prefer to have the option to validate themselves or have another vendor perform the function.	Only concern is that SMWD anticipates doing more in-depth validations periodically on our own.
Serrano W.D.	Likely	Choice	I think that you are more likely to get the program support from agencies if it is Choice.	no concerns
South Coast W.D.	Highly Likely	Core	State mandated.	WSO has clarified all concerns to date.
Trabuco Canyon W.D.	Highly Likely	Core	Required by regulations	None
Yorba Linda W.D.	Highly Likely	Core	Core, because of the difficulty becoming a certified validator.	If shared services for Audit Validation take away a lot of money from other potential services, we may want to opt-out of this particular item.

Sales Meter Accuracy Testing Shared Service							
	If MWDOC provided statistically-based Water Meter Accuracy Testing Services across all customer meter sizes, would your agency access these services?	**If MWDOC provided Water Meter Accuracy Testing Services for new meters, would your agency access these services?**	**If MWDOC provided independent verification of meter accuracy in response to a customer claim of inaccuracy, would your agency access these services?**	**If MWDOC provided Meter Accuracy Testing Services, how many meters do you anticipate testing per year, on average?**	**Should Meter Accuracy Testing be a Core or Choice funded activity?**	**Please share why you prefer this as a Core or Choice activity.**	**Please share any questions or concerns you may have regarding proposed Meter Accuracy Testing Shared Services.**
City of Anaheim	Likely	Likely	Likely	300 - 400	Choice	The Core and Choice funding do not apply to Anaheim. Anaheim funding will be per Master Agreement between MWDOC and Anaheim.	None.
City of Brea	Unlikely	Unlikely	Unlikely	0	Choice	we do in house	none
City of Buena Park	Unlikely	Unlikely	Unlikely	Unsure	Choice	Agencies should choose	none
City of Fountain Valley	Likely	Unlikely	Likely	350	Choice	It should be a Choice activity because only select agencies would participate in this.	none
City of Fullerton	Likely	Unlikely	Likely	Cost dependant	Choice	We have our own meter testing bench for smaller meters and meter testing truck for larger meters. The only reason we don't use them as much as we could is because we don't have the staff.	N/A
City of Garden Grove	Likely	Likely	Likely	500 to 1000	Choice	It just makes sense.	None
City of Huntington Beach	Unlikely	Unlikely	Unlikely	0	Choice	If an agency does not wish to participate, they should not be forced to subsidize those who do.	None at this time
City of La Habra	Highly Likely	Highly Likely	Highly Likely	100	Choice	I don't have staff or equipment to conduct testing whereas other agencies might, so I think it reasonable that this activity is	No problems. I've participated in the past and benefitted from a scale of economy rate.

						offered as a choice rather than a core function.	Happy with the results.
City of La Palma	Highly Likely	Likely	Likely	25 to 50	Choice	Some agencies may already perform this service in-house and may not find this necessary as a Core MWDOC activity. Given its staffing level La Palma would not perform this service in-house but would benefit from the economies of scale for this annual testing service.	None at this time.
City of Newport Beach	Likely	Likely	Likely	200	Choice	Same answer as before. some agencies may have their own agreements in place for this service.	No concerns.
City of Orange	Likely	Likely	Likely	Around 200	Choice	Our annual budget may not allow us to participate in all activities.	None at this time.
City of San Clemente	Unlikely	Unlikely	Unlikely	0	Choice	Choice, because many agencies already have meter testing programs that they may prefer to maintain rather than going through MWDOC with a new contractor/process.	Our agency has a long-standing individual contract with a meter testing company and it meets our needs entirely while giving us direct access to testing professionals for efficient and quick services.....so we would not be terribly interested in the choice program for this item.
City of San Juan Capistrano	Likely	Likely	Unlikely	100	Choice	To have a choice.	None.
City of Santa Ana	Likely	Unlikely	Unlikely	100	Choice	It seems the best fit for Santa Ana - MWDOC relationship.	We are currently more likely to utilize meter testing services to focus on our large meter inventory rather than trying to establish a statistical

							baseline for the City.
City of Seal Beach	Highly Likely	Highly Likely	Unlikely	50	Core	Again, if all agencies must perform this activity per state law, why not consolidate these services in one area (MWDOC) at a lower cost than doing agency by agency	NA
City of Tustin	Likely	Unlikely	Unlikely	100	Choice	same as last ?	none
City of Westminster	Highly Likely	Likely	Unlikely	200	Core	Economy of scale. We believe all agencies will eventually be required to do this, and a core function will lower cost on a county-wide scale.	This could be a function that is rolled out eventually. If this starts as a choice function, and moves to core, we would wait to add on as this is not currently urgent.
East Orange County W.D.	Likely	Likely	Likely	25-40	Choice	Better opportunities for cost control	I think MWDOC should contract out for this service and not hire this type of specialized service in-house
El Toro W.D.	Unlikely	Unlikely	Likely	Minimal. Meter testing in responsed to customer claims of inaccuracy are expected to be very infrequent.	Choice	Individual agencies are making choices whether or not to participate in the service. The cost should not be shared by agencies not choosing to benefit from the service.	None
Irvine Ranch W.D.	Unlikely	Unlikely	Unlikely	0	Choice	IRWD conducts its own meter testing.	This is a good service for agencies that do not otherwise have a means to test meters. The costs should be covered by the agencies that use the service not all MWDOC member agencies
Laguna Beach County W.D.	Unlikely	Unlikely	Unlikely	None	Choice	Since, we would not use this service we would prefer it be choice.	None
Mesa Water District	Highly Likely	Highly Likely	Highly Likely	300	Choice	Some agencies have in house meter test benches.	No concerns. This is a great idea.

Moulton Niguel W.D.	Unlikely	Unlikely	Unlikely	0	Choice	Moulton Niguel has its own meter test bench and trained technicians.	N/A
Santa Margarita W.D.	Highly Likely	Unlikely	Unlikely	Unknown	Choice	Some agencies won't be interested and/or have their own test benches.	The statistically-based portion of the water meter accuracy testing is what's interesting to me. Based off the data validity grades provided in the AWWA spreadsheet, having the testing be statistically-validated will be incredibly helpful. One of the requirements that SMWD would have is that we want to perform in-line testing so that customers are not inconvenienced.
Serrano W.D.	Highly Likely	Unlikely	Highly Likely	30	Choice	Same reason as abpove	None
South Coast W.D.	Highly Likely	Unlikely	Likely	50 meters	Choice	So it is an option.	None at this time.
Trabuco Canyon W.D.	Highly Likely	Unlikely	Likely	45	Choice	Some agencies have their own test benches and would not utilize the service	None
Yorba Linda W.D.	Highly Likely	Likely	Highly Likely	500 to 1,000	Choice	Choice, so agencies can op-out.	The same concern as the one listed in response to item number five.

Distribution System Leak Detection Shared Service						
	If MWDOC provided partial- or full-system Leak Detection Services for distribution infrastructure, would your agency participate?	**If MWDOC provided Distribution System Leak Detection Services to check for a suspected leak, would your agency participate?**	**If MWDOC provided partial or full system Leak Detection Services, how many miles of distribution main do you anticipate surveying per year, on average?**	**Should Distribution System Leak Detection be a Core or Choice funded activity?**	**Please share why you prefer this as a Core or Choice activity.**	**Please share any questions or concerns you may have regarding proposed Distribution System Leak Detection Shared Services.**
City of Anaheim	Likely	Likely	50	Choice	The Core and Choice funding do not apply to Anaheim. Anaheim funding will be per Master Agreement between MWDOC and Anaheim.	None.
City of Brea	Likely	Likely	100	Choice	unsure if we would need the service offered	none
City of Buena Park	Likely	Likely	3-5	Choice	Agencies should choose	none
City of Fountain Valley	Likely	Likely	20	Choice	It should be a Choice activity because only select agencies would participate in this.	none
City of Fullerton	Unlikely	Unlikely	0	Choice	At the moment, we have to many main breaks to take care of before we really start leak detection.	Come back to us with this question in 5-10 years. Hopefully we'll have gotten some of the main breaks under control by then.
City of Garden Grove	Likely	Likely	At least 1 mile	Core	Because we have aged distribution system.	None
City of Huntington Beach	Unlikely	Unlikely	0	Choice	If an agency does not wish to participate, they should not be forced to subsidize those who do.	None at this time
City of La Habra	Likely	Unlikely	50	Choice	Same reasons as previous two services.	Good service. Large scale of inspections completed in a short period of time.
City of La Palma	Highly Likely	Highly Likely	2 to 5	Choice	La Palma would certainly benefit from the economies of scale for such services but unsure	None at this time.

					of this as a Core MWDOC function.	
City of Newport Beach	Unlikely	Unlikely	0	Choice	Same as before	No concerns
City of Orange	Unlikely	Unlikely	Not sure	Choice	Up to now, the cost per mile of leak detection seems pretty high. Hopefully with higher participation rate from agencies, the cost would be somewhat more affordable.	While the leak detection result is definitely useful to water agencies, the restrained budget may prevent us from completely repair all the found leaks.
City of San Clemente	Unlikely	Unlikely	50	Choice	Our agency has somewhat distinctive leak detection needs that are better served by our own leak detection program. Paying for a core program that has somewhat different primary objectives (i.e. water loss control versus slope protection and risk management) may be helpful but may also be redundant for some agencies in our situatiob. Choice programs give agencies the opportunity to opt in/out depending on their own individual cost/benefit analysis and current spending and resources.	Concerns include cost/cost-effectiveness, response time (would still need to rely on own staff for time-sensitive leak detection tasks), how comprehensive the service is and what type of leak detection methods are involved, and the reliability of the work - performed by MWDOC staff? contractor? with what training?
City of San Juan Capistrano	Likely	Likely	10	Choice	The need for the service is not clearly defined in San Juan.	The methodology of the leak detection is unspecified. We have found acoustic testing lacking in clear benefits; and prefer correlative leak detection methods.
City of Santa Ana	Unlikely	Unlikely	0	Choice	It seems the best fit for Santa Ana - MWDOC relationship.	We are currently pursuing an AMI project and anticipate incorporating leak detection capabilities into the future AMI system.

City of Seal Beach	Highly Likely	Highly Likely	10	Core	Same as previous answers. Since all agencies would have to perform these services, why not consolidate into one agency (MWDOC) performing this services for all agencies at a probably lower cost than performing these services alone	NA
City of Tustin	Likely	Likely	10	Choice	same as other ?	none
City of Westminster	Unlikely	Likely	20	Choice	Our system is currently tight. Not a needed function at this point.	Westminster is not entirely convinced of the technology. Having some interaction with new technology may help.
East Orange County W.D.	Highly Likely	Highley Likely	0-40	Choice	Better opportunity for cost control	Contract for this service/provide cost savings through combined purchasing power - this is evolving technology and effectiveness can be highly variable depending upon pipe type and operator skill
El Toro W.D.	Unlikely	Unlikely	0	Choice	Individual agencies are making choices whether or not to participate in the service. The cost should not be shared by agencies not choosing to benefit from the service.	None
Irvine Ranch W.D.	Unlikely	Unlikely	0	Choice	IRWD implements its own leak detection program.	This is a good service for agencies that do not otherwise have leak detection programs. The costs should be covered by the agencies that use the service not all MWDOC member agencies
Laguna Beach County W.D.	Unlikely	Unlikely	None	Choice	We would not utilize this service.	None

Mesa Water District	Likely	Likely	To meet SB 555 requirement	Choice	Some agencies may already have an effective in house leak detection program. Also, I think we would only do leak detection if it is required by SB 555.	I think its a good choice option.
Moulton Niguel W.D.	Unlikely	Unlikely	0	Choice	Moulton Niguel will perform this activity in-house.	N/A
Santa Margarita W.D.	Unlikely	Unlikely	0	Choice	SMWD wouldn't want to participate in this for several years.	Our component analysis shows that it would not be cost-effective to perform leak detection for quite some time.
Serrano W.D.	Highly Likely	Highly Likely	5	Choice	More likely support	None
South Coast W.D.	Highly Likely	Highly Likely	180 miles	Choice	It should be an option.	None at this time.
Trabuco Canyon W.D.	Unlikely	Likely	Unknown	Choice	Not all agencies would need this service	Expensive and may not be funded
Yorba Linda W.D.	Highly Likely	Highly Likely	TBD	Core	Core, because YLWD desires to complete leak detection within the entire District within approximately 18-months.	The same concern as the one listed in response to item number five.

Distribution System Pressure Surveys				
	If MWDOC provided Distribution System Pressure Surveys (system-wide or pressure zone), would your agency participate?	**Should Distribution system Pressure Surveys be a Core or Choice funded activity?**	**Please share why you prefer this as a Core or Choice activity.**	**Please share any questions or concerns you may have regarding proposed Distribution System Pressure Survey Shared Services.**
City of Anaheim	Likely	Choice	The Core and Choice funding do not apply to Anaheim. Anaheim funding will be per Master Agreement between MWDOC and Anaheim.	None.
City of Brea	Unlikely	Choice	we manage internally	none
City of Buena Park	Unlikely	Choice	Agencies should choose	none
City of Fountain Valley	Likely	Choice	This should be a Choice activity because only select agencies would participate in this.	none
City of Fullerton	Unlikely	Choice	I'm not sure what this is. Is this like Surge Detection? If yes, then we would like to participate in it.	N/A
City of Garden Grove	Likely	Core	Because we have aged distribution system.	None
City of Huntington Beach	Unlikely	Choice	If an agency does not wish to participate, they should not be forced to subsidize those who do.	None at this time
City of La Habra	Likely	Choice	For the same reasons as noted with previous activities.	I don't know enough on this topic and the scope of the services. We are deploying battery-powered loggers in our system that provide real-time data to a cloud based server.
City of La Palma	Likely	Choice	La Palma would certainly benefit from the economies of scale for such services but unsure of this as a Core MWDOC function.	None at this time.
City of Newport Beach	Unlikely	Choice	Same as before.	No concerns
City of Orange	Likely	Choice	Flexibility	None
City of San Clemente	Unlikely	Choice	Similar to our opinion on other shared services, the unique challenges (topography) of our agency's service area means we would prefer to be able to opt out of a shared services that works for many agencies, but does not add as much value for us. We already monitor pressure at many turnouts and pump stations throughout our hilly service area so we might be better off using the potential cost of this shared service to work with a consultant to refine our pressure management through modeling.	Cost, and possible redundancy with what we already manage and monitor.
City of San Juan Capistrano	Unlikely	Choice	We do not see an immediate value in this in that we know what our pressures are, and cannot lower	None.

			them without loosing service in the higher elevations of any particular pressure zone.	
City of Santa Ana	Unlikely	Choice	It seems the best fit for Santa Ana - MWDOC relationship.	City is considering AMI systems which may be able to incorporate pressure monitoring/survey.
City of Seal Beach	Highly Likely	Core	same answers as before. If it is a new requirement of the state as a part of the water loss control audit, then perform it for all agencies as a part of the Core program.	My City has only one pressure zone, so I am not completely sure how this service will affect/help my city. However, if it is a core program, then we will be a part of it.
City of Tustin	Unlikely	Choice	same as other ?	none
City of Westminster	Unlikely	Choice	Not needed at this point in time.	Westminster does not believe it has pressure problems.
East Orange County W.D.	Unlikely	Choice	Better cost control opportunity	We do this in-house
El Toro W.D.	Unlikely	Choice	Individual agencies are making choices whether or not to participate in the service. The cost should not be shared by agencies not choosing to benefit from the service.	None
Irvine Ranch W.D.	Unlikely	Choice	IRWD currently monitors system pressure.	The costs should be covered by the agencies that use the service not all MWDOC member agencies
Laguna Beach County W.D.	Unlikely	Choice	This would not be helpful for our system.	None.
Mesa Water District	Likely	Choice	Some agencies have established pressure monitoring.	It would need to be done to a standard that we could the pressure data to calibrate our hydraulic model, and maybe even provide the data to developers for fire sprinkler calcs.
Moulton Niguel W.D.	Likely	Choice	Ability to opt in or out is desired.	Does this shared service only provide the equipment, or would technical support also be included? What would be the frequency of testing? What would be the next steps if and when transients are identified?
Santa Margarita W.D.	Likely	Choice	Some utilities may not want to participate.	This is an intriguing option that SMWD would be interested in. We don't have the available bandwidth to go install the loggers, collect the loggers, and combine the data. In addition, we have too many pressure zones to get an accurate picture with our available pressure loggers.
Serrano W.D.	Likely	Choice	More likely support	None
South Coast W.D.	Likely	Choice	Like options.	None.

