MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

Street Address:
18700 Ward Street
Fountain Valley, California 92708

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

(714) 963-3058
Fax: (714) 964-9389
www.mwdoc.com

December 31, 2015

Ms. Debra Whitney
Bureau of Reclamation
27708 Jefferson Avenue, Suite 202
Temecula, CA 92590

Subject: **Notice for Closeout** for Federal Grant Agreement No. R12AP35354 – Water Efficient Site Certification and Smart Timer Rebate Program

Dear Ms. Whitney:

The Municipal Water District of Orange County (MWDOC) is pleased to submit its final report for the above reference funding agreement to facilitate pending activity for Site Certifications and Smart Timer device installations.

We completed all work for the Project. We request de-obligation of funds in the amount of $51,543.38, to close this agreement.

Please find included the following items:

- Federal Financial Report SF425 – Marked Final
- Final Progress Report,
- Program Evaluation.
- Release of Claims Form,
- Program Benefits Form,

Should you have any questions regarding the report, please call me at 714/593-5023.

Sincerely,

Melissa Baum-Haley

Melissa Baum-Haley
Senior Water Resources Analyst
Municipal Water District of Orange County

Cc: Joe Berg
Accounting

FEDERAL FINANCIAL REPORT

(Follow form instructions)

1. Federal Agency and Organizational Element to Which Report is Submitted	2. Federal Grant or Other Identifying Number Assigned by Federal Agency (To report multiple grants, use FFR Attachment)	Page	of
SOUTHERN CALIFORNIA AREA OFFICE OF RECLAMATION	Agreement No. R12AP35354	1	1 pages

3. Recipient Organization (Name and complete address including Zip code)
Municipal Water District of Orange County, 18700 Ward Street, Fountain Valley, CA 92708

4a. DUNS Number	4b. EIN	5. Recipient Account Number or Identifying Number (To report multiple grants, use FFR Attachment)	6. Report Type	7. Basis of Accounting
08-738-0721	95-2650400	MWDOC Duns #087380721	□ Quarterly □ Semi-Annual □ Annual X Final	□ Cash X Accrual

8. Project/Grant Period From: (Month, Day, Year)	To: (Month, Day, Year)	9. Reporting Period End Date (Month, Day, Year)
August 1, 2012	September 30, 2015	September 30, 2015

10. **Transactions**	Cumulative
(Use lines a-c for single or multiple grant reporting)	
Federal Cash (To report multiple grants, also use FFR Attachment): N/A	
a. Cash Receipts	$0.00
b. Cash Disbursements	$0.00
c. Cash on Hand (line a minus b)	$0.00
(Use lines d-o for single grant reporting)	
Federal Expenditures and Unobligated Balance:	
d. Total Federal funds authorized	$299,850.00
e. Federal share of expenditures	$248,306.62
f. Federal share of unliquidated obligations	$0.00
g. Total Federal share (sum of lines e and f)	$248,306.62
h. Unobligated balance of Federal funds (line d minus g)	$51,543.38
Recipient Share:	
i. Total recipient share required	$522,008.88
j. Recipient share of expenditures	$579,721.13
k. Remaining recipient share to be provided (line i minus j)	($57,712.25)
Program Income: N/A	
l. Total Federal program income earned	$0.00
m. Program income expended in accordance with the deduction alternative	$0.00
n. Program income expended in accordance with the addition alternative	$0.00
o. Unexpended program income (line l minus line m or line n)	$0.00

11. Indirect Expense	a. Type	b. Rate	c. Period From	Period To	d. Base	e. Amount Charged	f. Federal Share
	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	N/A	N/A	N/A	N/A	N/A	N/A	N/A
				g. Totals:	N/A	N/A	N/A

12. *Remarks: Attach any explanations deemed necessary or information required by Federal sponsoring agency in compliance with governing legislation:*

13. Certification: By signing this report, I certify that it is true, complete, and accurate to the best of my knowledge. I am aware that any false, fictitious, or fraudulent information may subject me to criminal, civil, or administrative penalities. (U.S. Code, Title 218, Section 1001)

a. Typed or Printed Name and Title of Authorized Certifying Official	c. Telephone (Area code, number and extension)
Karl W. Seckel, Municipal Water District of Orange County Assistant General Manager	714-593-5023
	d. Email address: shedges@mwdoc.com
b. Signature of Authorized Certifying Official: Karl W. Seckel	e. Date Report Submitted (Month, Day, Year): December 30, 2015
	14. Agency use only:

Standard Form 425
OMB Approval Number: 0348-0061
Expiration Date: 10/31/2011

Paperwork Burden Statement
According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB Control Number. The valid OMB control number for this information collection is 0348-0061. Public reporting burden for this collection of information is estimated to average 1.5 hours per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0061), Washington, DC 20503.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Southern California Area Office

Agreement Number

R12AP35354

Agreement Date
August 31, 2012 to
September 30, 2015

RELEASE OF CLAIMS

WHEREAS, by the terms of the above-identified agreement for

Water Efficiency Site Certification and Smart Irrigation Rebate Program

entered into by the United States of America, hereinafter also referred to as the United States, and the grant recipient whose name appears on the agreement as

Municipal Water District of Orange County

it is provided that after completion of all work, the grant recipient will furnish the United States with a release of all claims;

NOW, THEREFORE, in consideration of the above premises and the payment by the United States to the recipient the total amount of

$248,306.62

the grant recipient hereby remises, releases, and forever discharges the United States, its officers, agents, and employees, of and from all manner of debts, dues, liabilities, obligations, accounts, claims, and demands whatsoever, in law and equity, under or by virtue of the said agreement except:

IN WITNESS WHEREOF, the agreement recipient has executed this release this 30th day of December, 2015.

By Karl W. Seckel
(Signature)

Karl W. Seckel
(Name -- Type or Print)

Assistant General Manager
(Title)

Municipal Water District of Orange County
(Agreement Recipient)

Water Efficient Site Certification and Smart Timer Rebate Project
Orange County, CA

Final Project Report

R12AP35354
Municipal Water District of Orange County
18700 Ward Street
Fountain Valley, CA 92708
December 30, 2015

Final Report: Water Efficient Site Certification and Smart Timer Rebate Project

1. Recipient Information:	
Recipient Name:	**Municipal Water District of Orange County** **Joseph M. Berg** **18700 Ward Street, Fountain Valley, CA 92708**
Project Name:	**Water Efficient Site Certification and Smart Timer Rebate Project**
Assistance Agreement No:	**R12AP35354**
Date of Award: (Month, Year)	**August 2012**
Estimated Completion Date (Month, Year)	**September, 2015**
Actual Completion Date: (Month, Year)	**September, 2015**

2. Final Funding Information	**Funding Amount**
Non-Federal Entities	
1. Municipal Water District of Orange County	$522,008.88
2.	
3.	
Non-Federal Subtotal:	$522,008.88
Other Federal Entities	
1.	
2.	
3.	
Other Federal Subtotal:	*$0*
Requested Reclamation Funding:	*$299,850.00*
Total Project Funding:	*$821,858.88*

3. One Paragraph Project Description:

The Water Efficiency Site Certification and Smart Irrigation Rebate Project (Project) provides rebates for the installation of residential water efficiency improvements in over 700 households, including advance irrigation timers and rotating nozzles. The Project also provided single-family sites with indoor and outdoor audits to identify the importance of installing water savings deceives and other water saving improvements. As a goal, the Project was to facilitate the installation of 576 residential smart timers and 23,400 rotating nozzles with installation verification. Additionally, the Project used a Site Water Use Audit Project format to perform up to 1,000 comprehensive residential audits. The single-family indoor and outdoor audits identified the areas of the property where water based improvements could be made, and as part of the audit any applicable rebates for improvements was recommended. Tasks included all required reporting, Marketing the Project, performing the site audits, providing a rebate for the installation and verification of Smart Timers and high efficiency nozzles, a Project Evaluation, and Database Enhancements.