Trabuco Canyon W.D.	Likely	Choice	Not needed by all Agencies	This is a valuable service if it can be funded by the Agency.
Yorba Linda W.D.	Unlikely	Choice	Choice, because we only occasionally need to monitor pressures and we have an in-house monitoring program.	The same concern as the one listed in response to item number five.

Distribution System Flushing Shared Services					
	If MWDOC provided Distribution System Flushing Services, would your agency participate?	**If MWDOC provided Distribution System Flushing Services, how many miles of distribution main do you anticipate flushing per year, on average?**	**Should Distribution System Flushing Services be a Core or Choice funded activity?**	**Please share why you prefer this as a Core or Choice activity.**	**Please share any questions or concerns you may have regarding proposed Distribution System Flushing Shared Services.**
City of Anaheim	Likely	20	Choice	The Core and Choice funding do not apply to Anaheim. Anaheim funding will be per Master Agreement between MWDOC and Anaheim.	None.
City of Brea	Likely	30	Choice	we have a loop system	none
City of Buena Park	Likely	Unknown	Choice	Agencies should choose	none
City of Fountain Valley	Likely	202	Choice	It should be a Choice activity because only select agencies would participate in this.	none
City of Fullerton	Unlikely	0	Choice	Our maintenance crews currently perform their own hydrant flushing program.	N/A
City of Garden Grove	Unlikely	Don't know	Choice	It just makes sense.	None
City of Huntington Beach	Unlikely	0	Choice	If an agency does not wish to participate, they should not be forced to subsidize those who do.	None at this time
City of La Habra	Highly Likely	25	Choice	Prefer as a choice activity considering current staffing levels and the time constraints for this type of work.	Great idea! I would like to get on a regular cycle of flushing and outsourcing this type of work is a viable way to get it done.
City of La Palma	Highly Likely	42 dead ends and approximately 10 miles of mains to begin with	Choice	La Palma would certainly benefit from the economies of scale for such services but unsure of this as a Core MWDOC function.	Nome at this time.
City of Newport Beach	Unlikely	0	Choice	Same as before	No concerns
City of Orange	Likely	Unsure	Choice	Flexibility	Will it be uni-directional flushing?
City of San Clemente	Unlikely	100	Choice	the level of service may not be enough to cover our entire system at the rate at	Cost, level of service, training to use the equipment (assuming we

				which we need to flush, so this activity would best serve us as a supplement to traditional flushing that we could opt in to on an annual basis, but be able to opt out of in years when coordinating between two types of flushing activities is too cumbersome and/or costly.	would provide the operator?). We also have 303 dead ends in addition to all of our hydrants that we already invest a lot of time and money into managing with traditional flushing, so using this service would require some operational adjustments in staffing, scheduling, etc.
City of San Juan Capistrano	Likely	50	Choice	We have a contract flushing program in place.	None.
City of Santa Ana	Likely	Not yet determined	Choice	It seems the best fit for Santa Ana - MWDOC relationship.	None.
City of Seal Beach	Likely	10	Core	Same answers as before	Seal Beach provides only about 1 mile of flushing every couple of years (not counting dead ends we flush
City of Tustin	Likely	1	Choice	we would only use this service as needed.	none
City of Westminster	Likely	63	Core	It's a needed function that we haven't done because of the drought. If we could incorporate the NO-DES truck, we'd be interested.	This also depends on drought conditions.
East Orange County W.D.	Highly Likely	20	Choice	Better opportunity for cost control	Do this via contract service or assist with grant purchase opportunity - don't hire in-house
El Toro W.D.	Unlikely	0	Choice	Individual agencies are making choices whether or not to participate in the service. The cost should not be shared by agencies not choosing to benefit from the service.	None
Irvine Ranch W.D.	Unlikely	0	Choice	IRWD implements its own programs.	The costs should be covered by the agencies that use the service not all MWDOC member agencies
Laguna Beach County W.D.	Unlikely	None	Choice	We would not utilize this service.	None
Mesa Water District	Likely	10?	Choice	Cost	No-Dez may be cost prohibitive

					compared to traditional flushing.
Moulton Niguel W.D.	Unlikely	0	Choice	Ability to opt in or out is desired.	It is our understanding that this type of flushing is mainly used to remove sediment, which our distribution system does not typically have to deal with. Our system does not have large particulates, turbidity, or residual problems. When our system requires flushing, we don't want to put the water back into the system.
Santa Margarita W.D.	Unlikely	0	Choice	Choice given that this has been significantly more expensive than just flushing traditionally.	Unless the cost was significantly lower than what we've seen, SMWD would probably not be interested.
Serrano W.D.	Unlikely	0	Choice	Likely support	none
South Coast W.D.	Unlikely	N/A	Choice	Should be an option.	None.
Trabuco Canyon W.D.	Unlikely	Unknown	Choice	TCWD internal staff would perform this	I believe there is more value to the Agency to perform this service themselves.
Yorba Linda W.D.	Highly Likely	Approx. 75-miles.	Choice	Choice, so other agencies can participate or opt-out.	The same concern as the one listed in response to item number five.

Appendix 3: Job Descriptions

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY			
JOB TITLE:	WATER LOSS CONTROL PROGRAMS SUPERVISOR		
DEPARTMENT:	WATER USE EFFICIENCY	SUPERVISOR:	DIRECTOR OF WUE
STATUS:	NON-EXEMPT		
SALARY GRADE:	TBD		

Position Summary:
Under general supervision, the Water Loss Control Programs Supervisor is responsible for overseeing implementation of Water Loss Control Services including Water Audit Validation, Distribution System Leak Detection, Distribution System Pressure Surveys, and Distribution System Flushing. These services will be provided by the District to its retail water agencies throughout Orange County.

Duties and Responsibilities (Essential Functions):

- Supervise the overall implementation of Water Loss Control Services Program including supervision and evaluation of subordinate staff, consultants and other service providers.
- Schedule and coordinate shared services with up to 32 retail water agencies.
- Conduct Water Balance Validations for up to 32 retail water agencies in accordance with SB 555 requirements.
- Present progress, findings, and available services at bi-monthly District water loss control work group meetings.
- Ensure compliance with all District policies.
- Conduct performance management review of employees.
- Provide reports or updates on implementation and impact of services to management, accounting and retail agency staff.
- Prepare Request for Proposals and make recommendations to management and the Board for contract services as needed to perform shared services.
- Ensure that proper use and maintenance of District vehicles are adhered to while performing job duties and any District related duties.

Qualifications (Knowledge, Skills and Abilities):
Knowledge of:
Water loss control strategies and implementation plans, including:

- water audit compilation and validation methodology
- pressure management
- proactive leak detection
- customer meter accuracy testing and management

- distribution system flushing
- progress tracking mechanisms
- water loss and conservation regulations in California

Ability to:

- Effectively communicate both orally and in writing.
- Operate in a Microsoft Office Suite software environment, with specific proficiency in Microsoft Excel.
- Communicate effectively with all levels including management, office/field employees, member agencies and retail customers, and outside contractors/vendors.
- Represent the District in a professional manner when dealing with member agencies and retail customers, outside contractors and agency officials.
- Advise and provide interpretation to others on how to apply policies, procedures and standards to specific situations.
- Establish and maintain effective working relationships with all those encountered in the course of work.
- Use good personal judgement and discretion in performing all job functions.
- Exercise independent judgement when making decisions involving specific job functions, shutdowns and most efficient utilization of staff and equipment in absence of Supervisor.
- Calculate water formulas and interpret application tables and charts; knowledge of algebra and basic statistics.
- Practice safe work methods in the course of work.

Education and Experience:

Graduation from high school or G.E.D. equivalent. An Associate degree in water and/or wastewater treatment environmental studies, mechanical or electrical engineering is preferred. Five (5) years of increasingly responsible experience in the operation, maintenance, and repair of operation of underground water utilities. The qualification guidelines generally describe the knowledge and ability required to enter the job in order to successfully perform the assigned duties. Any combination of education, experience and training that would provide the required knowledge, skills and abilities will be considered.

Other Requirements:

1) Possess and maintain or ability to acquire a valid Cal-Nev American Water Works Association Water Audit Validator Certification, 2) possess and maintain a California State Water Resources Control Board Grade 2 Water Distribution Certificate, or the ability to obtain within one year of hire date and 3) possess and maintain a valid California driver's license

All District employees are Disaster Service Workers by CA state law and are expected to participate in emergency response initiatives. This could include contributing to the emergency planning process, participating in disaster exercises and training, as well as potentially responding to support actual emergency events.

Working Conditions and Physical Activities:

Environment: The employee works in a shop and field environment where the noise level is typically moderate. The employee works in outdoor weather conditions; extreme heat or cold; wet humid conditions; precarious places; on uneven or slippery surfaces; near moving mechanical parts; near moving equipment; and near heavy traffic. The employee is occasionally exposed to loud or prolonged noise and equipment with heavy vibrations. The employee may be exposed to environmental factors.

Physical Demands: While performing the duties of this job, the employee is regularly required to walk and stand; talk and hear; use hands to finger, handle, feel or operate objects, tools or controls; balance on ladders or stairs; stoop, kneel, bend at the waist, crouch or crawl; and smell. The employee will be required to lift up to 50 pounds and may be required to lift up to 100 pounds with assistance. The employee must walk frequently.

Visual ability (which may be corrected) to read handheld meter reading device screens, small print, including good peripheral vision and depth perception. Specific vision abilities required by this job include close vision, distance vision, and peripheral.

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

JOB TITLE:	WATER LOSS CONTROL PROGRAMS TECHNICIAN – LEAK DETECTION	
DEPARTMENT:	WATER USE EFFICIENCY	SUPERVISOR: WATER LOSS CONTROL PROGRAMS SUPERVISOR
STATUS:	NON-EXEMPT	
SALARY GRADE:	TBD	

Position Summary:

Under direct supervision, provide Distribution System Leak Detection services to up to 32 retail water agencies throughout Orange County. Assists the Water Loss Control Programs Supervisor in day-to-day operations of meter accuracy testing activities. Candidate will also periodically participate in distribution system pressure surveys of retail systems. Operate a District vehicle and utilize and operate required machinery essential to perform the job.

Duties and Responsibilities (Essential Functions):

The duties listed below are intended only as illustrations of the various types of work that may be performed. The omission of specific statements of duties does not exclude them from the position if the work is similar, related or a logical assignment to this class.

- Ability to walk frequently during the course of the work day locating underground water leaks using a variety of tools, including but not limited to acoustic leak sounding rods, ground microphones, and leak correlators.
- Determine the source of leak and who is responsible for repair (retail agency or other agency.)
- Document suspected leaks and confirmed leaks thoroughly, according to District documentation standards and using District documentation forms.
- Drive, operate and maintain equipment, tools, and vehicles.
- Routinely required to work in the roadway and provide traffic control, according to District safety standards.
- Read and interpret blueprints, maps, atlases, and specifications.
- Deploy and recover distribution system pressure loggers on retail water agency distribution systems throughout Orange County.
- Develop and maintain positive working relationships with District and member agency staff and members of the public.
- Ability to communicate effectively with retail water agency staff and all individuals who the position interacts with while representing the District.
- Provide equipment and maintenance support to member agency/retail staff.
- Comply with applicable retail agency procedures.
- Ensure job site is left safe and clean.
- Responsible for keeping accurate journals and work assignments.
- Comply with safety work-related practices and attend relevant safety training.

Qualifications:

- High school graduation or equivalent.
- 1-3 years of experience in water maintenance work or related field.
- Familiarity with hand and power tools.
- Familiarity with Windows based computerized environment and Preventive Maintenance database programs is highly desirable.
- Knowledgeable in the maintenance and operation of water distributions systems.

Knowledge of:

- Methods and procedures used in pulling and repairing large water meters and other equipment.
- Traffic control practices and requirements.
- Safety policies, procedures and safe work practices applicable to assignment including OSHA regulations.
- Principles and practices of sound business communication; correct English usage, including spelling, grammar and punctuation.
- Records management, recordkeeping, filing and basic purchasing practices and procedures.

- Use and operation of computers, and preventive maintenance database programs.

Ability to:

- Effectively communicate both orally and in writing, with all levels of staff, including retail water agency staff, customers, office/field employees, management and vendors.
- Represent the District in a professional manner when dealing with retail water agency staff, customers, outside contractors and agency officials.
- Advise and provide interpretation to others on how to apply policies, procedures and standards to specific situations.
- Calculate water formulas and interpret applicable tables and chart; knowledge of algebra.
- Establish and maintain effective working relationships with all those encountered in the course of work.
- Use good personal judgement and discretion in performing all job functions.
- Exercise independent judgment when making decisions involving specific job functions, shutdowns and most efficient utilization of staff and equipment in absence of Supervisor.
- Fully and accurately document suspected and confirmed leaks, including location and degree of certainty.
- Practice safe work methods in the course of work.

Education and Experience:

Graduation from high school or GED equivalent and 1-3 years of experience reading meters and testing or replacing/repairing or calibrating meters (5/8" through 36") in either the field or shop settings.

Other Requirements:

1) Possess and maintain or ability to acquire a valid Cal-Nev American Water Works Association Water Audit Validator Certification, 2) possess and maintain a California State Water Resources Control Board Grade 2 Water Distribution Certificate, or the ability to obtain within one year of hire date and 3) possess and maintain a valid California driver's license and automobile insurance under the terms of the District's Vehicle Insurance Policy.

All District employees are Disaster Service Workers by CA state law and are expected to participate in emergency response initiatives. This could include contributing to the emergency planning process, participating in disaster exercises and training, as well as potentially responding to support actual emergency events.

Working Conditions and Physical Activities:

Environment: The employee works in a shop and field environment where the noise level is typically moderate. The employee works in outdoor weather conditions; extreme heat or cold; wet humid conditions; precarious places; on uneven or slippery surfaces; near moving mechanical parts; near

moving equipment; and near heavy traffic. The employee is occasionally exposed to loud or prolonged noise and equipment with heavy vibrations. The employee may be exposed to environmental factors.

Physical Demands: While performing the duties of this job, the employee is regularly required to walk and stand; talk and hear; use hands to finger, handle, feel or operate objects, tools or controls; balance on ladders or stairs; stoop, kneel, bend at the waist, crouch or crawl; and smell. The employee may be required to lift up to 50 pounds; and may be required to lift up to 100 pounds with assistance. The employee must walk frequently.

Visual ability (which may be corrected) to read handheld meter reading device screens, small print, including good peripheral vision and depth perception. Specific vision abilities required by this job include close vision, distance vision, and peripheral.

Appendix 4: Shared Services Agreement

WATER LOSS CONTROL SHARED SERVICES AGREEMENT

This Water Loss Control Shared Services Agreement ("Agreement") is made and entered into as of _____ 2019, by and between the Municipal Water District of Orange County ("MWDOC") and _____ ("Participating Agency"). MWDOC and Participating Agency may be collectively referred to as "Parties" and individually as a "Party."

RECITALS

A. MWDOC offers its member agencies ("Member Agencies") the benefits of certain programs called choice services, which are services that MWDOC makes available to Member Agencies that they may elect to participate in or not ("Choice Services").

B. If Member Agencies elect to receive certain Choice Services, they execute an agreement with MWDOC that sets forth the terms and conditions for such Choice Services.

C. Through these agreements MWDOC offers cost sharing and shared services components that allows Member Agencies to obtain economies of scale and save money on such Choice Services.

D. With input from its Member Agencies, MWDOC prepared a Water Loss Control Shared Services Business Plan, which proposed five water loss control shared services that would be provided to Member Agencies by MWDOC staff and, as necessary and as determined by MWDOC, third party consultants.

E. Participating Member Agencies may elect which of the shared services, if any, they wish to receive from MWDOC by completing an initial election form with this Agreement. The initial election form is attached as Exhibit A to this Agreement.

F. At the end of each year, the Participating Agency may change the shared services that it elects to receive for the following year by completing an annual election addendum to this Agreement.

G. Annual election addendums may also be used to tailor the types and amounts of shared services that each participating Member Agency will receive, as well as the costs.

H. The Parties desire to enter into this Agreement whereby MWDOC will provide the water loss control shared services that the Participating Agency elects to receive on the terms and conditions described in this Agreement.

TERMS

1. Scope of Services. MWDOC will provide the water loss control services to Participating Agency that are identified in the initial election form attached as Exhibit A and, unless otherwise provided in Exhibit A, that are consistent with the description in the Water Loss Control Shared Services Business Plan attached as Exhibit B ("Services"). The actual scheduling of Services shall be done only upon request of the Participating Agency. The Parties agree that MWDOC may provide the Services by utilizing MWDOC staff or third party vendors as determined by MWDOC.