Based on results of previous statistical evaluations, the projected water savings for the Project is estimated to be 138 acre-feet (AF) per year with a lifetime water savings of 1,292 AF. In addition to water conservation, the Project also provides an energy-water nexus benefit. Approximately 0.5 million KWh per year of energy savings or 4.26 million kWh over the 10 year life of the Project will be realized. Lastly, the Project will reduce dry-weather runoff containing non-point source pollution that enters local creeks and untimely, the Pacific Ocean.

4. Final Project Description: *Briefly describe components of the project and the work completed, including each element of the scope of work and the work completed at each stage of the project. Please include maps, sketches, and/or drawing of the features of the completed project, as appropriate. In addition, please describe any changes in the project scope.*

MWDOC was awarded a USBR WaterSMART Water and Energy Efficiency Grant 2012 to implement the Water Efficient Site Certification and Smart Timer Rebate Project. The following are the Tasks associated with the Grant.

Task 1 – Marketing and Promotion

Work completed: The main focus for marketing the Project was through promotional pieces the included twice yearly retail water agency bill inserts. Over 150,000 bill inserts and over 30,000 one-page flyers were produced and distributed to MWDOC's retail water agencies. The Project also promoted through social media outlets, at community outreach events, and on the both MWDOC's water use efficiency microsite (www.ocwatersmart.com) and the Metropolitan Water District of Southern California rebate administration website (www.socalwatersmart.com).

Task 2 – Site Audits

Work completed: The purpose of the home water site audits is to educate the homeowner regarding water use efficiency opportunities in and outside their home, and to promote MWDOC's incentive Projects as a means to implement recommendations identified in the survey.

The home water audit will have three components including 1) a site survey, 2) an efficiency evaluation including recommendations for improved efficiency, and 3) a water efficiency designation. The site survey will establish an indoor and outdoor inventory of water using features and associated flow rates. When the flow rate of the water using features meets or exceeds Project criteria, points will be awarded. A "points" threshold will be established, in partnership with member agencies, designating a minimum level of efficiency to be recognized in the Project. When the flow rates of the water using feature do not meet Project criteria recommendations for improved efficiency will be made including access to existing rebates. If a participant implements these recommendations they will be awarded additional points to achieve Project recognition. Each participant will receive a customized and comprehensive report detailing their water-use findings and recommended water savings, and an individualized point total.

Task 3 – Smart Timer and High Efficiency Nozzle Incentives

Work completed: Incentives for Smart Timers and the High Efficiency Nozzles installed as part of this Project were processed using Metropolitan's regional rebate contractor - Electric & Gas Industries Association (EGIA). Project participants were informed through the Home Water Survey what devices are recommended to assist them in saving water. EGIA processed the application and issue a rebate check for available devices. A summary of devices and associated rebates are provided in Table 1. These rebates are funded through our ongoing rebate Project using a combination of Reclamation, Metropolitan, MWDOC, and participating retail water agency funds.

Table 1
Summary of Water Saving Devices and Associated Rebate Amounts

Water Saving Devices:	Rebate Amount:
Low Precipitation Rate Sprinkler Nozzle	$4 per nozzle
Smart Irrigation Timer	$380 per timer
Turf Removal	$1.00 per square foot*
High Efficiency Clothes Washer	$80 per clothes washer*

*these actions were recommended as appropriate, but not a goal of the Project.

A total of 576 residential smart timers and 23,400 low-precipitation rate sprinkler nozzles are targeted for installation through this Project.

Task 4 – Project Evaluation

Work completed: The Project Evaluation commenced on August 2015. The purpose of this Project Evaluation was to perform (1) a Process Evaluation of the Project format and (2) an Impact Evaluation of water savings achieved by participants in the Project. In additional to fulfilling a grant agreement requirement, MWDOC looked to determine what successes and challenges came with implementation of the Project. As part of this Project Evaluation, a census sampling (full population of program) of the participating residential sites was taken and analysis was performed to determine the following: (1) Project participation trends; (2) Project satisfaction and waster savings perception; and (3) impact on water use. For the water savings impact analysis, audit results and rebate database records were evaluated for the participating customers. The Impact Evaluation analyzed the water use trends of the customers based efficiency targets as a means to compare impact. The water use was weather normalized to allow

for removal of temporal and climatic variability. Finally, these results will be used as water savings value for the development of an autonomous version of this program.

Task 5 – Database Enhancement

Work completed: MWDOC's current historical database was modified to accommodate the Project's participation data.

5. Accomplishment of Project Goals: *Describe the goals and objectives of the project and whether each of these was met. Where appropriate, state the reasons why goals and objectives were not met, and describe any problems or delays encountered in completing the project. Please include whether or not the project was completed within cost.*

The goals of the Project were to facilitate the installation of 576 Smart Timers, 23,400 High Efficiency Nozzles, and conduct up to 1,000 residential home water audits. In addition it was proposed 138 acre-feet per year of water would be saved as a result of the Project. To measure the water savings from the devices installed, MWDOC would also perform a statistical evaluation Through the Project, MWDOC facilitated the installation of 1,055 residential smart timers and 112,526 high efficiency nozzles. These implementation rates far exceeded the Project goals by 183% for residential timers and 481% for high efficiency nozzles. Over the same time period, 653 residential water audits were performed. , exceeding the goals by 540% and 217% respectively.

From Project launch, in September 9, 2011, through the term end date of September 30, 2014, a total of 2,072 residential timers and 1,803 commercial timers were installed, yielding a potential water savings of 783 acre feet of water per year. These implementation rates have far exceeded the Project goals by 436% for residential timers and 225% for commercial timers. Over the same time period, 400 residential and 100 commercial post-installation inspections were performed, exceeding the goals by 540% and 217% respectively.

The purpose of the Impact Evaluation was to estimate the actual water savings; meaning realized water savings that could be discerned at the meter. A pre/post implementation treatment designation with weather normalization and pairwise analysis was introduced into the analytic framework to keep irrigation need based on site size consistent. Through the Impact Evaluation, it is estimated that the water savings is 59 gallons per day per residential site and 320 gallons per day per commercial site or 783 acre feet per year of overall Project savings, which is within 140% of the assumed water savings goal. As additional devices continued to be installed following the commencement of the Project Evaluation, the water savings goal will have been fully realized by the end of the Project term.

6. Discussion of Amount of Water Conserved, Marketed or Better Managed: *In responding to the questions set forth below, Recipients should rely on the best data or information available. Actual field measurements should be used whenever possible (e.g., baseline data or post-project data derived from measuring devices, diversion records, seepage tests, etc.) Where actual field measurements are not available, water savings (or amounts marketed or better managed) may be estimated based on studies, other similar improvement projects, or anecdotal evidence.*

A. Recipient's total water supply (average, annual, available water supply in acre-feet per year):

The five year average water demand in the MWDOC service area is 589,853 acre-feet (AF). This is the total supply for all retail water agencies in Orange County and is comprised of both imported water from the Metropolitan Water District of Southern California, ground water pumped from the Orange County Water District ground water basin, and recycled water. This water is currently going to single- and multi-family residential users, landscape irrigation, and commercial, industrial and institutional users. Of the total, approximately 55% is used for landscape irrigation and 45% is used indoor.

Imported sources account for 42% (241,000 AF), groundwater accounts for 51% (303,000 AF), recycled water accounts for 6% (37,000 AF), and surface water accounts for 2% (8,000 AF). Imported supplies provided by Metropolitan include the Colorado River and the Bay-Delta via the State Water Project. Approximately 99% of MWDOC's demand is for municipal and industrial purposes, and 1% is for agricultural purposes. Municipal and industrial water use in Orange County is comprised of single- and multi-family residential, commercial, industrial, and institutional users. According to the 2010 MWDOC rates survey, there are approximately 557,000 single family connections, 78,000 multi-family connections, and 72,000 irrigation, commercial, industrial, and institutional connections. There are also 8,000 recycled water connections, primarily for irrigation, and over 100 agriculture connections.

Shortfalls in supply are two-fold. First, the region is experiencing multiple dry-years on the Colorado River, which is inhibiting our ability to access surplus water. Second, on the State Water Project from Northern California, we are experiencing extreme dry-year conditions and pumping restrictions due to endangered species. Over the last three water years California has experienced below normal rainfall, and access to imported water from the State Water Project this year is again limited due to continued dry conditions. Because of these ongoing reductions of imported water supply, water agencies have, in some years, been forced to draw from emergency storage to meet demand. In addition, agencies continue to enforce mandatory water use restrictions such as irrigation time of day and days of the week, no washing of hard surfaces, no runoff, etc.

B. Amount of water conserved, marketed or better managed as a result of the project (in acre-feet per year):

Since the launch of the Water Efficiency Site Certification and Smart Irrigation Rebate Program in August 31, 2012 through September 30, 2015, a total of 1,055 residential smart timers, 112,526 rotating nozzles, and 644 Home Water Audits were conducted. Overall, the goals were exceeded by 457%. Based on results of previous statistical evaluations, the projected water savings for this project was 138 acre-feet per year with a lifetime water savings of 1,292 acre-feet.

Water conserved through implementation of the proposed Project will be retained in regional storage reservoirs or the groundwater basin for future use, thereby improving water supply reliability for Orange County.

C. Describe how the amounts stated in response to 6.B were calculated or estimated:
In responding to this question, please address (1) – (3) below.

(1) Describe the information/data being relied on to calculate/estimate the project benefits. State how that data/information was obtained, if appropriate. Provide any other information necessary to explain how the final calculation/estimate of project benefits was made.

The purpose of this Program Evaluation was to perform an evaluation of the Program participation trends and impact. In addition to fulfilling a grant agreement requirement, MWDOC is looking to determine what successes and challenges came with implementation of the Program. As part of this Program Evaluation, a random sampling of 329 residential sites was taken and analysis was performed to determine the following: (1) Program participation trends; (2) Resultant activities following the Home Water Audit; and (3) Impact on water use.

This Program evaluation utilized both follow-up self-reported results and well as mining MWDOC's outdoor rebate programs database to draw conclusions relating to the effectiveness of the Home Water Audit Reports. As part of the Home Water Audit Report, the participant was given to opportunity to amend their score and attain certification by completing a follow-up survey form noting the changes (including proof) made as a result of this program.

(2) As appropriate, please include an explanation of any concerns or factors affecting the reliability of the data/information relied on.

The self-reported follow-up survey form noting the changes (including proof) had a relatively small response rate (5% overall). As a result of this MWDOC staff mined the complete landscape programs historic participation database for activity by Home Cert participants. Activity date was noted and only participation following the Home Audit date was counted. One assumption made was that the participation in the secondary rebate program was a result of the Home Water Audit survey report.

(3) Attach any relevant data, reports or other support relied on in the calculation/estimate of project benefits, if available. Please briefly describe the data/information attached, if any.

Past Studies of residential water audits in we used for the development and anticipated savings rates associated with the Home Water Audits.

1.	Water Reductions from Residential Audits, Contra Costa Water District, 1993
2.	Evaluating Water Conservation Cost-Effectiveness with an End-Use Model, 2004
3.	Home Water Survey, City of Pasadena, California
4.	Water Wise House Call, Santa Clara Valley Water District
5.	Florida Water Star Program, Southwest Florida Water Management District
6.	EPA WaterSense

MWDOC has a long standing practice of conducting evaluations at the completion of Project terms. The table below summarizes the previous irrigation timer evaluation results and estimates of water savings used for evaluation.

Study Title	Author	Residential Gallons per Day Savings
Residential Weather-Based Irrigation Scheduling: Evidence from the Irvine "ET Controller" Study, 2001	Western Policy Research, Anil Bamezai, Ph.D.	37
ET Controller Savings Through the Second Post-Retrocit Year: A Brief Update, 2001	Western Policy Research, Anil Bamezai, Ph.D.	41
Residential Runoff Reduction Study, 2004	A&N Technical Services, Inc., Thomas Chesnutt, Ph.D.	41
Pilot Implementation of Smart Controllers: Water Conservation, urban Runoff Reduction and Water Quality, 2010	Kennedy/Jenks Consultants, Lawrence Y.C. Leong, Ph.D., QEP	37
MWDOC SmarTimer Rebate Project Evaluation, 2011	A&N Technical Services, Inc., Thomas Chesnutt, Ph.D.	49
OC Smart Irrigation Timer Rebate Project, 2014 (this Project's Evaluation)	Municipal Water District of Orange County	59

D. Use of Conserved Water: *Please explain where the water saved, better managed, or marketed as a result of the project is going (e.g. used by the recipient, in stream flows, available to junior water users, etc.*

The Project will improve water supply reliability by being more efficient with existing supplies. As a result, less pumping will occur from the groundwater basin, aiding in refilling the basin

more rapidly, and less imported water will be used, allowing unused water to be retained in regional water storage reservoirs for use at a future date. Both these benefits will minimize or forestall shortages due to drought.

The Project promotes and encourages collaboration among all water agencies in Orange County. While MWDOC serves approximately 70% of the county, the proposed Project will be implemented throughout 100% of the county in partnership with all 32 retail water agencies. Wide spread support for this Project is demonstrated by the letters of support from these retail agencies. This partnership is significant as all water agencies in the county will have a united message of "efficient water use" to water users. Because of this county-wide approach, the unfortunate situation of "haves" and "have not" will be avoided – all consumers will have access to one standardized Project.

The Project will significantly increase the awareness of water conservation in Orange County. The Project was be promoted through water bill stuffers, water bill messages, newsletters, websites, radio spots, and social media channels. The Project served as an example of efficiency that can be replicated not only from user to user, but also by water agency to water agency, thereby increasing the capability of future water conservation and efficiency efforts beyond Orange County.

E. Future tracking of project benefits: *Please state whether and how the recipient plans to track the benefits of the project (water saved, marketed or better managed) in the future. If no actual field measurements are currently available to support the estimate of project benefits in 6.B., please state whether actual field measurements will become available in the future. If so, please state whether the Recipient is willing to provide such data to Reclamation on a voluntary basis once it is available.*

As part of the MWDOC water use efficiency Project evaluation planning horizon, sites participating in this Project will be assessed under two future evaluations projects: 1) Device Retention Study, with expected to be complete within fiscal year 2015-16, and 2) Device Persistence Study, with an expected completion date to be determined.

7. Discussion of Amount of Renewable Energy Added: *If your project included the installation of a renewable component, please describe the amount of energy the system is generating annually. Please provide any data/reports in support of this calculation.*

Not Applicable

8. Describe how the project demonstrates collaboration, stakeholder involvement or the formation of partnerships, if applicable: *Please describe the collaboration involved in the project, and the role of any cost-share or other types of partners. If there were any additional entities that provided support (financial or otherwise) please list them.*

This Project provided multi-level partnerships within MWDOC's entire service area, including the north and south subwatershed basins, with benefits yielded by cities, water districts, community, and the environment. The Project was built on established regional integration and coordination with multiple goals across geographic and water resource services.