2. Term of Agreement. The term of this Agreement shall be from July 1, 2019 to June 30, 2024. The term will automatically renew for another five years unless either of the Parties terminate the Agreement pursuant to Section 6.

3. Annual Election Addendums. Prior to July 1 of each year of the Agreement and consistent with the requirements of this Section, Participating Agency may change the shared services that it elects to receive for the following fiscal year (July 1 – June 30) by completing an annual election addendum to this Agreement ("Election Addendum"). The Election Addendum with the elections for the following fiscal year must be submitted to MWDOC prior to the end of the third quarter of the previous fiscal year. The Election Addendum must be executed by the Parties prior to the start of the next fiscal year for it to take effect. The Election Addendum may contain terms that are different than those in the initial election form, including adjustment to the types of services and the addition of new shared services as they become available.

4. Pricing and Payment. Participating Agency shall pay MWDOC for the Services performed pursuant to this Agreement in the unit cost amounts for each type of elected shared service as set forth in Exhibit "A". The unit cost amounts in Exhibit A may be adjusted each year by MWDOC in MWDOC's discretion. MWDOC will provide notice to Participating Agency of any changes to the unit cost amounts for the next fiscal year by March 1 of the previous fiscal year and such adjusted costs shall be reflected in the Election Addendum. In addition, Participating Agency is not obligated to request any Services and is only required to pay for Services performed by MWDOC at the request of Participating Agency.

5. Billing Procedure and Payment. MWDOC shall, on a monthly basis, submit to Participating Agency invoices for Services ("Invoices") actually performed during the previous month. The Invoices shall be provided within the monthly water bill that Participating Agency receives from MWDOC for water service. The Invoices shall specify with sufficient detail the Services provided during the month and the amount due to MWDOC. Participating Agency shall pay MWDOC within thirty (30) days of receipt. Participating Agency may not unreasonably withhold payment.

6. Termination. Either Party may terminate this Agreement upon thirty (30) days written notice to the other. In such an event, the Parties shall be responsible to each other for any obligations that have already been incurred prior to the termination date.

7. Qualifications. MWDOC represents and warrants to Participating Agency that it and its agents have the qualifications, experience, equipment, and licenses, necessary to properly perform the Services in a competent and professional manner.

8. Standard of Care. MWDOC's services will be performed in accordance with generally accepted professional practices and principles and in a manner consistent with the level of care and skill ordinarily exercised to perform the Services.

10. Accounting. MWDOC shall for a reasonable time keep accurate and detailed records of the Services performed and the financial details in connection with such, including all Records related to any third party consultants ('Records"). Any and all Records must be maintained in accordance with generally accepted accounting principles and must be sufficiently complete and detailed so as to permit an accurate evaluation of the services provided by MWDOC under this Agreement. MWDOC shall give Participating Agency, during normal business hours, access to such Records. Upon request of Participating Agency, MWDOC will provide copies of MWDOC's Consultant's invoices and MWDOC's payment records.

11. Indemnification. MWDOC agrees to indemnify and hold harmless Participating Agency, its Board, members of the Board, employees, and authorized volunteers from any and all claims, demands, causes of action, costs, expenses, liability, loss, damage or injury of any kind, in law or equity, to property or persons, including wrongful death, in any manner arising out of any negligent acts or willful misconduct of MWDOC or its agents in connection with the provision of Services. Participating Agency agrees and acknowledges that MWDOC is not responsible for the maintenance and quality of any of Participating Agency's facilities and Participating Agency is responsible for any costs, expenses, liability, loss, damage or injury of any kind, in law or equity, to property or persons, including wrongful death, arising from such.

12. Insurance. MWDOC agrees to procure and maintain, at MWDOC's expense, insurance in amounts as described in Exhibit C. MWDOC shall require any third party consultants to carry the same policies and limits of insurance that MWDOC is required to maintain pursuant to this Agreement, unless otherwise approved in writing by Participating Agency.

13. Independent Contractor. MWDOC shall act as an independent contractor in the performance of the Services provided for in this Agreement and shall furnish such Services in MWDOC's own manner and method and in no respect shall MWDOC or any of its agents be considered an agent or employee of Participating Agency. No provisions of this Agreement shall be intended to create a partnership or joint venture between MWDOC or any of its agents and participating Agency and neither Party shall have the power to bind or obligate the other Party, except as expressly set forth in this Agreement.

14. Notices. All notices permitted or required under this Agreement shall be given to the respective parties at the following address, or at such other address as the respective parties may provide in writing for this purpose.

Municipal Water District of Orange County:

Robert J. Hunter, General Manager
Municipal Water District of Orange County
18700 Ward St.
P.O. Box 20895

_____

_____
_____
_____
_____

Such notice shall be deemed made when personally delivered or when mailed, forty-eight (48) hours after deposit in the U.S. Mail, first class postage prepaid and addressed to the party at its applicable address. Actual notice shall be deemed adequate notice on the date actual notice occurred, regardless of the method of service.

15. Jurisdiction and Venue. In all matters concerning the validity, interpretation, performance, or effect of this Agreement, the laws of the State of California shall govern and be applicable. The Parties hereby agree and consent to the exclusive jurisdiction of the courts of the State of California and that venue of any action brought hereunder shall be in Orange County, California.

16. Counterparts and Facsimile. This Agreement may be executed by the Parties in counterparts, which counterparts shall be construed together and have the same effect as if all the Parties had executed the same instrument. Counterpart signatures may be transmitted by facsimile, email, or other electronic means and have the same force and effect as if they were original signatures. All parties have participated in the drafting of this Agreement.

17. Severability. If any provision of this Agreement shall be held illegal, invalid, or unenforceable, in whole or in part, the legality, validity, and enforceability of the remaining provisions shall not be affected thereby.

18. Entire Agreement. This Agreement 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 that are not set forth herein. Except as provided herein, this Agreement may not be modified or altered without prior written approval from both parties.

19. Authority to Execute. Each Party represents and warrants to the other Party that all necessary action has been taken by such Party to authorize the undersigned to execute this Agreement and to bind it to the performance of its obligations hereunder.

20. Incorporation of Recitals. The Recitals and section titles set forth herein are incorporated herein and are an operative part of this Agreement.

IN WITNESS WHEREOF, the Parties have hereunto affixed their names as of the day and year thereinafter written, which shall be and is the effective date of This Agreement.

MWDOC

Date _____

By:_____
Robert J. Hunter, General Manager
Municipal Water District of Orange County

Approved as to Form

Date:_____

By:_____
Joseph Byrne, General Counsel

_____

Date _____

By:_____

Approved as to Form

Date:_____

By:_____

EXHIBIT A

Initial Election Form

EXHIBIT B

Water Loss Control Shared Services Business Plan

EXHIBIT C

Insurance Requirements

Attachment 2

Water Loss Control Shared Services Business Plan

Joe Berg, Director of Water Use Efficiency
Planning & Operations Committee

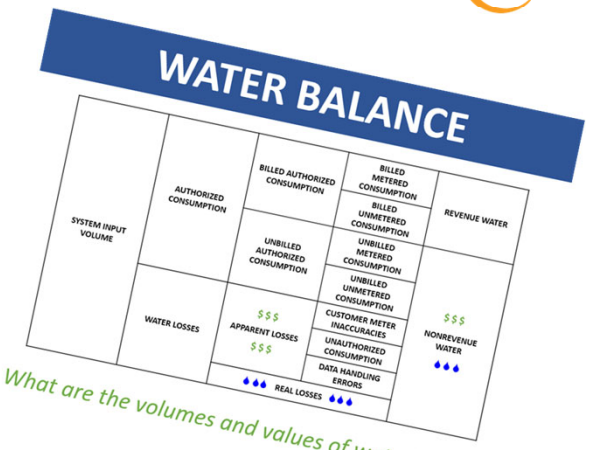
December 3, 2018

Presentation Content

- Background
- How Much Shared Services?
- Shared Services Models
- Implementation Plan
- Shared Services Agreement
- Timeline
- Recommendations

Background

- In 2015, the Board authorized implementation of a comprehensive Water Loss Control Technical Assistance Program (TAP) to assist member agencies in complying with AB 1420
  - In 2016, the Board authorized the addition of sales meter accuracy testing to the TAP
  - In 2018, the Board authorized the purchase of leak detection equipment for an equipment lending library

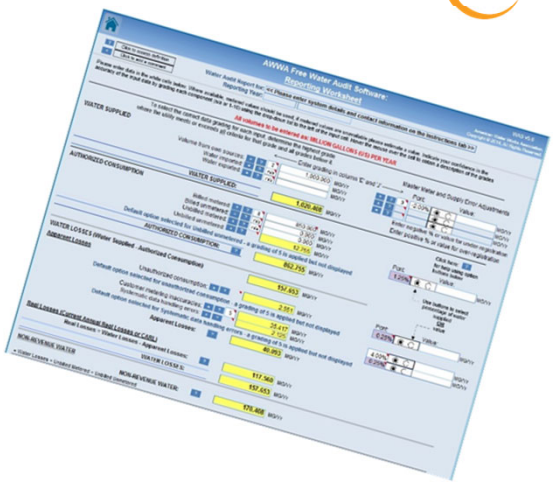


What are the volumes and values of water losses?

3

Background (Cont.)

- In 2018, the Board authorized Water Balance Validation research to better inform the SB 555 water loss standards setting process
- In 2018, the Board authorized staff to explore offering water loss control shared services through the development of a Water Loss Control Shared Services Business Plan
- The purpose of this presentation is to …….



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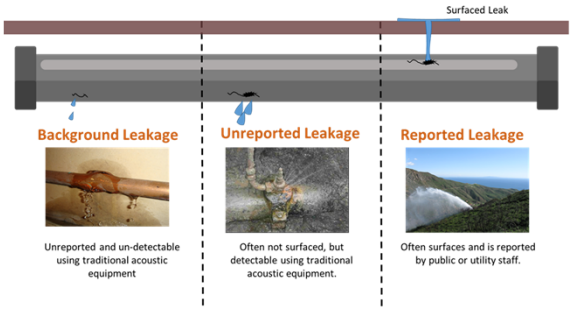
Shared Services Survey

- To help shape the content and direction of the Business Plan, staff surveyed member agencies and the 3-Cities to identify:
  - What shared services were of interest
    - Water Balance Validation
    - Meter Accuracy Testing
    - Leak Detection
    - Pressure Survey
    - Distribution System Flushing



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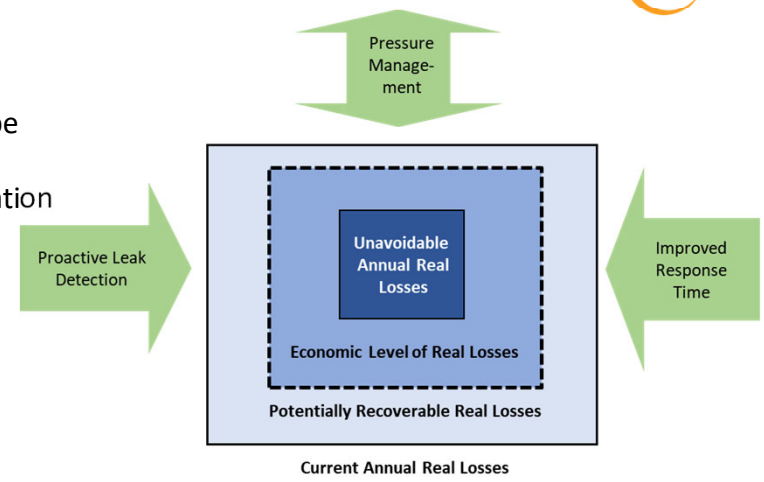
Shared Services Survey (Cont.)

- How shared services should be funded; either core or choice
- Preliminary levels of participation
- 28 of 30 retail agencies responded to the survey
- Survey says?



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How much shared services?

- There is support for WLC Shared Services:
  - Water Audit Validation - 28 agencies indicated they would use validation services
  - Sales Meter Accuracy Testing - agencies indicated they would test between 3,100 to 4,300 meters per year
  - System Leak Detection - agencies indicated they would survey between 500 and 550 miles of distribution mains per year
  - System Pressure Survey - 10 agencies indicated they would use pressure survey services
  - System Flushing - agencies indicated they would flush 600 miles of mains per year

Shared Services Models –

- Contract Services Model
  - Approach for current TAP
  - Matches resources directly to work load
  - Minimizes risk of stranded staffing and equipment assets
  - Likely higher cost to use private sector services
  - Increased management / oversight by existing MWDOC staff
- In-house Services Model
  - Potential for cost savings over private sector
  - Risk of stranded staffing and equipment assets
  - Local control of process and services
  - More accountability and flexibility of services
- Staff Recommendation: A combination of contract and in-house staff provided services

MWDOC's Pricing

Table 1: Initial shared services pricing

Shared Service	Provider	Unit Cost	
Water audit validation	MWDOC staff	$840	per validation
Customer meter testing	Outside vendor	$168	administrative fee *
Distribution system leak detection	MWDOC staff	$207	per mile
Suspected leak survey	MWDOC staff	$259	per suspected leak
Pressure survey	MWDOC staff	$3,360	per survey
NO-DES flushing	Outside vendor	$840	administrative fee *

** Unit costs for meter testing and system flushing only include administrative costs for MWDOC staff to facilitate contractor-provided shared services.*

Implementation Plan

Table 2: Five-year shared services implementation plan

Shared Service	Year I FY 2019-20	Year II FY 2020-21	Year III FY 2021-22	Year IV FY 2022-23	Year V FY 2023-24
Water Audit Validation	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Customer Meter Accuracy Testing	Outside Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *Consider MWDOC Staff*	Outside Vendor or MWDOC Staff
Distribution System Leak Detection	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Pressure Surveying	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff	MWDOC Staff
Distribution System Flushing	RFP Process to Select Vendor	Outside Vendor	Outside Vendor	Outside Vendor - *Consider MWDOC Staff*	Outside Vendor or MWDOC Staff

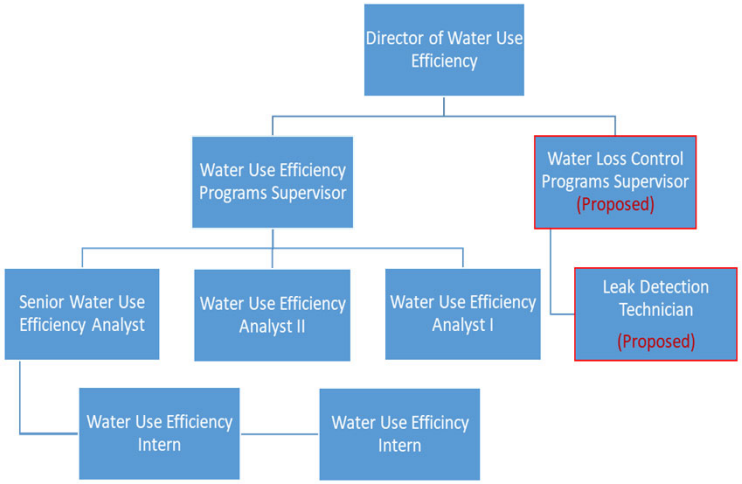
Proposed Staffing

Table 1: Proposed water loss control shared services staffing

Position and Responsibilities	Funding Mechanism	Staffing Need (Low)	Staffing Need (High)
Water Loss Control Programs Supervisor		**1.03**	**1.19**
Level 1 water audit validation	*Core*	*0.10*	*0.14*
Customer meter accuracy testing	*Choice*	*0.09*	*0.09*
Distribution system pressure surveys	*Choice*	*0.32*	*0.44*
Distribution system flushing	*Choice*	*0.22*	*0.22*
Water loss policy development	*Core*	*0.20*	*0.20*
Overhead (holiday, sick & vacation time)	*Core*	*0.10*	*0.10*
Leak Detection Technician *		**0.78**	**1.07**
Distribution system leak detection	*Choice*	*0.68*	*0.97*
Overhead (holiday, sick & vacation)	*Core*	*0.10*	*0.10*
Total		**1.81**	**2.26**