MWDOC, the Metropolitan Water District of Southern California, and the 28 retail water agencies within the MWDOC service area were all proactive in marketing the Project. This Project promoted the region-wide utilization of non-structural Best Management Practices, appropriate to non-point-source pollutants, which aide in the prevention of potential pollutants from entering municipal storm drain systems and aquatic ecosystems, during dry weather.

The water savings achieved through this Project leads to supply reliability and reduction of imported water dependency. MWDOC, in collaboration with its retail agencies, and cities of Anaheim, Fullerton, and Santa Ana, established the OC 20x2020 Regional Alliance as part of MWDOC's 2010 Regional Urban Water Management Plan, where all retail water agencies benefit from pooling their water use efficiency investments.

9. Describe any other pertinent issues regarding the project:

None

10. Feedback to Reclamation regarding the WaterSMART Project: *Please let us know if there is anything we can do to improve the WaterSMART Project in general, including the process for applying for or completing a WaterSMART project. Your feedback is important to us.*

The overall WaterSmart process runs very smooth, from the proposal process through to final reporting. MWDOC has enjoyed working with Reclamation throughout. The local field and regional personnel are a tremendous help when needed in understanding the grant agreement requirements. Thanks again.

11. Attachments: *Please attach the following*

- **Any available data or information relied on in responding to paragraph 7, above; Not Applicable**
- **A map or illustration showing the location of the recipient's facilities (see paragraph 4, above);**
- **Maps, sketches, and/or drawings of the features of the completed project, as appropriate (see paragraph 5, above);**
- **Representative before and after photographs, if available;**
- **A table showing the total expenditures for the completed project (please see Sample Final Project Costs Table, below).**

FINAL PROJECT COSTS TABLE.

BUDGET ITEM DESCRIPTION	COMPUTATION		RECIPIENT FUNDING	RECLAMATION FUNDING	TOTAL COST
	$/Unit and Unit	Quantity			
SALARIES AND WAGES					
Joseph Berg	$61.23	39.5	$2,013.02	$405.38	$2,418.39
Beth Fahl	$29.63	306.25	$7,553.77	$1,521.16	$9,074.92
Jessica Ouwerkerk	$36.38	62.5	$1,892.51	$381.11	$2,273.63
Steve Hedges	$48.18	887	$35,572.00	$7,163.37	$42,735.39
Sergio Ramirez	$26.93	955.25	$21,409.65	$4,311.41	$25,721.06
Catherine Baker	$21.70	1.5	$27.09	$5.46	$32.55
Melissa Baum-Haley	$39.41	505	$16,568.01	$3,336.42	$19,904.42
Elizabeth Nam	$20.52	345.25	$5,896.00	$1,187.32	$7,083.32
Paula Knott	$15.00	99.25	$1,239.20	$249.55	$1,488.75
Rachel Waite	$17.67	183.75	$2,701.93	$544.11	$3,246.04
Denise Dos Reis	$16.26	3	$40.60	$8.18	$48.78
FRINGE BENEFITS					
Joseph Berg	$21.38	39.5	$702.90	$141.55	$844.45
Beth Fahl	$14.27	306.25	$3,638.87	$732.79	$4,371.66
Jessica Ouwerkerk	$10.90	62.5	$567.30	$114.24	$681.54
Steve Hedges	$13.97	887	$10,316.46	$2,077.50	$12,393.96
Sergio Ramirez	$9.02	955.25	$7,175.64	$1,445.01	$8,620.65
Catherine Baker	$3.15	1.5	$3.93	$.79	$4.72
Melissa Baum-Haley	$11.72	505	$4,924.71	$991.72	$5,916.43

Elizabeth Nam	$2.22	345.25	$637.81	$128.44	$766.25
Paula Knott	$1.96	99.25	$161.92	$32.61	$194.53
Rachel Waite	$2.14	183.75	$327.98	$66.05	$394.03
Denise Dos Reis	$2.24	3	$5.59	$1.12	$6.71
TRAVEL					
EQUIPMENT					
SUPPLIES/MATERIALS					
Task 1 – Marketing/Promotions			$16,608.40	$0.00	$16,608.40
CONTRACTUAL/ CONSTRUCTION					
Task 2 – Site Audits			$7,384.00	$72,126.00	$79,510.00
Task 3 – Rebate Incentives			$518,719.08	$150,751.33	$669,470.41
Task 4 – Project Evaluation			$0.00	$0.00	$0.00
Task 5 – Database Modification			$0.00	$584.00	$584.00
ENVIRONMENTAL AND REGULATORY COMPLIANCE					
OTHER					
TOTAL DIRECT COSTS					
TOTAL PROJECT COSTS			$666,088.37	$248,306.62	$914,394.99

WATER CONSERVATION FIELD SERVICES PROGRAM
PROJECT BENEFITS

Please check the appropriate water management benefits for agricultural or urban measures that you anticipate addressing in you proposal. Where available, please provide an estimate of the benefit to units (i.e. Acre Feet, Dollars, Percentages)

It is essential to establish benefits of the Program. Please help us with your best estimate.

Reduces Leaks and Seepage _____ Acre Feet/Year

Reduces System Spills _____ Acre Feet/Year

Makes More Water Available __138__ Acre Feet/Year

Reduces Operation Costs _____ $ /Year

Reduces Energy Costs __0.106_ million $ /Year
(Note: Benefit accrued to Metropolitan as a SWP contractor)

Reduces Waste Treatment Costs _____ $ /Year

Improves Crop Yield _____ Percent/Year

Reduces On-Farm Costs _____ $ /Year

Reduces Per Capita Use __0.26__ Gallons/Capita/Day

Provides Technical Training _1,500__ # of People

Provides Water Conservation Education _7,500__ # of People

Improves Water Supply Reliability _10-20__ Frequency (Years)*
* Estimate of how often the improvement will occur (i.e. 1 = each year)

Delays Construction of New Supplies _____ Years

Reduces Drainage/Erosion _____ Tons

Improves Water Quality __50___ % reduction of irrigation runoff pollutants
(Pollutants include: Nutrients, Pesticides, Herbicides, and Coliform)

Enhances Aquatic/Riparian Habitat _____ Years

Prepared for:
United States Dept. of Interior
Bureu of Reclamation
Agreement No. R12AP35354

Water Efficiency Site Certification and Smart Irrigation Rebate Program

Prepared by:
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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

The Family of Orange County Water Agencies

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- The Family of Orange County Water Agencies

Special thanks go out to all retail agencies and customers that supported and participated in the Water Efficiency Site Certification and Smart Irrigation Rebate Program and this program evaluation.

Executive Summary

The Water Efficiency Site Certification and Smart Irrigation Rebate Program (Home Certification Program) was developed by the Municipal Water District of Orange County (MWDOC) to provide sites with indoor and outdoor audits to identify existing water savings devices at the site and water saving area improvements. As a part of the audits, any applicable rebates for improvements are recommended. Additionally the program provided funding for rebates for smart timers and rotating nozzles. Following any water savings improvements, the site is eligible certification. Site certification is awarded based on the final qualification scoring. After review of the site documentation, sites meeting the minimum qualification scores will be certified as Water Smart, receiving plaque and public recognition.

MWDOC utilized the Home Water Audit program format to perform comprehensive residential audits. Increasing water efficiency through recommendations as part of the accompanying report, which is part of the site audits, and irrigation device upgrades will thereby reduce water consumption, irrigation runoff, and non-point source pollution.