** excludes suspected leak investigations.*

Proposed Staffing



Shared Services Equipment

Initial Equipment Purchases					
Equipment	**Make & Model**	**Quantity**	**Unit Cost**	**Total**	**Notes:**
Vehicles					
Truck - Option 1	Chevrolet Silverado C1500	2	$29,000.00	$ 58,000.00	Based of recent YLWD purchase
Truck - Option 2	Ford - Super Duty F250	2	$29,526.86	$ 59,053.72	Based on recent IRWD purchase, includes tax
			Average:	$ 58,526.86	
Vehicle Equipment	Misc.	2	$ 1,670.00	$ 3,340.00	Tool Boxes, safety lighting, etc. Based of recent YLWD purchase
Cab Guard		2	$ 600.00	$ 1,200.00	Installed price based on recent IRWD purchase
Corner Strobes		2	$ 400.00	$ 800.00	Installed price based on recent IRWD purchase
Traffic director		2	$ 500.00	$ 1,000.00	Installed price based on recent IRWD purchase
Tool Box		2	$ 450.00	$ 900.00	
				$ 3,900.00	
Miscellaneous Equipment					
Computer Work Stations		2	$ 1,300.00	$ 2,600.00	Estimate provided by MWDOC IT staff
Lap top computer		1	$ 1,100.00	$ 1,100.00	Estimate provided by MWDOC IT staff
Work Gloves		3	$ 16.25	$ 48.75	Grainger - High Visibility Gloves, Item No. 45VK70
Rubber Gloves		3	$ 19.80	$ 59.40	Grainger - Powdered Rubber Latex Disposable Gloves, Item No. 59NL17
Safety Glasses		3	$ 5.10	$ 15.30	Grainger - Pyramex Safety Glasses, Item No. 34WR32
Spray Paint		6	$ 7.15	$ 42.90	For marking pipe location and leak pin point of leak location
Pipe Locator		2	$ 3,140.00	$ 6,280.00	For Leak Detection
Traffic Cones		6	$ 20.65	$ 123.90	Staff and vehicle safety
Hard Hat		3	$ 10.00	$ 30.00	
ANSI Class III Safety Vests		3	$ 21.00	$ 63.00	
				$ 10,363.25	
		Grand Total:		**$72,790.11**	

Shared Services Equipment

On-Going Equipment Costs					
Equipment	**Annual)**	**Quantity**	**Cost**	**Total**	**Notes:**
Cell Phones	Monthly	2	$ 60.00	$ 1,440.00	Assumes Advanced allowance in Cell Phone Allowance Policy
Auto Insurance	Annually	2	$ 124.00	$ 248.00	As quoted by ACWA JPIA.
Boot Allowance	Annually	2	$ 200.00	$ 400.00	Based on OCWD policy
Uniforms	Annually	18	$ 25.00	$ 450.00	9 per staff person
Jacket	Annually	2	$ 75.00	$ 150.00	1 per staff person
Vehicle Fuel		96	$ 60.00	$ 5,760.00	SC Gas Cards; Assume 4 tanks per month per vehicle @ $60 per tank
		Total:		**$ 8,448.00**	

Shared Services Agreement

- Umbrella agreement for all shared services
  - Same model our current Technical assistance program utilizes
  - 5-year initial term
  - Annual addendums to specify services each year
    - Allow for annual adjustments by MWDOC and agencies
      - Types of services to be accessed
      - Fees to be charged for services
      - Addition of new shared services
    - Elections to be made the third quarter of each year
      - Within agencies normal budgeting cycle
      - Allows MWDOC time to schedule services for the coming year
      - Mid-year adjustments possible based on availability

Timeline

- December 2018: Committee & Board Consider Business Plan
- December 2018 – April 2019: Budgeting for MWDOC and participating agencies
- July 2019: Begin offering shared services

Staff Recommendation

- Staff recommends the Board of Directors adopt the Water Loss Control Shares Services Business Plan and authorize staff to plan for implementation of shared services in the Fiscal Year 2019-20 Budget including:
  - Two water loss control staff to be funded through a combination of core and choice services, and
  - MWDOC funding of Initial and ongoing equipment cost
    - Initial equipment costs of approximately $76,800
    - Ongoing equipment costs of approximately $8,600

Item No. 3

DISCUSSION ITEM
December 3, 2018

TO: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

FROM: **Robert Hunter, General Manager**

Staff Contact: Karl Seckel, Assistant General Manager

SUBJECT: **Planning and Resource Development Department Overview**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and discuss the department overview presentation for the Planning and Resource Development Department.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

In preparation for the FY 2019-20 budget process, Planning and Resource Development Department staff will provide an overview presentation summarizing department functions as well as near-term objectives and long-term goals.

Attachment: Department Presentation Planning and Resource Development Department

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

KS1

Planning and Resource Development

Karl Seckel, Assistant General Manager
Municipal Water District of Orange County

Planning & Operations Committee

December 3, 2018

Discussion Topics – Planning & Resources Development

01 - **Department Historical Perspective**
02 - **Department Overview**
03 - **Special Projects**
04 - **Department Staffing**
05 - **Overlap with MET Activities**
06 - **Department Functions Moving Forward**
07 - **Near-Term Objectives**
08 - **Long-Term Goals Moving Forward**
09 - **Karl Seckel Priorities**

2

Slide 1

KS1 How about a few pictures: in OC, MET PCCP replacement, demand projections chart, climate change, other

Karl Seckel, 11/25/2018

Historical Perspective:

- Access to MET Water/Annexations to MWDOC and MET
- Pipelines and Service Connections
- EOCF#2 - 1964
- Get MET to build the AMP - 1978
- Locals build the AMP - 1980
- Central Pool Augmentation Project
- South County Pipeline - 1992
- MET IRP - 1994
- Sale of the AMP to MET - 1995
- Reliability Planning sparked by the failure of the AMP in 1999
- Consolidation with Coastal MWD – 1997 - 2001
- Working closer with our Member Agencies

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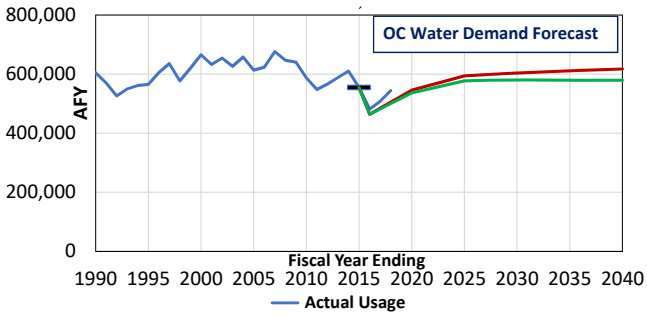
Historical Perspective:



- Center for Demographic Services
- LAFCO Municipal Services Reviews
- Poseidon Project – 2000 to present
- Doheny Desalination – 2001 to present
- IRWMP Planning – 2001 to present
- South County Reliability Studies – 2001 to present
- Orange County Reliability Studies – 2016 to present
- California WaterFix
- Rehabilitation and Repair – Long term maintenance

Next stop!

Operating in an uncertain world???

KS2

CALIFORNIA WATER FIX
RELIABLE. CLEAN. WATER.

4

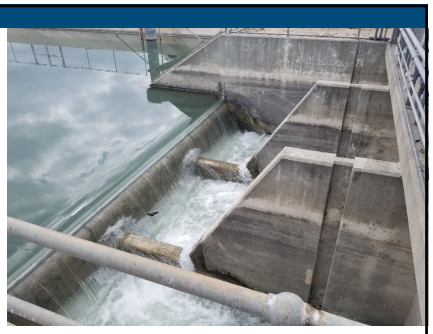
Slide 4

KS2 I was trying to think of a tag line
Karl Seckel, 11/26/2018

Department Overview:

Work with Orange County water agencies on solutions & priorities for improving OC's future water supply reliability

- **Reliability Planning and Resource Development**
  - Provide a local and countywide perspective to planning & resource development efforts
  - Advocate for local OC perspectives in MET regional planning & resource development efforts
  - Coordinate with OCWD on their activities
- **Support to Member Agencies**
  - Coordinate and provide support services to MWDOC Member Agencies regarding MET (interface between MET and our agencies regarding terms and conditions, imported water, operations, service connections, local pipelines, etc.
  - Metering issues at service connections



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Department Overview:

- **Local Water Supply Project Integration**
  - Work together with MET and OC water agencies to integrate local water supply projects into the OC distribution system
- **WEROC Support**
  - Coordinate seismic enhancements to support EOC operations
  - Emergency Planning
  - Assist with staffing the EOC during activations
- **Back-up & Assistance to Other Departments**

6

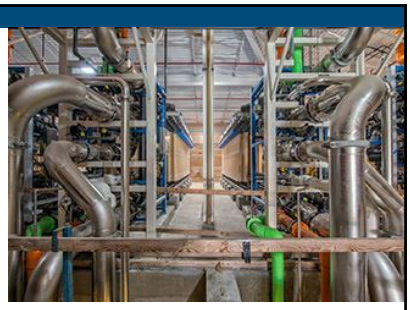
Department Overlap with MET Activities:

- **Review policies and write-ups as requested**
- **Sharing of staff support members**
- **Cross-training**
- **MET Water Quality issues**
- **Service connection/metering issues**
- **IRP issues**
- **Seismic impacts on facilities**
- **Planning**
- **Bay-Delta**
- **Demand Forecasting**

7

Special Projects:

- **Trustee Activities for AMP, Baker, EOCF#2 & SCP**
  - Represent AMP Participants in the Sale Agreement to MET and among themselves; track capacity usage of the AMP,
  - Participate on SAC Commission and other activities with respect to the Baker Pipeline and Baker Treatment Plant
  - Advocating and working towards seeking approval for Pump-in and conveyance of local water in the EOCF#2
  - Working with MET, SMWD and others regarding the disposition of the South County Pipeline
- **San Juan Basin Authority**
- **WEROC**
  - Coordinate seismic enhancements to support EOC operations
  - Assist with staffing the EOC during activations



8

Special Projects:

- **Integration of Local Projects from a Water Quality and Operations Perspective**
  - Conduct water quality investigations
  - Examine the use of a hydraulic model for improved understanding of integration issues
- **MET PCCP Lining, More Particularly the AMP**
  - Coordinate planning for extended outages of the AMP
  - Work with MET to seek additional operational flexibility such as an interconnection between the Aufdenkamp Transmission Main and the South County Pipeline
- **South Orange County IRWMP**
  - Participate as one of the regional foundational members
  - Support MWDOC's appointment to the Executive Committee
  - Participate on the Management Committee
  - Liaison with County Staff

9

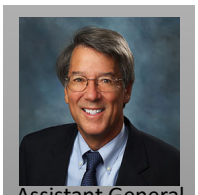
Special Projects:

- **Office Planning**
  - Coordinate seismic enhancements to support EOC operations
  - Assist with staffing the EOC during activations
  - HVAC, electrical, other
- **Work with MET, OC Coastkeeper and Others on the importance of Habitat Development in the Delta**
  - Dr. Peter Moyle Paper
  - Continuing discussions
- **Work on Small Non-Compliant Water Systems in California**
  - Assistance to Governmental Affairs

10

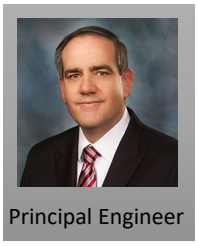
Department Staffing

- Two full time employees
- Access to staff from MET Activities
- Succession Planning for AGM



Assistant General Manager

Core Program	• **Planning & Resource Development**
FY 2017-18	• $723,935
FY 2018-19 Budget	• $785,812



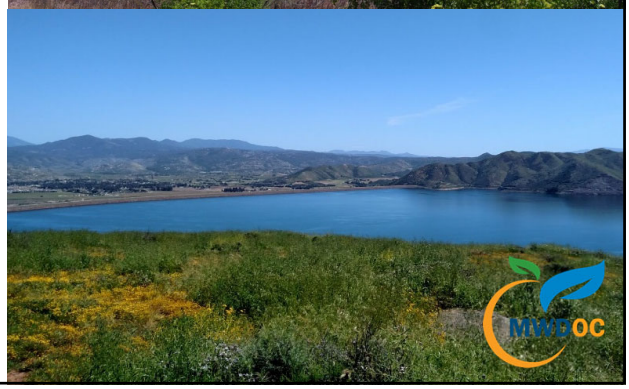
Principal Engineer

Department Functions Moving Forward

- Reliability Planning & Resource Development
  - OC Reliability Study spin-off efforts
  - Implement Supply Recommendations from Reliability Study
  - South OC Emergency Interconnect Project
  - Pump-in to EOCF#2
  - 2020 MET Integrated Resource Planning update
- Support for Member Agencies
  - Service Connections & Metering
  - Service Connection Shutdown Coordination
  - MET operating policies to support increased flexibility

Department Functions Moving Forward

- Water Quality
  - Planning for integration of local water supplies into OC Distribution System
  - Import Water Salinity Control
- WEROC Support
  - Seismic enhancements to South EOC & MWDOC Admin Building
  - EOC Staffing



Long-Term Objectives

- Successfully integrate new local supply projects into the OC distribution system
- Continue efforts to increase MET operational flexibility to handle import water demand variations while maintaining cost controls
- Work with MET staff on efforts to control salinity of imported water
- Explore the use of GIS as a decision making support system.

Karl Seckel Personal Priorities

- Wrap up and conclude the AMP Sale Agreement Responsibilities of MWDOC
- Wrap up and conclude the South County Pipeline Agreement Resolution of Responsibilities between MWDOC, SMWD and MET
- Pump-in to the EOCF#2
- OC-70 issues between EOCWD and MET

15

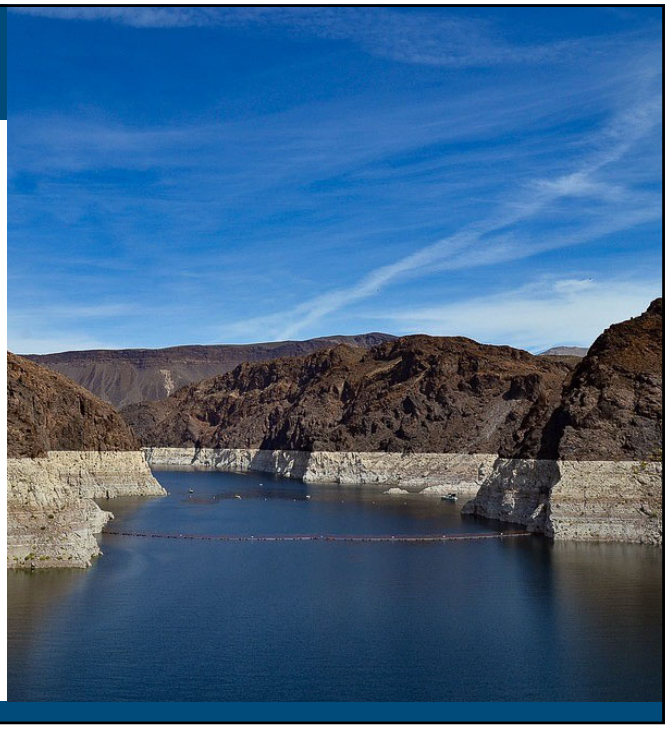
Priorities

- Local water supply integration
- South OC Emergency Interconnect Project
- MET IRP process update

17

Near-Term Objectives

- Complete 'road map' for integration of local water supplies into South OC distribution system.
- Work with South OC water agencies to determine capabilities/costs for a continued South OC emergency interconnect project
- Utilize recommendations from the 2018 OC Reliability Study in working with MET staff on the 2020 IRP Update
- Complete seismic enhancements for WEROC Emergency Operations Center & MWDOC Administration Building



Item No. 4

DISCUSSION ITEM
December 3, 2018

TO: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

FROM: **Robert Hunter, General Manager**

Staff Contact: Harvey De La Torre, Associate General Manager

SUBJECT: **Metropolitan and Water Issues Department Overview**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and discuss the department overview presentation for the Metropolitan and Water Issues Department.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

In preparation for the FY 2019-20 budget process, Metropolitan and Water Issues Department staff will provide an overview presentation summarizing department functions as well as near-term objectives and long-term goals.

Attachment: Department Presentation - Metropolitan and Water Issues

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

Department Presentation: Metropolitan and Water Issues

Harvey De La Torre, Associate General Manager
Municipal Water District of Orange County

Planning & Operations Committee

December 3, 2018

Presentation Topics

01 Department Overview

02 Department Staffing

03 Department Functions

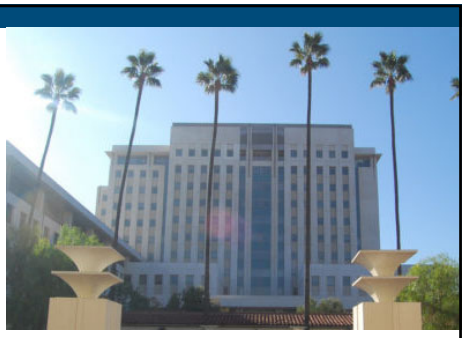
04 Near-Term Objectives

05 Long-Term Goals

2

Department Overview: Metropolitan and Water Issues

- Inform MWDOC Board and Member Agencies about MET and key water issues
- Promote interests of the MWDOC Board and Member Agencies' planning efforts at MET, Regional, and Statewide
- Assist and plan water reliability projects and programs in collaboration with MET and our Member Agencies
- Work together and communicate with Orange County water agencies to focus on solutions and priorities for improving Orange County's future water supply



3

Department Staffing

- Four full time employees
  - Fully staffed since 2017
- Provides inter-departmental support and collaboration

Harvey De La Torre
Associate General Manager

BUDGET INFORMATION:

- Core Funded
- FY 18/19 Budget $843,133

Melissa Baum-Haley
Senior Water Resources Analyst

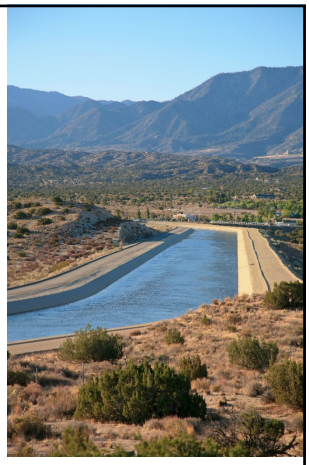
Kevin Hostert
Water Resources Analyst

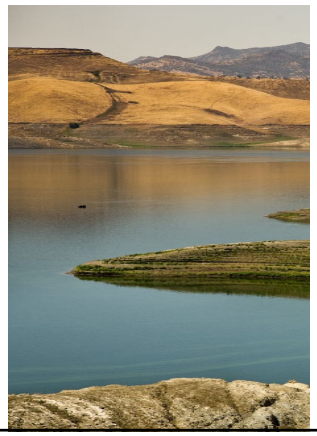
Chris Lingad
Water Resources Analyst

Department Functions

Metropolitan Issues

- District's liaison for MET information
- Support the MWDOC-MET Delegation in promoting Orange County objectives
- Work with MET staff on the development and management of programs and policies
- Work in collaboration with other MET Member Agencies





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Department Functions

Water Resources

- Member Agency Support & Advocacy
  - Examples:
    - Local Resources Program (LRP) Applications and Certification
    - Shutdown Coordination
    - Coastal Pumping and Transfer Program (CPTP)
- Planning and Forecasting
  - County-level Supply and Demand projections
- Water Reliability Program Development and Coordination
    - Urban Water Management Plan (UWMP)
    - Water Shortage Contingency "Stress Tests"

6

Department Functions

Water Resources (cont.)

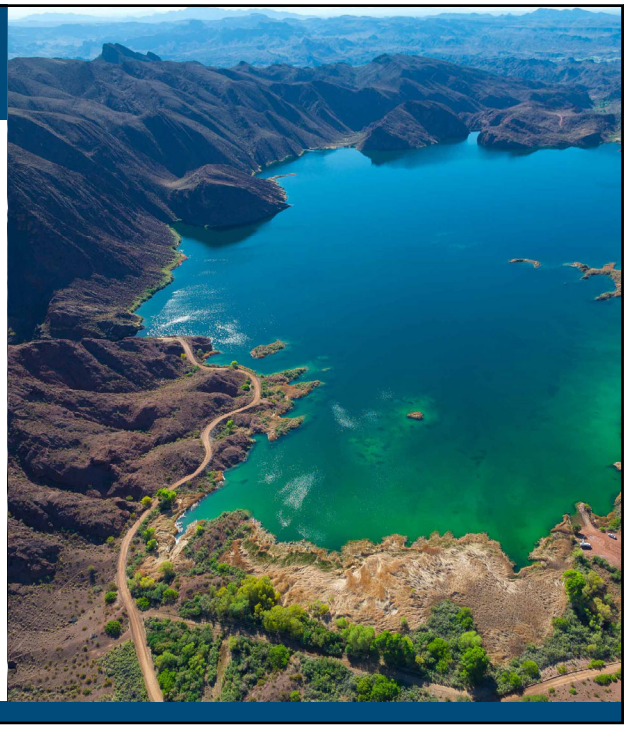
- Water Supply Program Management
  - Monitoring and Coordinating Supplies
    - Replenishment deliveries
  - In-Lieu & CUP Certifications
  - MET & MWDOC's Water Supply Allocation Plan
  - Water Use Data Management
- Assessment and Calculation of MWDOC's Annual Rates and Charges
  - Readiness to Serve
  - Capacity Charge
  - Groundwater Service Charge
- Annual Rate Resolution

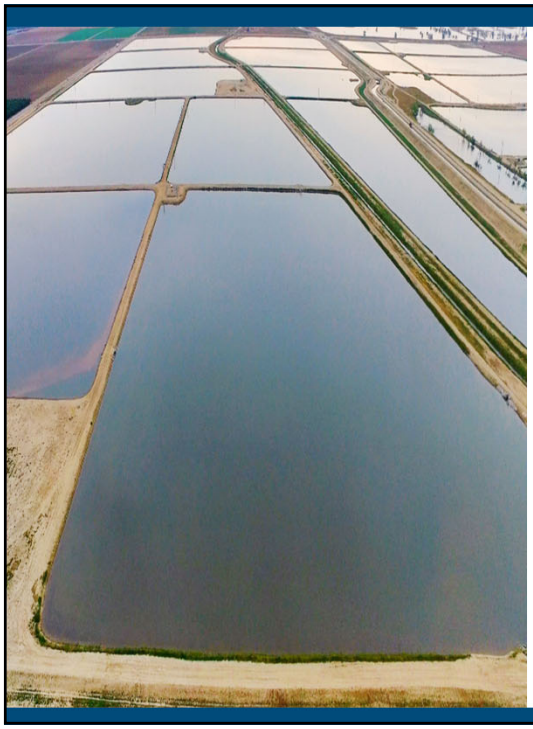
7

Near-Term Objectives

- Engage in the 2020 MET IRP Update
  - Utilizing the OC Reliability Study
- Continue to explore cost-benefits for storage opportunities for Orange County
- Work in coordination with MET and OCWD on the cost-benefits of the Regional Recycled Water Demonstration Plant (Carson)
- Provide the MWDOC Board and Member Agencies with updates on the CA WaterFix
- Prepare 2020 UWMP update and Water Shortage Contingency "Stress Tests"
- Assist with upcoming LRP project application

8





Potential Upcoming topics for Discussion in 2019:

- In-Lieu Delivery Program
- Modifications to MET's local resource program criteria
- MET Regional and Emergency storage portfolio
- Regional recycled water program update
- Review of MET's water quality and operations
- Series of discussion on the development of MET's 2020 IRP
- Exploring storage opportunities for MWDOC

9

Long-Term Goals

- Ensure MWDOC is actively engaged in key State and Regional water issues.
- Ensure MWDOC's investments are cost effective and meet Orange County Objectives
- Advocate for regional projects and programs that enhance the water reliability for Orange County and Southern California
- Seek areas of improvements in MET's Water Supply Allocation Plan that will result in drought resiliency

10


Questions

Item No. 5

COMMITTEE DISCUSSION ITEM
December 3, 2018

TO: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

FROM: **Robert Hunter, General Manager**

Staff Contact: Karl Seckel

SUBJECT: **2018 Orange County Water Reliability Study**

STAFF RECOMMENDATION

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

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

Staff and CDM-Smith have been working on the final report which will be provided to the Board for a "receive and file" action on December 19. The report will not be available in time for the P&O Committee meeting on December 3.

Since the detailed P&O Committee report last month which summarized all of the letters and comments on the report, no new comments or letters have been received and no additional presentations have been made.

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

Next Steps

After completion of the report, the next steps include the following:

1. Complete additional analysis on the Strand Ranch Integrated Water Banking Program using the results of the study and bring back a proposal for consideration by our Board and Member Agencies.

2. Staff to work through the list of Study implications to share with the Board and Member Agencies. The working list of items is as follows:

   Findings with Respect to MET: The Study has identified issues that should be dealt with in MET's Next IRP scheduled to be completed in 2020. These include:

   - Evaluation of the Carson IPR Project - Is it a beneficial project? Who pays and who receives the benefits? Is it good for OC? Is it good for MET at $1600 per AF? What does SOC pay and what benefits do they receive? Should there be any specific performance terms for agencies receiving the water during allocation situations?
   - Use of MET storage - What does it look like in our modeling? Does MET need more put and take capacity? What is the split between the SWP and CRA side of MET and how do these work independently when either the SWP or the CRA are constrained in any particular year and have low flows?
   - New 400,000 AF reservoir - Further quantification required of the need, operation and benefits of the conceptual project.
   - Changes to MET's WSAP - The Reliability Study identified areas of conflict between local supply development and improvements or benefits under a MET allocation. Can the WSAP be improved to allow agencies to significantly improve their drought protection? Extraordinary supplies seem to be the holy grail of drought protection. How can these opportunities be opened up for agencies that want to make such investments? Should MET offer drought protection for a price? Should local projects get more of a credit under the WSAP? Do we want to remain under a "share the pain" allocation system, or is it time to go down another path?
   - MET Emergency Storage - What level of storage should MET be providing for emergency situations including for concurrent outages of the CRA, SWP and LAA?
   - Operational issues associated with new projects - These include a large gamut of concerns from operational issues associated with adding new projects within MET and OC. These include issues with water moving different directions in systems, getting approval from MET for introducing local sources in the MET system, long residence times during low demands or during periods of certain operations, chloramine residual decay, and water quality issues from blending various sources of water. Issues can also include the stranding of assets (MET and local) and the base-loaded integration during low demand winter months. MWDOC is looking at hydraulic and water quality modeling to help on some of these issues.
   - Stranding of MET assets - How much "roll-off" of MET supply is anticipated? How to incorporate into planning? What are the operational and financial implications?
   - Future MET rate structure - What changes are needed or what changes can be anticipated?
   - MET TDS Issues for the long run
     - How TDS control issues are working on the CRA? Can additional measures be implemented?

    - Feasibility of lowering the TDS via RO of a portion of the CRA flows? Is this the most cost effective way of managing TDS for the groundwater basins and recycling? What are the hidden costs of TDS to plumbing and other?
    - TDS for groundwater basins with respect to replenishment water?
- Quagga control with respect to replenishment water?
- Improved Groundwater Basin Management & MET Programs - How to provide better drought and emergency protection by conjunctive use and MET programs. Historically, there have been problems with developing effective MET groundwater programs. The recent drought allocations and having the groundwater basins at low storage levels are situations that should be discouraged in the future. How can we help to make progress on this? Should we convene a working group of the groundwater basin managers?
- MET's 2020 IRP Update - initial thoughts for the process include:
    - Use of scenario planning to incorporate a more adverse climate change future for MET as a planning technique
    - Get MET to take a close look at recent and future demand projections as these are what drives the investments at MET.
    - More clarity/specificity as to what the plan is moving forward. What opportunities there are for MET and local investments, and deciding how these opportunities should be worked out.
    - Looking at the issue of MET agencies rolling off the system or decreasing their dependence on MET (how can we develop an overall "low cost plan for Southern California" by working together) - this was part of the origin for MET's first IRP, but we have gotten away from that.
    - Need for changes in MET's LRP program and MET's WSAP to provide opportunities for improved drought protection by the member agencies.
    - More definitive forecast of LRP projects to be included
    - More clarity between WUE investments and what they will bring - separate from recycling and local projects (the last couple of IRP's have had these all grouped together)
    - More definitive evaluation of benefits that could accrue from improved groundwater management issues within MET
    - Resolution of the Los Angeles Aqueduct as a "local project"; it should stand on its own and not be included with other local projects.
    - Targeting projects to provide specific reliability benefits in certain areas of MET
    - Consider the need for additional surface storage in Southern California to deal with both emergency supplies and the capture of additional wet year water

3. Complete additional work on systems integration for local water in SOC. This includes work related to operations and water quality issues as identified in the August 2018 Local Project Integration Workshop. This also includes work associated with securing/developing a working hydraulic model, hopefully from MET, that can be used to evaluate various operational scenarios regarding the residence time of water delivery in Orange County as well as other water quality parameters.

4. Complete the study/evaluation of the IRWD SOC Emergency Interconnection delivery capacity over time for review by the SOC agencies and assist the agencies in the decision-making process regarding emergency supply projects. This process is also examining the potential for a pump-in to the EOCF#2.

5. Work with the SOC Agencies to move forward on implementation and cost-sharing of the Doheny Ocean Desalination Project, the San Juan Watershed Project and the Emergency Groundwater Project (either an expansion of the IRWD ability to move emergency water into SOC or the pump-in to the EOCF#2).

Item No. 6

INFORMATION ITEM
December 3, 2018

TO: **Planning & Operations Committee**
(Directors Osborne, Tamaribuchi, Yoo Schneider)

FROM: **Robert Hunter, General Manager**

Staff Contact: Karl Seckel

SUBJECT: **MET Shutdown Schedule**

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and file the MET shutdown schedule information.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

MET Shutdown Schedule

In September 2018, MET released their FY 2018-19 Shutdown Schedule and a three-year preliminary shutdown schedule for FY 2019-20, 2020-21 and 2021-22 (see attached charts). The shutdowns are necessary to perform required maintenance, inspection, and repairs to MET's water delivery system. MET has a large number of upcoming shutdowns in its work plans (57 shutdowns scheduled for FY 2018-19). These shutdown windows generally occur during non-peak demand periods between November through April; however, a few shutdowns are been pushed into the summer months where retail agency operating flexibility is limited due to higher demands. Of these extended summer shutdowns, two impact MWDOC (Orange County Feeder and 2nd Lower Feeder) and several of its member agencies (Mesa Water, Newport Beach, IRWD, La Palma, and Golden State WC).

MET and their contractors realize significant financial savings by extending the shutdown period through the summer season thereby completing work sooner and avoiding mobilization and demobilization costs incurred by having more shutdowns of shorter periods. MWDOC's agencies typically do not like to go without access to MET water during

the summer high demand periods, and proceeding with shutdowns during these periods increase the risks and costs to retail agencies.

MWDOC has promoted the position that we should work cooperatively with all of our agencies and MET to provide assistance in accommodating these shutdowns; and MWDOC staff believes that financial assistance from MET to help our member agencies accommodate summer period shutdowns would be beneficial. MWDOC staff believes that MET should reinvest some of the savings by absorbing a portion of the costs being incurred by local agencies to accommodate the summer shutdowns.

Discussions with MET staff and impacted local agency staff regarding the Orange County Feeder and 2nd Lower Feeder shutdowns began in June 2018 with dates finalized in September 2018. MET's current solution to continue supplying local agencies with imported water during these shutdowns is to install bulkheads upstream of the pipe section under repair. Estimates indicate that this option would be costly. Several lower cost options were discussed with the impacted local agencies. The proposed solutions would require some financial assistance from MET and were presented to MET staff. Currently, MET staff does not have the authority to provide financial assistance of this nature to local agencies. If MET staff was provided more flexibility in shutdown planning, there may be a potential cost savings seen for current and future shutdowns. MWDOC staff will be meeting with the MWDOC MET Directors on December 5th to discuss options for MET staff to provide more flexibility for MET to assist local agencies in accommodating shutdowns.

Related Efforts

Seismic Resilience Water Supply Task Force

In June 2017, the Seismic Resilience Water Supply Task Force (SRWSTF), consisting of Metropolitan, Los Angeles Department of Water & Power, and the State Department of Water Resources released its latest Aqueduct Workshop report and Five-Year Action Plan on potential damages to Southern California's imported water aqueducts from a major seismic event on the San Andreas Fault. Conclusions from the workshop included a consensus recognition that recovery times for California's major aqueducts would exceed the historic planning assumptions of no more than a 6-month aqueduct outage (see excerpt highlight below). It also called for better cooperation between the three agencies and initiated a repeating 5-year cycle of planning, executing, and reporting of collaborative activities and accomplishments.