Concurrently, over the two-year term of the Project, MWDOC used a rebate program format to facilitate the installation of 1,055 residential smart timers, 112,526 rotating nozzles with verification, and 664 Home Water Audits were conducted. This exceeded the proposed goals of by a net 457%. Based on results of previous statistical evaluations, the projected water savings for this project was 138 acre-feet per year with a lifetime water savings of 1,292 acre-feet.

A key requirement of the USBR grant funding is that a program evaluation be performed to determine the successes and challenges faced by the program and the actual water savings achieved by the program. As part of this Program Evaluation, 329 residential audits were critically analyzed to determine the program benefits. The actual water savings achieved from the Home Water Audits resulted in 125 gallons per day of sustainable savings as result of fixture and appliance upgrades, this will result in an additional lifetime water savings 1.4 acre-feet.

Introduction

The Municipal Water District of Orange County (MWDOC) commenced the Water Efficiency Site Certification and Smart Irrigation Rebate Program (Home Certification Program) in August 2012. The Program was offered to residential sites located within MWDOC's service territories, which includes 28 retail agencies as well as the cities of cities of Anaheim, Fullerton, and Santa Ana. The purpose of the Program is to provide enhanced rebates for the upgrade of conventional time-based irrigation controllers to weather-based irrigation controllers (commonly referred to as smart timers) and rotating nozzles as well. Additionally, the Program provided training to auditors on qualification scoring and other documentation for site submission. Program standards and guidelines focus on appliances, plumbing fixtures, irrigation systems, and landscapes. The Program provides sites with indoor and outdoor audits to identify existing water saving devices at the site and water saving area improvements. As part of the audits, any applicable rebates for improvements are recommended. Following any water saving improvements, the site is eligible certification. Site certification is awarded based on the final qualification scoring. After review of the site documentation, sites meeting the minimum qualification scores will be certified as Water Smart receiving plaque and public recognition.

The Program is funded by a WaterSMART Grant provided by the United States Dept. of Interior Bureau of Reclamation (USBR), along with additional funding from the Metropolitan Water District of Southern California (MWD), and the Family of Orange County Water Agencies. As part of the Program, the funding agencies require that a Program Evaluation be performed.

Evaluation Need

The purpose of this Program Evaluation was to perform an evaluation of the Program participation trends and impact. In addition to fulfilling a grant agreement requirement, MWDOC is looking to determine what successes and challenges came with implementation of the Program. As part of this Program Evaluation, a random sampling of 329 residential sites was taken and analysis was performed to determine the following: (1) Program participation trends; (2) Resultant activities following the Home Water Audit; and (3) Impact on water use.

A key requirement for receiving this grant funding from USBR is the performance of a Program Evaluation to determine either the successes or challenges faced by the Program and the water savings achieved. The results from this Program Evaluation will help determine the effectiveness of the Home Water Audits and will provide information on how similar water efficiency programs should be focused in the future.

Program Evaluation Objectives

The goal of the Program Evaluation is to determine:

1. Program participation trends.
2. Resultant activities following the Home Water Audit.
3. Impact on water use.

Program Effectiveness

Since the launch of the Water Efficiency Site Certification and Smart Irrigation Rebate Program in August 31, 2012 through September 30, 2015, a total of 1,055 residential smart timers, 4,570 rotating nozzles, and 644 Home Water Audits were conducted. Overall, the goals were exceeded by 457%. The breakdown of the goal achievements can be seen in Table 2.

Table 1. Number of devices implemented through the Water Efficiency Site Certification and Smart Irrigation Rebate Program.

Device/Activity	Total Performed	Goal	Percent of Goal
Residential Weather-Based Irrigation Controller	1,055	576	183%
Low Precipitation Rate Sprinkler Nozzle	112,526	23,400	481%
Home Water Audit	664	1,000	66%
Total	114,245	24,976	457%

Program Promotion

MWDOC was awarded a USBR WaterSMART Water and Energy Efficiency Grant 2012 to implement the Water Efficiency Site Certification and Smart Irrigation Rebate Program, a continuation of the OC Smart Irrigation Timer Rebate Program which as funded by USBR in 2011 and the SmarTimer Rebate Program that was established in 2004.

Data collection and reporting tools were developed to MWDOC's, MWD's, and USBR's specifications, and rebate funding levels were established. By using grant funds, the Program rebates are enhanced beyond the standard offerings by MWD. Additionally, a retail water agency must contribute in order have access to the MWDOC portion of the rebate. Table 1 provides a detailed description of the rebate levels for the smart timer devices as well as the funding source. The device incentive levels are limited to the cost of the device. The home water audits were provided to the participant at no cost to the customer or agency.

MWDOC, MWD, and the retail agencies were all proactive in marketing the Program. Components of marketing for the Water Efficiency Site Certification and Smart Irrigation Rebate Program involved local retail agencies including bill stuffers informing them of the availability of the enhanced rebates through this Program. Additionally, the program was advertised on the MWDOC, MWD, and local retail agency websites and concurrently MWDOC used a variety of social media platforms as a promotion tactic. MWDOC also promoted the Program at public outreach and industry specific events and presentation.

Table 2. Water Conservation Fixture and Appliance Rebates

Device	MWD SoCal WaterSmart Contribution	MWDOC Supplemental Contribution	Retail Agency Mandatory Contribution	Retail Agency Supplemental Contribution*	Potential Maximum Rebate
Residential Weather-Based igation Controller	$80	$225	$75	$0	$225
Low Precipitation Rate Sprinkler Nozzle	$4	$0	$0	$1	$5
Turf Removal (per sq-ft)**	$2	$0	$0	$1-$3	$5
High Efficiency Clothes Washer**	$85	$0	$0	$25-$100	$185
High Efficiency Toilet**	$50	$0	$0	$25-$100	$150

** Not all agencies contributed to the enhanced rebate level.*
*** These actions were recommended as part of the audit, but not a goal of the Project.*

Program Evaluation

The Water Efficiency Site Certification and Smart Irrigation Rebate Program was developed to assist in residential water efficiency improvements in over 700 households. The Project provided single-family sites with indoor and outdoor or outdoor only audits to identify the importance of installing water saving deceives and other water saving improvements. The single-family indoor and outdoor audits identified the areas of the property where water-based improvements could be made, and as part of the audit, any applicable rebates for improvements were recommended.

This Program Evaluation utilized a random sampling of 329 residential sites for which analysis was performed. Table 3 lists the number and type of Home Water Audit within the sample set by retail agency. Figure 1 illustrates the geographic distribution of the audited sites.

Table 3. Home Water Audit type by retail agency.