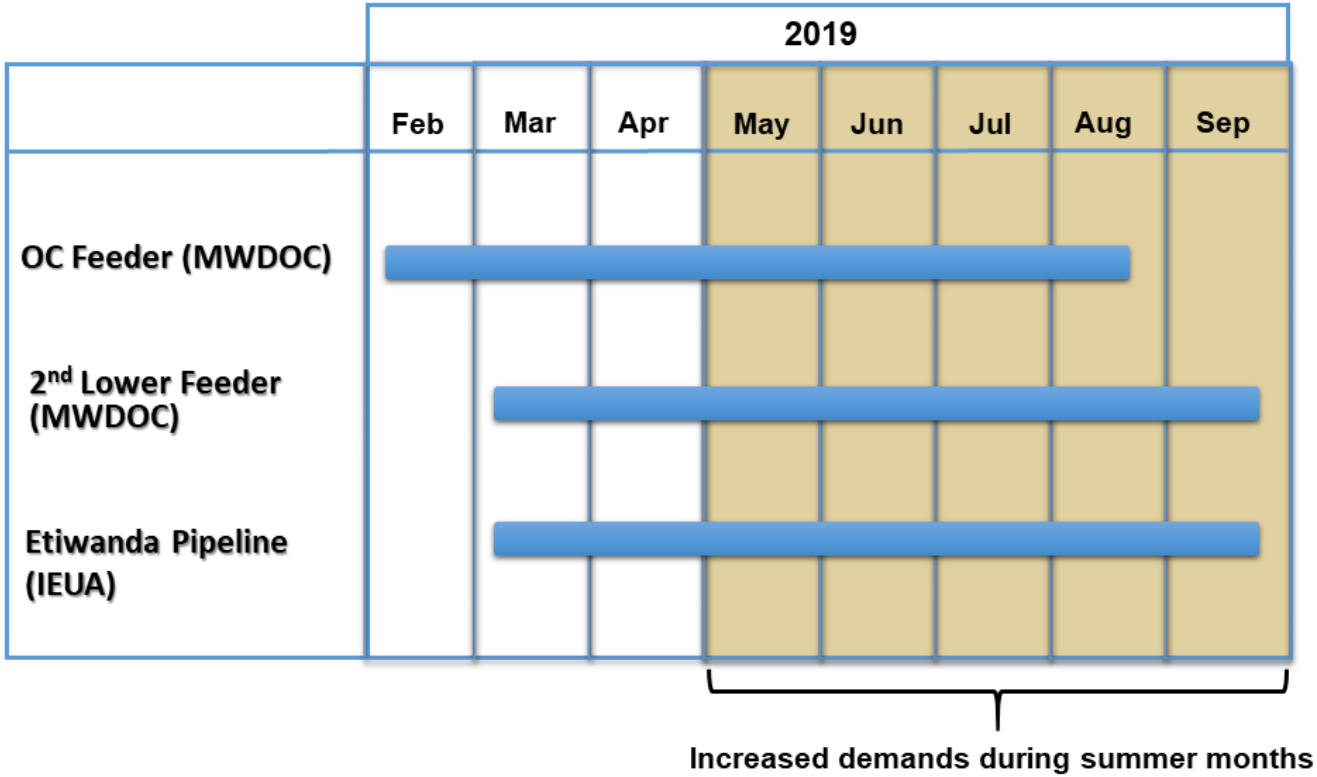
From the report:

> *"While damage on the West Branch may be substantial, the exposure risk is significantly less than on the East Branch. Preliminary evaluations suggest that partial flows may be restored on the West Branch within 6-12 months. The level of uncertainty regarding potential damage and repair scenarios for the East Branch is considerably higher given the extensive length of aqueduct and higher number of facilities within close proximity to the SAF (San Andreas Fault). Preliminary evaluations suggest that repairs to restore partial flows along the East Branch may exceed 12-24 months".*

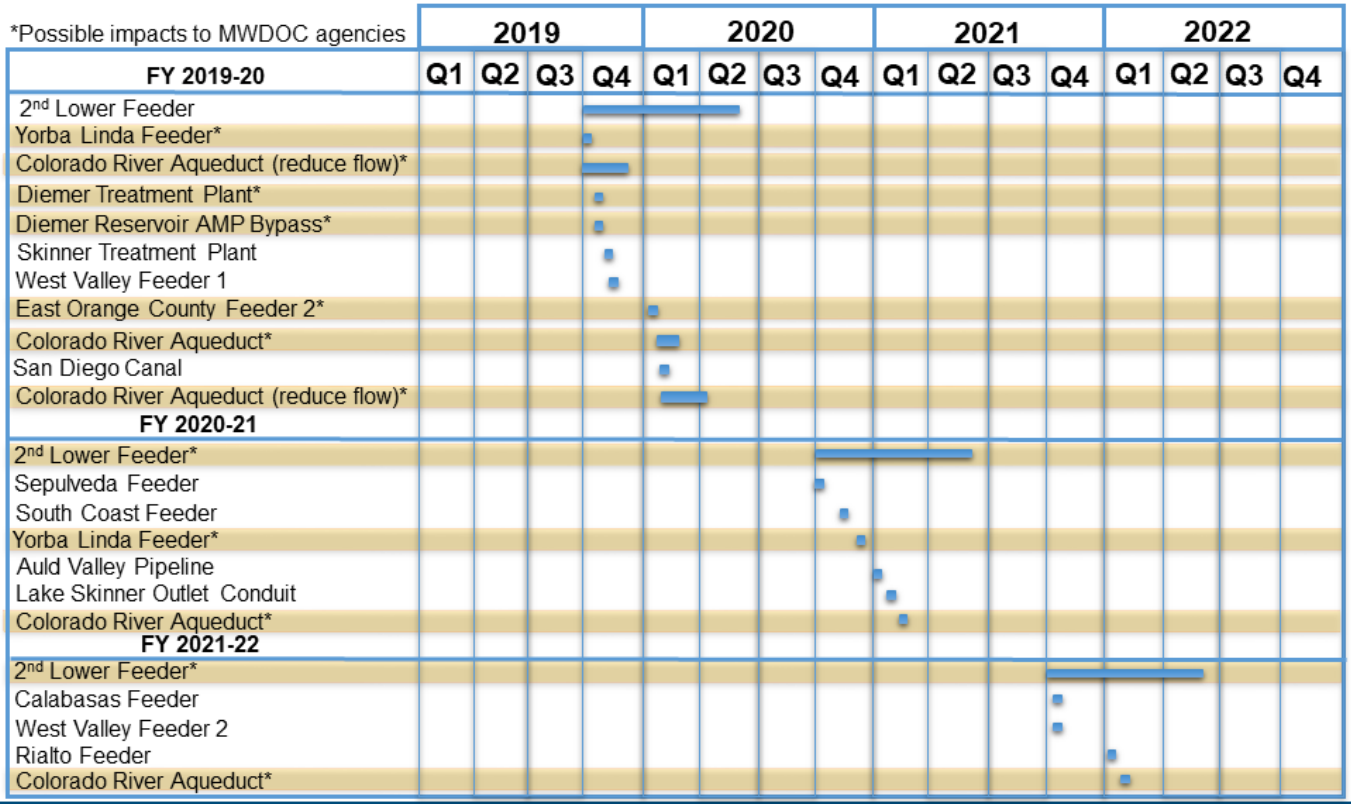
2018 Evaluation of Regional Storage Workshop

On October 29, 2018 MET released a draft White Paper which provides a summary of the process for review of the policy, history, and criteria for evaluating Metropolitan's emergency storage. Metropolitan's emergency storage objective is based on the potential for major earthquake damage to the aqueducts that transport imported water supplies to Southern California. On November 1, 2018, MET held the third of a series of workshops on evaluating MET regional storage to discuss the draft White Paper. MET Member Agencies were given the opportunity to provide feedback, and MET staff is currently reviewing their feedback. MET staff anticipates briefing the MET Board on the current status of the evaluation at the December 2018 Water Planning and Stewardship Committee meeting.

MET Extended Summer Shutdowns



MET 3-Year Shutdown Plan



Shutdowns affecting Orange County

1. 2nd Lower Feeder
2. Yorba Linda Feeder
3. Diemer Treatment Plant
4. Orange County Feeder
5. EOCF NO. 2

ENGINEERING & PLANNING	
Orange County Reliability Study	Staff and CDM-Smith have been working on the final Reliability Study report which will be provided to the Board for a "receive and file" action on December 19. The report will not be available in time for the P&O Committee meeting on December 3. Since the detailed P&O Committee report last month which summarized all of the letters and comments on the report, no new comments or letters have been received and no additional presentations have been made.
South Orange County Emergency Service Program	Dudek has continued to assist MWDOC and IRWD to determine if the existing IRWD South Orange County Interconnection capacity to provide emergency water to South Orange County can be expanded in capacity or extended beyond its current time horizon of 2030. Modeling and evaluation of a number of options or the IRWD system is required for the study effort. It appears that Dudek will be ready to share the report with the SOC agencies in January.
Strand Ranch Project	MWDOC is using the modeling from the Orange County Reliability Study to evaluate how "extraordinary supplies" from the Strand Ranch Project can be utilized by the MWDOC agencies to provide drought protection over the next 7 to 11 years or longer. A cost-authorization is being reviewed with the P&O Committee for this work.
MET Evaluation of Regional Storage Portfolio (ERSP)	MET Evaluation of Regional Storage Portfolio (ERSP). Metropolitan's emergency water storage objective is based on the potential for major earthquake damage to the State Water Project and Colorado River aqueducts that transport imported water supplies to Southern California (following the San Andreas M7.8 'Great ShakeOut' scenario developed by the US Geological Survey). MET has established a Member Agency Workgroup to consider updates to MET's emergency storage objective, including: 1. Updating emergency criteria, 2. Revising the framework for determining emergency storage volume. The new framework would shift from a traditional single equation for determining emergency storage volume, to an updated evaluation that considers various combinations of criteria to determine a storage amount that provides an envelope of alternatives for MET's emergency storage that could provide reliability during the outage period. 3. Proposed periodic re-evaluation of emergency storage volume to coincide with completion of each new IRP (every 5 years). MET released a White Paper on October 29, 2018 to member agencies for their review and feedback. The paper discusses a methodology for review and update of emergency criteria and re-evaluation of Metropolitan's emergency storage. Included in the proposed outage period criteria is:

	A. Recognition that an outage on the SWP could exceed previous estimates of six months (now one to two years), and B. Incorporation of increased operational flexibility of the MET system which was demonstrated during the last drought. Some areas in the MET's service area that normally receive SWP water from the East Branch could be served by delivering DVL water to Mills through the Inland Feeder/Lakeview Pipeline intertie. These changes modify the Emergency Outage Criteria from a minimum/ maximum outage criteria to an 'effective outage' duration which better represents conditions. A third Workgroup meeting was held November 1, 2018 which continued the discussion on updating emergency storage criteria and re-evaluation of Metropolitan's Emergency Storage Requirements. Based on these discussions, it appears as if MET staff will only be making marginal changes in the existing emergency storage recommendations.
Poseidon Resources	Poseidon continues working with the Santa Ana Regional Water Quality Control Board (SARWQCB) to renew and update its existing National Pollution Discharge Elimination System permit and expects to be in front of the Regional Board in early 2019.
SMWD Rubber Dams Project	(Nothing New to Report) SMWD continues to work on additional technical studies to complete the response to comments on the Draft Environmental Impact Report (DEIR).
Doheny Ocean Desalination Project	(Nothing New to Report) South Coast WD released the Doheny Ocean Desalination Project Draft Environmental Impact Report (EIR) on May 17, 2018. A Public Meeting for the EIR was held on June 26, 2018, and the EIR public comment period closed on August 6, 2018. Consultant GHD is currently working on an updated Coastal Hazard Technical Study to address comments received. A Request for Qualifications (RFQ) for a 3rd party legal firm to assist with Design-Build-Operate (DBO) contract development was released and interviews with 5 respondents were held August 22, 2018. The South Coast WD Board is currently in negotiations and anticipates awarding the contract in the near future. South Coast WD staff also submitted a grant application for up to $20 million for project construction through Bureau of Reclamation 'Water SMART: Desalination Construction Projects under the WIIN Act'. The Bureau of Reclamation expects to contact potential award recipients and unsuccessful applications toward the end of 2018.
Meetings	
	Karl Seckel presented on the California WaterFix at the ETWD Community Advisory Committee.
	Karl Seckel and Charles Busslinger met with SMWD staff, Dan Ferons, Rich Kissee and Daniel Peterson and MET staff Brent Yamasaki, Mark Bushyeager, Richard Ford and Ezekiel Montanez to discuss maintenance activities for the South County Pipeline. It is about 28 years old and is beginning to need

	attendance to cathodic protection, re-coating of valve vaults and is in need of its first full internal inspection. Due to the number of years of experience MET staff have accrued, they were invited to share their expertise. MET was very gracious to share staff from operations, corrosion, maintenance and repair and engineering to discuss the various activities with SMWD staff. The meeting was very informative and will lead to additional sharing of expertise.
	Karl Seckel, Rob Hunter, MWDOC Director Sat Tamaribuchi and OC Coastkeeper Garry Brown participated in a phone discussion with Curt Schmutte on Bay-Delta issues relative to progress (or lack thereof) on habitat restoration activities. The discussions indicated that the primary factor being considered to help fish by the SWRCB and others is "more water flows", which is not consistent with the bulk of science developed nor the Whitepaper prepared by Dr. Peter Moyle. The sense is that the environmentalist feel as if they have no other options to gravitate to other than water flows and they are not prepared to discuss alternatives other than flow reductions because of a lack trust. It was also observed that the lack of "kick-off" energy for Eco-Restore compared to the "kick-off" energy for the Tunnels is leading to further distrust.
	Charles Busslinger attended the Western Water Technology Approval Group (TAG) meeting on November 14, 2018 at MET. The TAG is a global innovation forum of water utilities looking at emerging technologies. The forum is facilitated by Isle Utilities which facilitates many collaborative projects through the trialing of emerging technologies and assessment of emerging technologies in the market.
	Charles Busslinger is participating in the South OC IRWM Project Review Ad Hoc Committee which will be reviewing projects being submitted in South OC for the Prop 1 IRWM Grant Call for Projects.

Status of Ongoing WEROC Projects
November 2018

Description	Comments
Coordination with WEROC Member Agencies	WEROC hosted its first Cyber and Information Security Symposium for its member agencies on Monday, October 29. The agenda included information on cyber insurance, free government support services, the interdependencies of IT and finance processes, and a presentation from OCTA on their lesson's learned from their cyberattack a few years ago. The group also participated in facilitated cyber related disaster exercises related to disaster policies and procedures in different circumstances. The WEROC Emergency Coordinator Quarterly meeting took place November 6, 2018. Topics discussed included: Hazard Mitigation Plan and Grants, Member Agency Fuel Survey, County Recovery Exercise, WEROC Cyber Security Symposium, the January County Exercise, Water Quality Notification Translations, Public Safety Power Shutoff Program, and Dam Planning.
Training and Programs	Kelly Hubbard hosted an EOC training for the Planning and Intelligence Section of the EOC. The training focused on reviewing the Situation Summary Report, identifying where to locate information, reviewing each positions role in the overall response, and how each position interacts with the others. Kelly and Francisco met with Public Affairs staff to review various components specific to the Public Information Officer's role during an EOC activation. Discussion topics included, the safe keeping of administrator passwords to various webpages, public outreach material design, and the design of the MWDOC dark page that can be used during emergencies.
Coordination with the County of Orange	Kelly attended the November OCEMO meeting at the Orange County Fire Authority Headquarters. Fred Selayandia from the Emergency Management Division provided an overview of the Terrorism Annex. Nicole Garcia from the Orange County Health Care Agency presented "A Look Inside Health Care Agency Behavioral Health Services Disaster Response." Nicole used her agency's response to the Aliso Bombing as an example of impacts to employees and the services that HCA Behavioral Health can provide to any agency following a traumatic event. WEROC staff reviewed and provided feedback on the following OA and County plans: • OA Radio System Standard Operating Procedures • Joint Information System Plan – This plan provides • Mass Evacuation Annex

	• Mass Care and Shelter Annex • Holy Fire Debris Flow Plan • Canyon II Debris Flow Plan Francisco attended the Urban Area Working Group at the North Net Training Center in Anaheim. This is the group that reviews and approves Urban Areas Security Initiative (UASI) Homeland Security grant funds. Discussion topics focused on potential funding opportunities, and presentations from the Orange County Sheriff's Department and the City of Anaheim. WEROC is working with the group on potential funding for water distribution bags for disasters and emergency generators for key water utility facilities, including the WEROC EOCs. Francisco attended the Operational Area Executive Board Meeting in Santa Ana. As an ISDOC representative, WEROC staff provided input on various plans that were up for approval and provided the board with project highlights that ISDOC membership are currently working on. Francisco participated in a conference call that took place on November 21st for the activation of Phase 2 of the Holy Fire Debris Flow Plan due to projected incoming rain. The call detailed the current rain forecast and each agencies' role to prepare for possible debris flows. Trabuco Canyon Water District has infrastructure that can be impacted by the debris flows. They participated in the call and WEROC staff are aware of their concerns and possible need to coordination should a debris flow occur. *Ongoing: The Operational Area has started its review and update of the County of Orange and Orange County Operational Area Flood, Dam and Reservoir Annex. This update will combine what was two separate plans, as well as address planning requirement updates in Dam Emergency Action Planning that were implemented this year.* Kelly attended the last OA Dam planning meeting to participate in reviewing the entire revision of plan. Kelly facilitated a discussion on planning concepts that Dam Owners should consider standardizing across the county. WEROC will host a Dam meeting for its member agencies in December and invite other OC Dam owners to participate.
EOC Readiness	Janine Schunk successfully participated in the OA and MET Radio Test and WebEOC tests for the month. Janine facilitated the monthly test of the WEROC Radio System.
Coordination with Outside Agencies	Kelly and Karl Seckel attended and were guest speakers at the Chapman University Earthquake Forum. Karl spoke about Reliability planning for

	water infrastructure and Kelly provided information about how the Water utilities prepare and coordinate in a disaster. Kelly was asked to sit on a national committee to review the joint agency American Water Works Association (AWWA) Water & Wastewater Mutual Aid & Assistance Resource Typing Manual. The process is a joint planning effort between FEMA and AWWA that provides guidance to water and wastewater agencies when requesting and providing mutual aid resources. The current version was updated in 2008. All travel cost and accommodations associated with the trip will be reimbursed.