Retail Water Agency	Survey Type		
	Indoor & Outdoor	Outdoor Only	Total
Brea	3	0	3
Buena Park	1	0	1
East Orange County Water District	18	2	20
El Toro Water District	3	0	3
Fountain Valley	6	1	7
Fullerton	14	6	20
Garden Grove	5		7
Huntington Beach	4	5	9
Irvine Ranch Water District	8	3	11
La Habra	0	1	1
Laguna Beach County Water District	11	2	13
Moulton Niguel Water District	4	3	7
Newport Beach	13	4	17
Orange	14	10	24
San Clemente	20	8	28
San Juan Capistrano	17	3	20
Santa Margarita Water District	67	5	72
Seal Beach	3	0	3
Serrano Water District	5	1	6
South Coast Water District	12	1	13
Trabuco Canyon Water District	4	0	4
Tustin	15	1	16
Yorba Linda Water District	20	4	24
Total	**267**	**62**	**329**

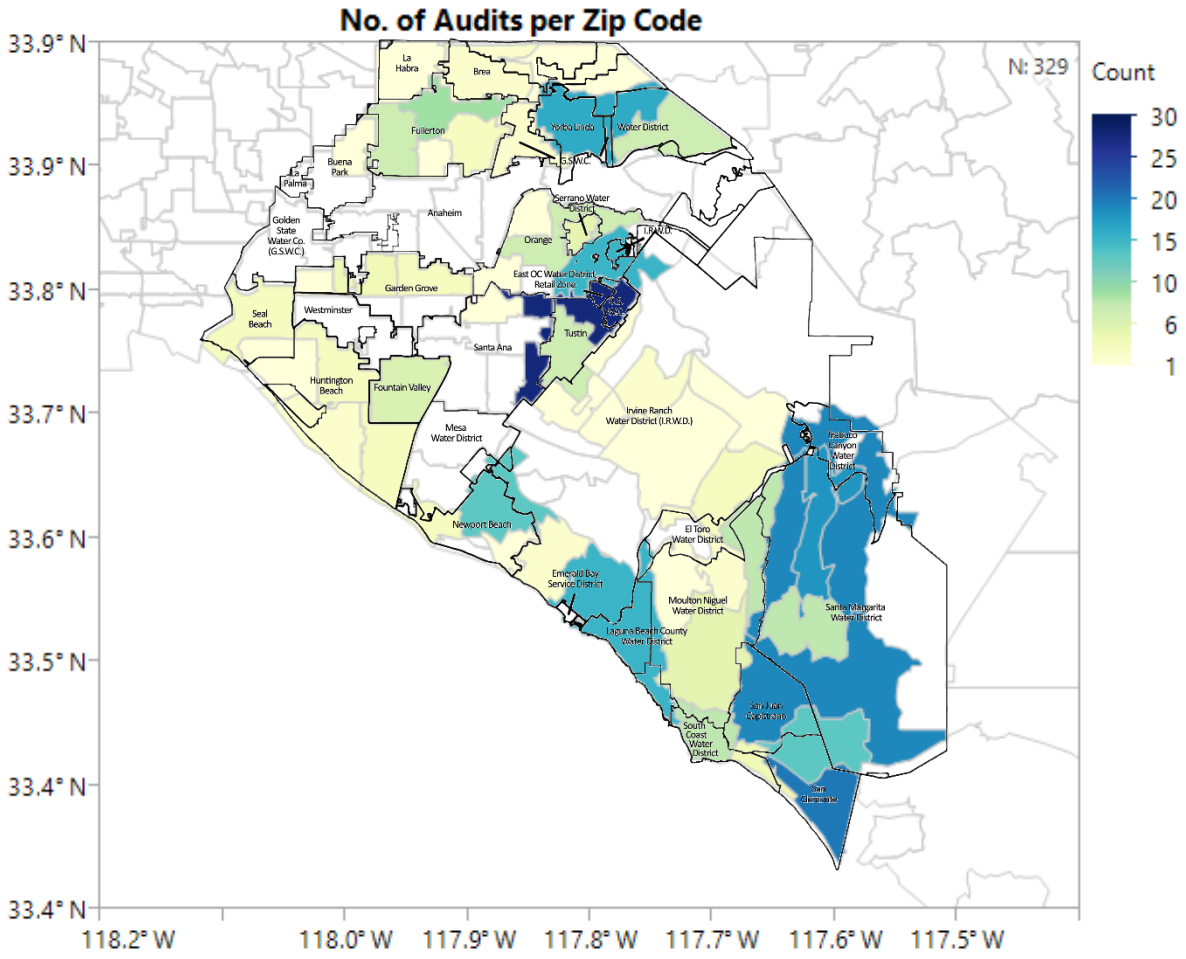

Figure 1. Geographic distribution of devices installed across Orange County.

Audit Response Trends

Service pressure

As part of the audit, indoor service pressure was measured. Forty-four percent (44%) of homes fell within the normal service pressure (40 to 65 pounds per square inch) with an average service pressure of 58 psi. Of the 56% of the sites with service pressure above the normal range, the average pressure was 80 psi, although 10% of those were above 100 psi with a maximum of 150 psi. For the subset with a pressure greater than 65, 64% had a pressure regulating valve (PRV) installed. However, there was no notable correlation between indoor service pressure being within the normal range and the presence of a PRV; 65% percent of homes with a PRV were beyond the normal service pressure.

Additionally, there was a correlation between sites with leaks and a service pressure beyond the normal range. As a part of the audit process, the auditor offered to read the meter alongside the resident, 92% of the participants completed this task. As part of this process, the resident was educated on determining if any leaks may be present through observation of the meter.

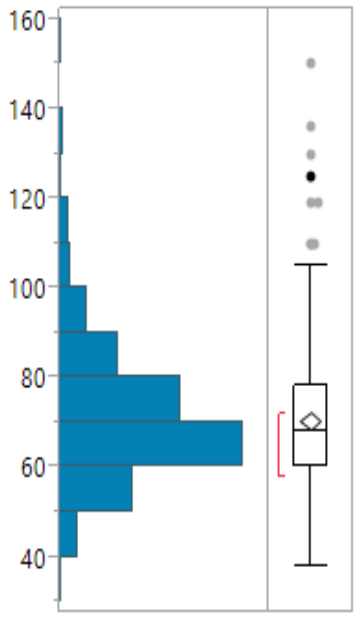

Figure 2. Indoor service pressure.

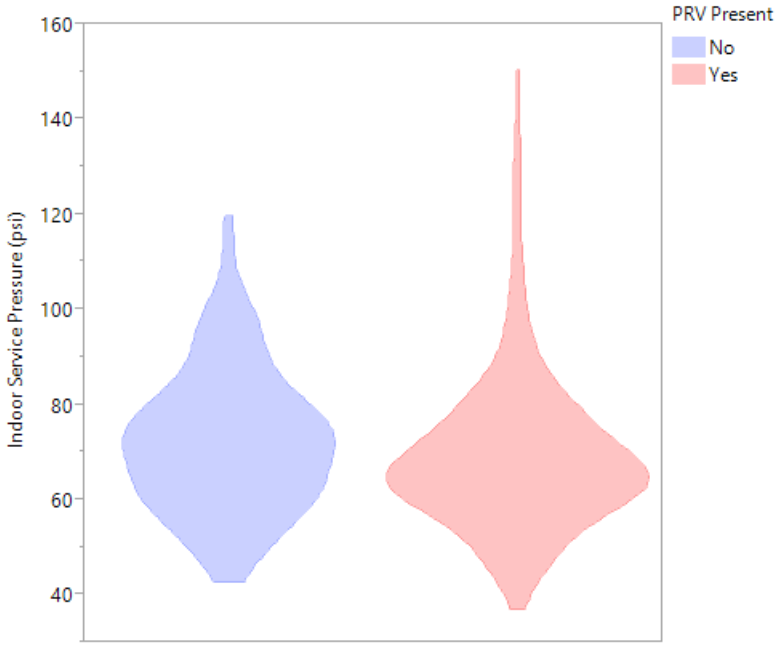

Figure 3. Indoor service pressure and presence of a pressure regulating valve (PRV).

Indoor Fixtures and Appliances

Toilets

As part of the audits, toilets and bathroom fixtures were evaluated. Overall, only 6% of the evaluated sites had toilets with a household average flow rate of more than 1.6 gallons per flush. The majority of the sites, 87%, had an average flow rate between 1.6 and 1.29 gallons per flush. Extremely high efficiency flow rates were present in the remaining 7% of the sites, comprised of 4% with the EPA WaterSense standard of 1.28 gallons per flush, and 3% with less than 1.28 gallons per flush (Figure 4).