Status of Water Use Efficiency Projects

December 2018

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Smart Timer Rebate Program	MWDSC	Ongoing	Ongoing	In October 2018, 96 residential and 74 commercial smart timers were installed in Orange County. For program water savings and implementation information, see MWDOC Water Use Efficiency Program Savings and Implementation Report.
Rotating Nozzles Rebate Program	MWDSC	Ongoing	Ongoing	In October 2018, 346 rotating nozzles were installed in Orange County. For program savings and implementation information, please see MWDOC Water Use Efficiency Program Savings and Implementation Report.
SoCal Water$mart Residential Indoor Rebate Program	MWDSC	Ongoing	Ongoing	In October 2018, 186 high efficiency clothes washers and 27 premium high efficiency toilets were installed through this program. For program savings and implementation information, please see MWDOC Water Use Efficiency Program Savings and Implementation Report.
SoCal Water$mart Commercial Rebate Program	MWDSC	Ongoing	Ongoing	In October 2018, 45 premium high efficiency toilets were installed through this program. For program savings and implementation information, please see MWDOC Water Use Efficiency Program Savings and Implementation Report.

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Industrial Process/ Water Savings Incentive Program (WSIP)	MWDSC	75%	July 2020	This program is designed for non-residential customers to improve their water efficiency through upgraded equipment or services that do not qualify for standard rebates. Incentives are based on the amount of water customers save and allows for customers to implement custom water-saving projects. This fiscal year, two projects have been completed, which will save over 28 AFY. Total water savings to date for the entire program is 673 AFY and 3,281 AF cumulatively.
Turf Removal Program	MWDOC	Ongoing	Ongoing	In October 2018, 29 rebates were paid, representing $98,275.82 in rebates paid this month in Orange County. To date, the Turf Removal Program has removed approximately 21.8 million square feet of turf. For program savings and implementation information, please see MWDOC Water Use Efficiency Program Savings and Implementation Report.
Spray to Drip Conversion Program	MWDOC	Ongoing	Ongoing	This is a rebate program designed to encourage residential and commercial sites to convert their existing conventional spray heads to low-volume, low-precipitation drip technology. To date, 236 residential sites and 63 commercial sites have completed spray to drip conversion projects.
Recycled Water Retrofit Program	MWDSC	100%	September 2018	This program provides incentives for commercial sites to convert dedicated irrigation meters to recycled water. To date, Metropolitan has provided a total of $465,881.93 in funding to 29 sites irrigating 90 acres of landscape, and MWDOC has paid a total of $56,950.00 in grant funding to 20 of those sites. The total potable water savings achieved by these projects is 220 AFY.

Orange County

Item No. 7d

Water Use Efficiency Programs Savings
and
Implementation Report

Retrofits and Acre-Feet Water Savings for Program Activity

Program	Program Start Date	Retrofits Installed in	Month Indicated		Current Fiscal Year		Overall Program		
			Interventions	Water Savings	Interventions	Water Savings	Interventions	Annual Water Savings[4]	Cumulative Water Savings[4]
High Efficiency Clothes Washer Program	2001	October-18	186	0.53	996	6.62	117,541	4,055	30,402
Smart Timer Program - Irrigation Timers	2004	October-18	170	4.41	1,045	42.73	23,758	8,286	54,890
Rotating Nozzles Rebate Program	2007	October-18	346	1.38	2,191	22.82	566,498	2,749	19,639
Commercial Plumbing Fixture Rebate Program	2002	October-18	45	0.14	3,128	13.07	96,901	5,006	49,366
Industrial Process/Water Savings Incentive Program (WSIP)	2006	October-18	0	0.00	2	4.88	33	673	3,281
Turf Removal Program[3]	2010	October-18	79,398	0.93	252,130	5.95	21,847,208	3,059	13,340
High Efficiency Toilet (HET) Program	2005	October-18	27	0.10	108	4.59	60,211	2,226	19,277
Water Smart Landscape Program [1]	1997						12,677	10,621	72,668
Home Water Certification Program	2013						312	7.339	15.266
Synthetic Turf Rebate Program	2007						685,438	96	469
Ultra-Low-Flush-Toilet Programs [2]	1992						363,926	13,452	162,561
Home Water Surveys [2]	1995						11,867	160	1,708
Showerhead Replacements [2]	1991						270,604	1,667	19,083
Total Water Savings All Programs				**7**	**259,600**	**101**	**24,056,974**	**52,057**	**446,699**

[1] Water Smart Landscape Program participation is based on the number of water meters receiving monthly Irrigation Performance Reports.
[2] Cumulative Water Savings Program To Date totals are from a previous Water Use Efficiency Program Effort.
[3] Turf Removal Interventions are listed as square feet.
[4] Cumulative & annual water savings represents both active program savings and passive savings that continues to be realized due to plumbing code changes over time.

HIGH EFFICIENCY CLOTHES WASHERS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19	Total	Current FY Water Savings Ac/Ft (Cumulative)	Cumulative Water Savings across all Fiscal Years	15 yr. Lifecycle Savings Ac/Ft
Brea	93	115	114	76	57	56	22	1,945	0.13	503.39	1,006
Buena Park	105	106	91	76	54	50	11	1,579	0.06	397.16	817
East Orange CWD RZ	10	8	8	8	3	1	1	194	0.01	53.75	100
El Toro WD	134	121	111	65	47	50	13	1,584	0.09	398.90	820
Fountain Valley	115	102	110	76	65	49	11	2,460	0.07	664.71	1,273
Garden Grove	190	162	165	251	127	87	27	3,677	0.16	948.08	1,903
Golden State WC	265	283	359	260	138	156	41	5,212	0.28	1,344.02	2,697
Huntington Beach	334	295	319	225	180	141	34	8,421	0.23	2,311.61	4,357
Irvine Ranch WD	1,763	1,664	1,882	1,521	1,373	1,203	304	26,173	1.99	6,413.89	13,543
La Habra	82	114	87	66	53	48	17	1,392	0.11	347.91	720
La Palma	34	25	34	29	10	14	3	475	0.02	120.38	246
Laguna Beach CWD	38	37	39	32	19	20	7	959	0.05	253.68	496
Mesa Water	114	86	89	113	80	54	14	2,586	0.11	708.11	1,338
Moulton Niguel WD	442	421	790	688	575	527	131	10,579	0.95	2,554.87	5,474
Newport Beach	116	92	95	66	61	51	19	2,694	0.12	750.12	1,394
Orange	218	163	160	124	80	74	24	3,996	0.16	1,101.49	2,068
Orange Park Acres					-	-	-	12	0.00	4.09	6
San Juan Capistrano	76	73	92	63	33	33	6	1,498	0.04	392.19	775
San Clemente	140	94	141	75	70	85	25	2,730	0.14	710.50	1,413
Santa Margarita WD	553	662	792	466	367	274	81	9,871	0.62	2,476.31	5,108
Seal Beach	31	29	38	23	9	17	3	622	0.01	163.03	322
Serrano WD	13	10	26	8	11	8	-	365	0.00	100.05	189
South Coast WD	89	79	68	43	44	36	12	1,632	0.06	423.87	844
Trabuco Canyon WD	30	45	47	34	28	22	1	821	0.01	211.93	425
Tustin	78	59	80	66	44	49	10	1,671	0.07	448.01	865
Westminster	121	82	109	149	84	65	15	2,666	0.08	696.29	1,379
Yorba Linda	181	167	156	123	56	67	17	3,836	0.13	1,056.13	1,985
MWDOC Totals	5,365	5,094	6,002	4,726	3,668	3,237	849	99,650	5.68	25,554.46	19,252
Anaheim	331	285	295	266	213	173	47	10,902	0.30	3,039.05	5,641
Fullerton	200	186	211	165	107	99	53	3,847	0.35	1,000.26	1,991
Santa Ana	163	131	132	259	141	124	47	3,142	0.29	807.80	1,626
Non-MWDOC Totals	694	602	638	690	461	396	147	17,891	0.93	4,847.12	3,456
Orange County Totals	6,059	5,696	6,640	5,416	4,129	3,633	996	117,541	6.62	30,401.57	22,708

SMART TIMERS INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 12/13		FY 13/14		FY 14/15		FY 15/16		FY16/17		FY17/18		FY18/19		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm	Res	Comm.	
Brea	9	8	4	0	43	6	20	4	31	4	32	0	15	0	178	80	584.33
Buena Park	3	0	0	0	4	10	7	4	10	7	15	3	11	4	57	48	184.05
East Orange CWD RZ	2	0	0	0	2	0	1	0	11	1	6	0	1	0	32	1	26.81
El Toro WD	7	2	11	0	8	9	9	17	33	8	29	4	17	0	161	359	2,728.64
Fountain Valley	3	2	4	0	7	10	13	1	33	12	28	12	15	1	134	53	228.37
Garden Grove	5	2	9	0	10	14	13	11	28	0	27	2	16	0	144	40	208.43
Golden State WC	9	49	9	25	39	12	35	16	56	37	88	6	36	13	349	211	976.48
Huntington Beach	18	33	20	35	19	2	42	12	88	94	70	30	49	0	391	298	1,300.84
Irvine Ranch WD	414	135	71	59	67	310	239	207	344	420	416	78	175	56	2,360	2,420	13,079.68
La Habra	4	7	2	0	4	7	3	1	12	7	8	0	8	2	52	46	235.19
La Palma	1	0	2	0	2	0	3	2	1	0	5	0	2	0	17	2	8.29
Laguna Beach CWD	76	2	71	0	86	0	86	1	27	0	11	0	3	0	511	20	272.36
Mesa Water	10	2	15	2	17	28	36	12	149	41	49	0	20	55	387	209	855.93
Moulton Niguel WD	51	74	40	45	46	95	163	100	236	129	284	33	134	55	1,332	889	4,261.73
Newport Beach	242	26	168	75	11	9	28	43	30	12	24	0	12	0	1,074	409	2,940.58
Orange	20	24	13	9	18	31	51	13	69	10	61	13	45	26	391	204	1,075.03
San Juan Capistrano	14	18	6	11	6	19	20	8	22	8	23	5	11	0	256	130	745.55
San Clemente	26	7	28	2	28	24	26	3	37	13	38	41	16	0	1,105	415	3,014.29
Santa Margarita WD	53	171	64	93	53	321	189	136	326	221	273	220	103	19	1,530	1,611	6,917.32
Santiago CWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00
Seal Beach	1	0	1	36	1	12	2	2,446	2	4	5	0	1	0	13	2,502	6,804.34
Serrano WD	1	0	0	0	4	0	11	2	4	0	8	0	7	0	53	2	17.80
South Coast WD	13	16	8	4	104	73	9	11	7	0	15	2	2	2	295	216	1,307.18
Trabuco Canyon WD	6	0	2	0	6	1	16	50	13	3	20	0	12	0	135	157	1,062.61
Tustin	8	4	9	1	18	14	33	8	33	23	27	1	22	0	192	81	403.52
Westminster	1	1	2	0	13	17	7	1	17	12	22	0	13	0	100	44	231.71
Yorba Linda	20	0	12	5	32	2	61	27	72	71	68	10	37	0	443	193	985.15
MWDOC Totals	1,017	583	571	402	648	1,026	1,123	3,136	1,691	1,137	1,652	460	783	233	11,692	10,640	50,456.22
Anaheim	19	10	9	26	7	52	30	34	87	10	62	0	62	63	368	520	2,930.89
Fullerton	9	29	8	0	40	26	32	12	53	7	43	0	1	0	243	199	1,080.63
Santa Ana	8	19	7	8	9	27	22	26	15	3	11	0	1	0	94	100	422.18
Non-MWDOC Totals	36	58	24	34	56	105	84	72	155	20	116	0	64	63	705	819	4,433.70
Orange County Totals	1,053	641	595	436	704	1,131	1,207	3,208	1,846	1,157	1,768	460	847	296	12,397	11,459	54,890

ROTATING NOZZLES INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 13/14			FY 14/15			FY 15/16			FY 16/17			FY 17/18			FY 18/19			Total Program			Cumulative Water Savings across all Fiscal Years
	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	Small		Large	
	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	Res	Comm.	Comm.	
Brea	84	0	0	157	45	0	74	2,484	0	0	0	0	0	0	0	0	0	0	572	2,749	0	61.57
Buena Park	53	0	0	248	0	0	45	98	0	0	0	0	0	0	0	0	0	0	509	173	2,535	815.14
East Orange	30	0	0	221	0	0	0	0	0	0	0	0	30	0	0	0	0	0	781	0	0	20.63
El Toro	56	3,288	0	1,741	28,714	0	730	4,457	0	55	242	0	36	0	0	0	0	0	3,260	43,348	890	1,374.09
Fountain Valley	0	0	0	107	0	0	222	0	0	0	0	0	85	0	0	0	283	0	919	2,874	0	20.48
Garden Grove	80	0	0	88	50	0	110	0	0	55	98	0	52	0	0	0	0	0	855	254	0	35.24
Golden State	192	0	0	583	1,741	0	1,088	0	0	207	6,008	0	161	-495	0	35	0	0	3,480	10,837	0	289.91
Huntington Beach	120	0	0	798	1,419	0	1,345	2,836	0	149	3,362	0	-37	0	0	0	0	0	4,001	9,135	2,681	1,351.83
Irvine Ranch	11,010	4,257	0	1,421	632	0	1,989	5,047	0	335	9,511	0	356	-215	0	0	0	0	46,498	43,325	2,004	4,986.44
La Habra	15	0	0	109	338	0	300	0	0	0	0	0	0	0	0	0	0	0	1,515	55,404	900	369.02
La Palma	0	0	0	0	0	0	46	505	0	0	2,385	0	33	0	0	0	0	0	89	3,163	0	38.08
Laguna Beach	2,948	878	0	2,879	1,971	0	1,390	0	0	0	0	0	0	0	0	0	0	0	11,948	2,896	0	355.81
Mesa Water	361	0	0	229	0	0	166	0	0	113	0	0	36	0	0	0	0	0	2,062	302	343	199.99
Moulton Niguel	361	227	0	1,596	4,587	0	5,492	1,441	0	153	5,872	0	893	0	0	306	38	0	12,728	20,598	2,945	1,783.40
Newport Beach	19,349	6,835	0	460	3,857	0	348	670	0	0	0	0	45	0	0	0	0	0	46,865	16,632	0	1,812.10
Orange	245	120	0	304	668	0	631	91	0	0	0	0	0	0	0	0	0	0	3,133	5,853	0	118.53
San Juan Capistrano	370	0	0	495	737	0	310	593	0	75	123	0	59	0	0	0	0	0	5,027	3,143	0	465.39
San Clemente	415	5,074	0	326	0	0	426	0	0	0	0	0	146	0	0	40	1,400	0	10,062	11,948	1,343	828.92
Santa Margarita	389	0	0	1,207	1,513	0	1,820	837	0	15	0	0	224	0	0	0	0	0	15,387	7,283	611	852.79
Seal Beach	0	0	0	40	5,261	0	0	2,300	0	0	0	0	0	0	0	0	0	0	155	7,561	0	157.83
Serrano	105	0	0	377	0	0	695	0	0	0	0	0	0	0	0	0	0	0	1,907	291	0	98.75
South Coast	70	0	0	4,993	13,717	0	1,421	2,889	0	16	0	0	0	0	0	0	0	0	9,628	18,870	0	566.88
Trabuco Canyon	0	0	0	56	0	0	130	0	0	0	4,339	0	0	0	0	0	0	0	729	4,339	0	149.82
Tustin	329	0	0	408	0	0	317	386	0	65	-341	0	30	0	0	0	0	0	4,444	1,849	0	127.30
Westminster	0	0	0	54	0	0	73	0	0	105	0	0	50	0	0	47	0	0	748	0	0	12.54
Yorba Linda	40	990	0	921	0	0	1,715	0	0	213	0	0	0	0	0	42	0	0	5,790	1,103	500	478.49
MWDOC Totals	36,622	21,669	0	19,818	65,250	0	20,883	24,634	0	1,556	31,599	0	2,199	-710	0	470	1,721	0	194,823	274,867	14,752	17,370.96
Anaheim	338	0	0	498	712	0	794	5,221	0	147	3,953	0	0	0	0	0	0	0	4,020	49,799	105	1,402.16
Fullerton	107	0	0	684	1,196	0	521	7,015	0	65	3,034	0	0	0	0	0	0	0	2,910	11,309	1,484	720.24
Santa Ana	86	2,533	0	310	0	0	0	1,420	0	0	1,106	0	0	0	0	140	0	0	859	5,752	0	146.67
Non-MWDOC Totals	531	2,533	0	1,492	1,908	0	1,315	13,656	0	212	8,093	0	0	0	0	140	0	0	7,789	66,860	1,589	2,269.07
Orange County Totals	37,153	24,202	0	21,310	67,158	0	22,198	38,290	0	1,768	39,692	0	2,199	-710	0	610	1,721	0	202,612	341,727	16,341	19,640.04