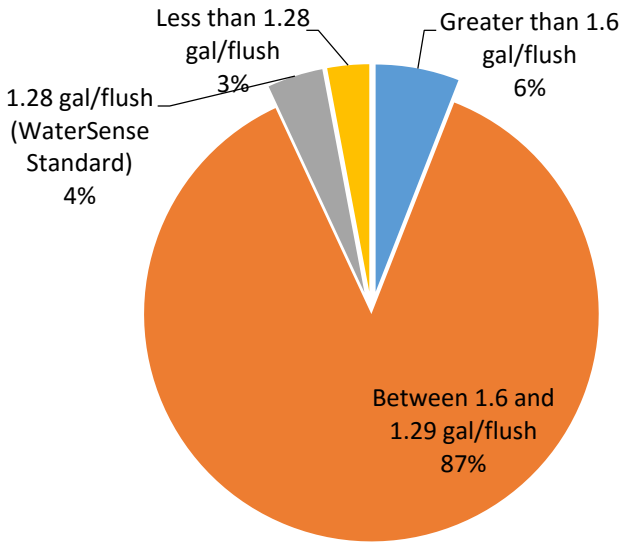

Figure 4. Percentage of indoor audits with average household toilet gallon per flush flow rates.

Faucets

Overall, 62% of the sites with indoor audits performed had faucets with the flow rates of 1.5 gallons per minute or less. While shower heads only resulted in 47% having a less than the 2.0 gallon per minute recommended flow rate.

As part of the audits, kitchen fixtures and appliances were evaluated. Of the sites with indoor audits performed, 68% of the kitchen faucets had flow rates less than 1.8 gallons per minute. Of these, 2% had current leaks at the kitchen faucet location.

Appliances

The clothes washer was evaluated and categorized into three water factor (WF) ratings: less than 4.0, between 4.0 and 6.0, and greater than 6.0 or not listed by manufacturer. All sites in which an indoor audit was conducted had a clothes washer present and functioning. While the greatest percentage, 48% (Figure 5) of clothes washers had a water factor less than 4.0, the distribution was more evenly split,

suggesting that there is still a market need to promote the high efficiency clothes washers to the residential sector.

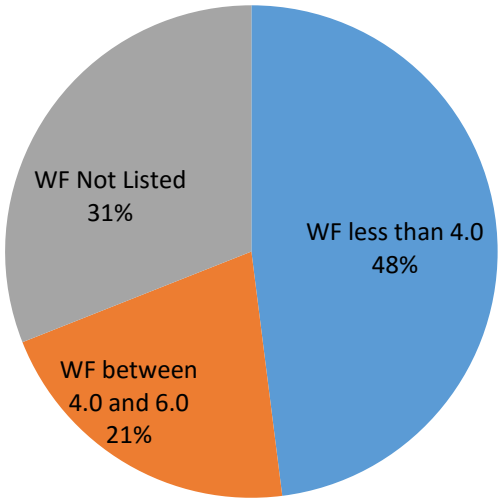

Figure 5. Percentage of indoor audits and clothes washer water factor (WF).

The dishwasher flow was also evaluated, with a benchmark of efficiency of 4.25 gallons per cycle. Similarly, 68% of the homes had dishwashers at or below this flow rate (Figure 5).

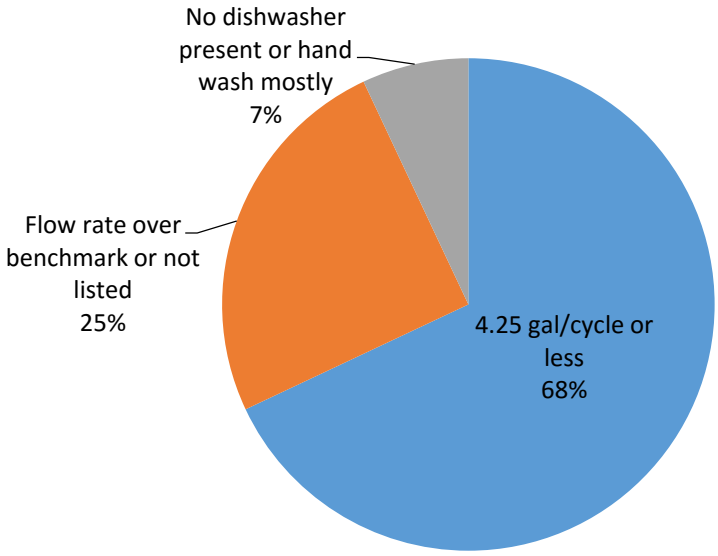

Figure 6. Percentage of indoor audits and dishwasher gallon per cycle flow rates.

Outdoor Results

Irrigation System

Within the 329 audit sample size, 95% possessed and utilized an in-ground irrigation system. Additionally, 40% of the sites also contained a "hand watered only" area of their landscape, with the predominant water method of this area being a hand held hose. Of these sites, the average landscape area was 4,961 square feet and the average irrigated area of this was 3,956 or 80%. The average number of stations per irrigation system was 6, which would concur with the average irrigable areas observed.

Table 3. Irrigation system features at audited sites (n=300).

Irrigation System Feature	Yes
Rain shutoff device	20%
High efficiency sprinklers (rotating nozzles)	58%
Precipitation rates for all sprinklers within a zone are matched	52%
Pressure-regulating valves control all zones and are automated	31%
Pressure Regulation:	
At the valve	23%
At the nozzle head(s)	4%
Micro/Drip Irrigation:	
Drip used and correctly installed	57%
Embeded emitters 0.3-2.0 gallons per hour	33%
Micro-spray used and correctly installed	0.3%

Low-quarter Distribution Uniformity (DU) tests were performed at all sited with a functioning irrigation system for turfgrass or turfgrass-like areas. A DU test would not be performed as a result of the irrigated area planting material being non-uniform foliage (such as non-turfgrass or low climbing ground cover plants), or the emission equipment being non-overhead irrigation such as micro-spray heads or drip irrigation. Of the sites at which a DU test was performed (n=242), 42% had a DU greater than 0.55 and 64% had a DU less than 0.55. Figure 7 illustrates a complete breakdown of these results. While the irrigation system was running, typically during the DU test, runoff and overspray was observed.

At 80% of the sites (n=248), runoff appeared within 5 minutes of the system being on, with 2 minutes as the average time until runoff was observed. Additionally, overspray was observed at 91% of the sites (n=259), with an average overspray radius of 28 inches, ranging from 0 to 48 inches.

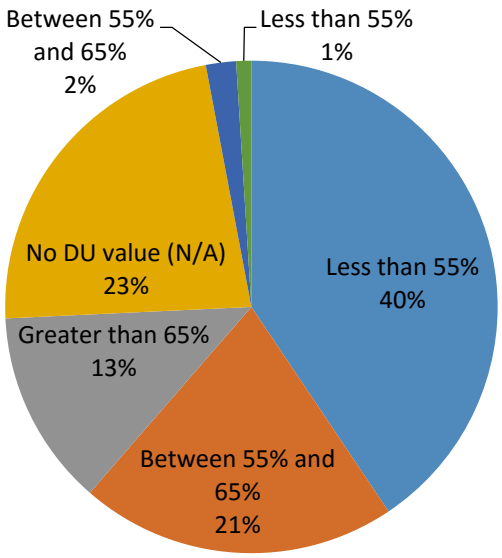

Figure 7. Low-quarter Distribution Uniformity Results.

Landscape Area

White turfgrass was observed to be the largest percentage of the landscape area at the time of the audits, at only 40% of the sites turfgrass represented more than 50% of the irrigated area. Table 4 provides specific information regarding landscape features.

Table 3. Landscape features at audited sites (n=328).