COMMERCIAL PLUMBING FIXTURES REBATE PROGRAM[1]
INSTALLED BY AGENCY
through MWDOC and Local Agency Conservation Programs

Agency	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	Totals	Cumulative Water Savings across all Fiscal Years
Brea	234	0	10	91	734	242	0	**1,607**	**586**
Buena Park	5	23	56	591	133	49	0	**2,538**	**1,363**
East Orange CWD RZ	0	0	0	0	0	0	0	**0**	**0**
El Toro WD	0	212	6	268	35	737	717	**2,516**	**750**
Fountain Valley	0	0	1	249	0	895	0	**1,767**	**755**
Garden Grove	4	1	167	676	410	0	0	**2,451**	**1,805**
Golden State WC	0	1	0	1,008	53	93	0	**2,958**	**2,278**
Huntington Beach	104	144	7	783	641	10	0	**2,964**	**1,942**
Irvine Ranch WD	1,090	451	725	11,100	5,958	1,599	413	**29,878**	**9,794**
La Habra	0	0	0	340	42	0	0	**925**	**664**
La Palma	0	0	0	0	509	0	0	**675**	**159**
Laguna Beach CWD	0	27	0	0	0	0	0	**446**	**373**
Mesa Water	6	0	79	661	782	0	0	**4,254**	**2,545**
Moulton Niguel WD	0	0	3	413	281	506	1,013	**2,796**	**1,069**
Newport Beach	0	0	566	0	0	0	0	**1,834**	**1,550**
Orange	1	271	81	275	2,851	458	414	**5,902**	**2,280**
San Juan Capistrano	0	14	0	0	0	0	0	**260**	**457**
San Clemente	0	0	1	0	0	0	0	**432**	**444**
Santa Margarita WD	0	0	2	90	743	598	506	**2,054**	**368**
Santiago CWD	0	0	0	0	0	0	0	**0**	**0**
Seal Beach	0	0	0	0	184	278	0	**816**	**519**
Serrano WD	0	0	0	0	0	0	0	**0**	**0**
South Coast WD	148	0	382	0	0	0	0	**1,320**	**646**
Trabuco Canyon WD	0	0	0	0	0	0	0	**11**	**18**
Tustin	0	0	75	358	212	2	64	**1,468**	**1,007**
Westminster	1	28	0	146	177	25	0	**1,163**	**1,191**
Yorba Linda	1	0	0	226	84	338	0	**933**	**684**
MWDOC Totals	**1,594**	**1,172**	**2,161**	**17,275**	**13,829**	**5,830**	**3,127**	**71,968**	**33,245**
Anaheim	165	342	463	3,072	309	1,808	1	**15,562**	**8,468**
Fullerton	94	0	178	476	621	274	0	**3,052**	**2,015**
Santa Ana	16	17	5	1,293	238	582	0	**6,319**	**5,637**
Non-MWDOC Totals	**275**	**359**	**646**	**4,841**	**1,168**	**2,664**	**1**	**24,933**	**16,120**
Orange County Totals	**1,869**	**1,531**	**2,807**	**22,116**	**14,997**	**8,494**	**3,128**	**96,901**	**49,366**

Family 4-Liter HETs, Zero Water Urinals, High Efficiency Clothes Washers, Cooling Tower Conductivity Controllers, Ph Cooling Tower Conductivity Controllers, Flush Valve Retrofit Kits, Pre-rinse Spray heads, Hospital X-Ray Processor Recirculating Systems, Steam Sterilizers, Food Steamers, Water Pressurized Brooms, Laminar Flow Restrictors, and Ice Making Machines.

INDUSTRIAL PROCESS/WATER SAVINGS INCENTIVE PROGRAM

Number of Projects by Agency

Agency	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16	FY 16/17	FY 17/18	FY 18/19	Overall Program Interventions	Annual Water Savings[1]	Cumulative Water Savings across all Fiscal Years[1]
Brea	0	0	0	0	0	0	0	0	0	0	0
Buena Park	0	0	0	0	1	0	0	0	2	54	532
East Orange	0	0	0	0	0	0	0	0	0	0	0
El Toro	0	0	0	0	0	0	1	0	1	9	1
Fountain Valley	0	0	0	0	0	1	0	0	1	23	38
Garden Grove	0	0	0	0	1	0	0	0	1	0	1
Golden State	0	0	0	0	0	0	0	0	1	3	31
Huntington Beach	0	2	0	1	2	0	1	0	6	180	671
Irvine Ranch	1	1	1	0	2	1	1	0	10	119	702
La Habra	0	0	0	0	1	0	0	0	1	0	1
La Palma	0	0	0	0	0	0	0	0	0	0	0
Laguna Beach	0	0	0	0	0	0	0	0	0	0	0
Mesa Water	0	0	0	0	0	0	0	0	0	0	0
Moulton Niguel	0	0	0	0	0	0	0	0	0	0	0
Newport Beach	0	0	0	1	0	0	0	0	1	21	83
Orange	0	0	0	0	1	2	1	0	5	97	553
San Juan Capistrano	0	0	0	0	0	0	0	0	0	0	0
San Clemente	0	0	0	0	0	0	0	0	0	0	0
Santa Margarita	0	0	0	0	0	0	0	0	0	0	0
Seal Beach	0	0	0	0	0	0	0	0	0	0	0
Serrano	0	0	0	0	0	0	0	0	0	0	0
South Coast	0	0	0	0	1	1	0	0	2	134	224
Trabuco Canyon	0	0	0	0	0	0	0	0	0	0	0
Tustin	0	0	0	0	0	0	0	0	0	0	0
Westminster	0	0	0	0	0	0	0	0	0	0	0
Yorba Linda	0	0	0	0	0	0	0	1	1	20	3
MWDOC Totals	1	3	1	2	9	5	4	2	32	662	2842
Anaheim	0	0	0	0	0	0	0	0	0	0	0
Fullerton	0	0	0	0	0	0	0	0	0	0	0
Santa Ana	0	0	0	0	1	0	0	0	1	11	439
OC Totals	1	3	1	2	10	5	4	2	33	673	3281

[1] Acre feet of savings determined during a one year monitoring period.

If monitoring data is not available, the savings estimated in agreement is used.

TURF REMOVAL BY AGENCY[1]

through MWDOC and Local Agency Conservation Programs

Agency	FY 12/13		FY 13/14		FY 14/15		FY 15/16		FY 16/17		FY 17/18		FY 18/19		Total Program		Cumulative Water Savings across all Fiscal Years
	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	Res	Comm.	
Brea	7,605	0	5,697	0	71,981	30,617	118,930	404,411	8,354	479	9,853	27,234	3,180	0	228,997	472,207	**406.07**
Buena Park	0	0	0	0	11,670	1,626	77,127	16,490	3,741	0	4,586	0	1,230	0	98,354	18,116	**64.76**
East Orange	0	0	1,964	0	18,312	0	27,844	0	0	0	0	0	0	0	48,120	0	**30.06**
El Toro	4,680	72,718	4,582	0	27,046	221,612	63,546	162,548	13,139	48,019	7,273	42,510	5,263	5,797	130,252	553,204	**426.83**
Fountain Valley	682	7,524	4,252	0	45,583	5,279	65,232	0	3,679	0	8,631	0	2,849	27,679	132,208	40,482	**93.44**
Garden Grove	4,534	0	8,274	0	67,701	22,000	177,408	49,226	11,504	0	4,487	0	0	0	287,921	117,403	**281.06**
Golden State	31,813	3,200	32,725	8,424	164,507	190,738	310,264	112,937	0	0	0	0	0	0	581,902	346,272	**636.92**
Huntington Beach	9,219	12,437	20,642	0	165,600	58,942	305,420	270,303	9,560	21,534	14,236	6,032	7,937	0	561,045	421,737	**629.23**
Irvine Ranch	32,884	32,384	36,584	76,400	234,905	317,999	782,844	2,675,629	231,483	46,725	86,893	61,037	18,109	10,281	1,435,575	3,234,915	**2,676.87**
La Habra	0	0	0	0	14,014	1,818	49,691	72,164	0	0	3,003	0	1,504	0	68,212	90,019	**99.42**
La Palma	0	0	0	0	4,884	0	10,257	59,760	0	0	0	0	0	0	15,141	59,760	**42.63**
Laguna Beach	2,664	1,712	4,586	226	13,647	46,850	47,614	0	3,059	0	589	0	0	0	75,670	48,788	**82.86**
Mesa Water	10,667	0	22,246	0	131,675	33,620	220,815	106,896	4,173	77,033	17,373	77,785	1,360	0	415,086	295,334	**396.89**
Moulton Niguel	11,538	84,123	14,739	40,741	314,250	1,612,845	889,748	1,059,279	220,749	0	98,271	0	41,689	0	1,596,423	2,840,054	**2,763.50**
Newport Beach	3,548	2,346	894	0	33,995	65,277	76,675	375,404	2,924	0	5,938	6,499	0	25,000	127,428	474,526	**341.25**
Orange	15,951	8,723	11,244	0	120,093	281,402	289,990	106,487	12,847	2,366	11,956	0	10,320	1,798	485,372	400,776	**562.65**
San Clemente	16,062	13,165	18,471	13,908	90,349	1,137	215,249	438,963	4,267	0	33,083	7,098	5,134	0	404,117	474,271	**524.07**
San Juan Capistrano	29,544	27,156	12,106	0	101,195	32,366	197,290	143,315	2,624	40,748	0	0	0	0	365,415	347,277	**509.68**
Santa Margarita	10,151	11,600	17,778	48,180	211,198	514,198	534,048	550,420	17,010	28,094	62,706	25,000	19,624	23,198	878,962	1,217,651	**1,268.89**
Santiago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-**
Seal Beach	3,611	0	0	0	15,178	504	17,349	15,911	1,234	0	752	0	0	0	38,124	16,415	**33.87**
Serrano	0	0	2,971	0	41,247	0	127,877	4,403	5,450	0	555	0	4,000	0	182,100	4,403	**108.45**
South Coast	9,429	4,395	15,162	116,719	84,282	191,853	181,102	128,290	14,967	0	13,319	7,806	5,990	0	331,057	465,387	**532.10**
Trabuco Canyon	1,542	22,440	2,651	0	14,771	0	42,510	88,272	1,465	0	4,788	0	1,536	0	69,535	110,712	**111.78**
Tustin	9,980	0	1,410	0	71,285	14,137	232,697	33,362	11,173	0	16,926	0	5,941	6,894	349,412	54,393	**230.98**
Westminster	0	0	0	0	14,040	34,631	71,833	23,902	11,112	0	10,033	0	3,961	0	110,979	58,533	**95.71**
Yorba Linda	0	0	0	0	112,136	12,702	360,279	116,985	19,420	0	9,529	3,696	11,856	0	524,569	133,383	**382.47**
MWDOC Totals	**216,104**	**303,923**	**238,978**	**304,598**	**2,195,544**	**3,692,153**	**5,493,639**	**7,015,357**	**613,934**	**264,998**	**424,780**	**264,697**	**151,483**	**100,647**	**9,541,976**	**12,296,018**	**13,332.42**
Anaheim	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-**
Fullerton	0	0	0	9,214	0	0	0	0	0	0	0	0	0	0	0	9,214	**7.74**
Santa Ana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**-**
Non-MWDOC Totals	**0**	**0**	**0**	**9,214**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9,214**	**7.74**
Orange County Totals	**216,104**	**303,923**	**238,978**	**313,812**	**2,195,544**	**3,692,153**	**5,493,639**	**7,015,357**	**613,934**	**264,998**	**424,780**	**264,697**	**151,483**	**100,647**	**9,541,976**	**12,305,232**	**13,340**

[1]Installed device numbers are listed as square feet

HIGH EFFICIENCY TOILETS (HETs) INSTALLED BY AGENCY

through MWDOC and Local Agency Conservation Programs

Agency	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	Total	Cumulative Water Savings across all Fiscal Years
Brea	0	38	146	154	4	6	0	**456**	**116.31**
Buena Park	0	96	153	112	13	3	0	**687**	**215.26**
East Orange CWD RZ	0	13	26	24	0	0	0	**86**	**24.09**
El Toro WD	133	218	869	264	12	6	5	**2,048**	**611.66**
Fountain Valley	0	41	132	220	7	9	1	**833**	**278.76**
Garden Grove	0	63	350	363	7	4	0	**1,488**	**474.87**
Golden State WC	2	142	794	512	9	11	1	**2,802**	**877.53**
Huntington Beach	0	163	1,190	628	4	3	0	**2,904**	**821.99**
Irvine Ranch WD	1,449	810	1,777	2,798	638	239	72	**17,220**	**6,026.79**
Laguna Beach CWD	0	45	112	81	1	4	0	**392**	**118.10**
La Habra	0	37	94	83	5	1	0	**591**	**215.86**
La Palma	0	21	59	52	4	2	3	**227**	**66.14**
Mesa Water	0	147	162	162	7	3	0	**1,621**	**650.09**
Moulton Niguel WD	0	400	2,497	1,939	49	40	7	**5,737**	**1,344.61**
Newport Beach	0	49	168	243	11	6	0	**731**	**208.28**
Orange	1	142	978	416	17	10	3	**2,192**	**608.94**
San Juan Capistrano	0	35	140	202	3	9	2	**534**	**139.85**
San Clemente	0	72	225	246	11	6	2	**880**	**255.95**
Santa Margarita WD	0	528	997	1,152	114	34	0	**3,343**	**793.90**
Seal Beach	2	17	50	69	-1	0	0	**857**	**421.72**
Serrano WD	0	2	40	55	3	0	0	**121**	**28.68**
South Coast WD	64	102	398	235	11	7	0	**1,028**	**266.55**
Trabuco Canyon WD	0	10	108	169	2	3	2	**344**	**77.50**
Tustin	0	64	132	201	12	10	1	**1,517**	**589.83**
Westminster	0	35	161	359	3	4	0	**1,335**	**460.36**
Yorba Linda WD	0	40	280	379	12	8	0	**1,259**	**388.69**
MWDOC Totals	1,651	3,330	12,038	11,118	958	428	99	**51,233**	**16,082.31**
Anaheim	0	156	1,188	614	70	19	5	**5,889**	**2,193.20**
Fullerton	0	61	293	286	14	9	4	**1,068**	**314.09**
Santa Ana	0	33	602	293	20	0	0	**2,021**	**687.54**
Non-MWDOC Totals	0	250	2,083	1,193	104	28	9	**8,978**	**3,194.82**
Orange County Totals	**1,651**	**3,580**	**14,121**	**12,311**	**1,062**	**456**	**108**	**60,211**	**19,277.13**