Landscape Feature	Yes	No	Not Present
Trees provide shade coverage	70%	30%	-
Turfgrass areas all greater than 4 feet in width	49%	49%	2%
Mulched Areas:			
At least 95% coverage	44%	53%	3%
At least 2 inches deep	28%	69%	

LID Features

Low Impact Design (LID) features were also considered as a component of the outdoor audit. These features and practices result in runoff reduction and were recently promoted as part of the modern landscape design. LID features were only observed in 25% of the landscapes audited (Table 5), suggesting a need for further education and acceptance of these features and practices as commonplace. Of the 78 sites with LID features present, the most predominant feature was an area of permeable pavers. Figure 8 presents the LID features observed.

Table 4. Low Impact Design features at audited sites (n=328).

LID Feature	Yes	No	Not Present
Slopes > 3:1 with no runoff within 3 min of watering	5%	95%	
Rain Catchment:			
Functioning rain barrel	5%	95%	8%
Irrigation supplied by a rain harvesting system	4%	96%	
Downspouts:			
Directed to pervious areas	33%	59%	8%
Greater than2 feet from foundation	19%	73%	

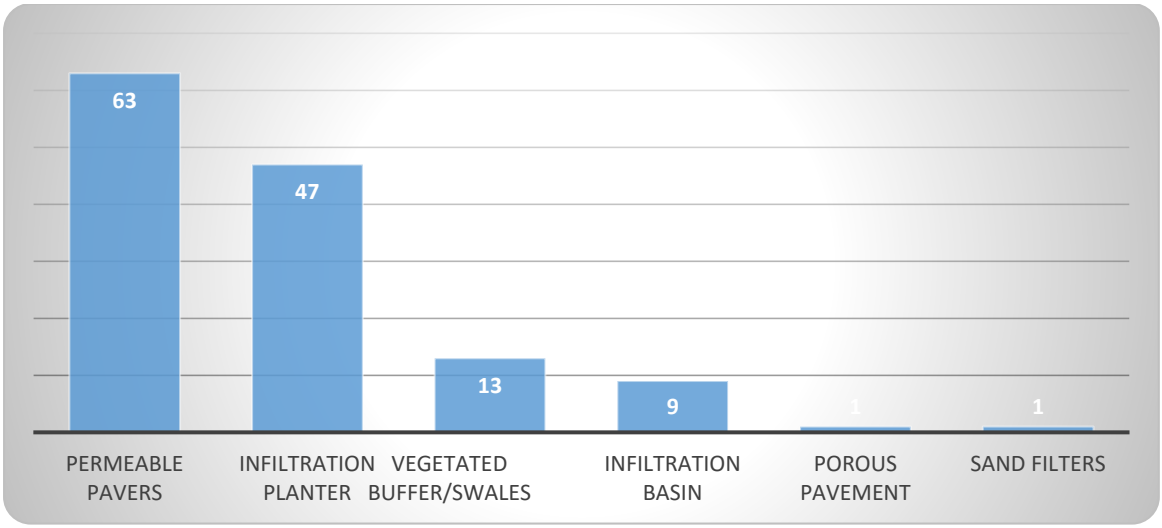

Figure 8. Percentage of sites with each of the observed Low Impact Design features.

Outdoor Leaks

As part of the irrigation system inspection process, the presence of leaks was recorded. The most common location for leaks was at the spray heads. Figure 9 presents the locations where outdoor leaks were observed. The average pressure of the irrigation system was 45 psi, but the range was up to 128 psi. Additionally, there was a correlation between increased irrigation system pressure and the presence of irrigation system leaks. While only 10% of the sites had an irrigation system pressure above 80 psi, misting at the heads was observed in 49% of the systems.

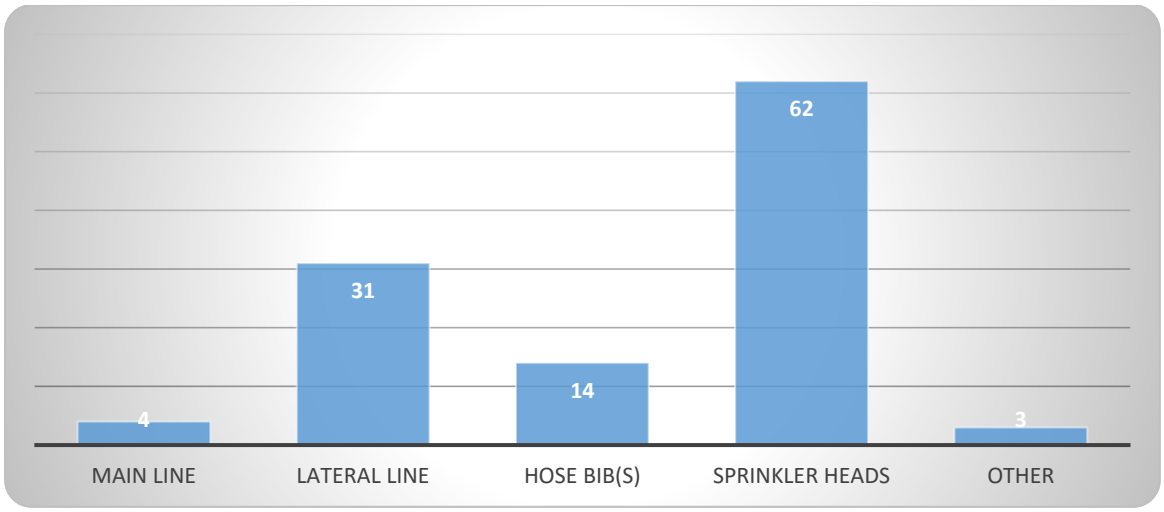

Figure 9. Percentage of sites with each of the observed locations leaks (%).

Irrigation Management

Irrigation management is captured in two manners: device type and interaction. Of the sites with a functioning irrigation system, 16% of the controllers were weather-based irrigation controllers and 65% of these were WaterSense labeled. However, 69% of the participants thought this meant that the system included soil moisture as a component of the weather-based system, a common misconception.

Figures 9 and 10 relate to the adjustment of irrigation schedule. Of this sample set, 66% of the participants manage the system by adjusting the irrigation controller's schedule themselves, followed by 21% that rely on a gardener. While self-reported, 54% of the participants adjust the schedule seasonally and 97% understand the percent adjust feature.

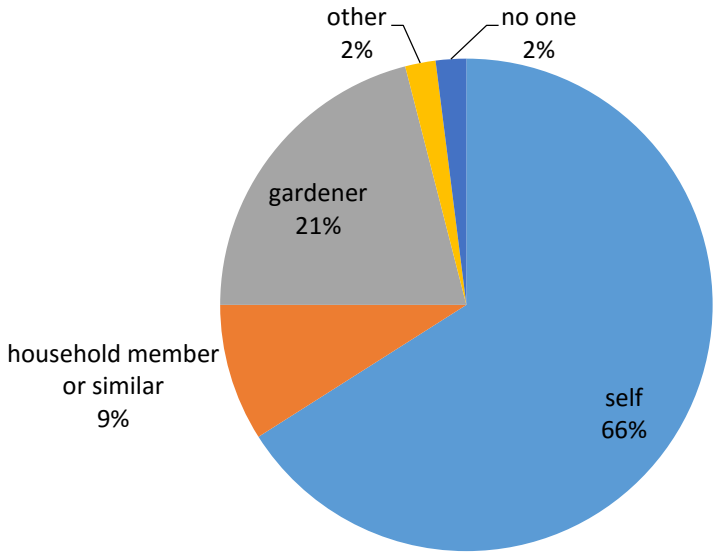

Figure 9. Who controls/adjusts the irrigation controller (self-reported).

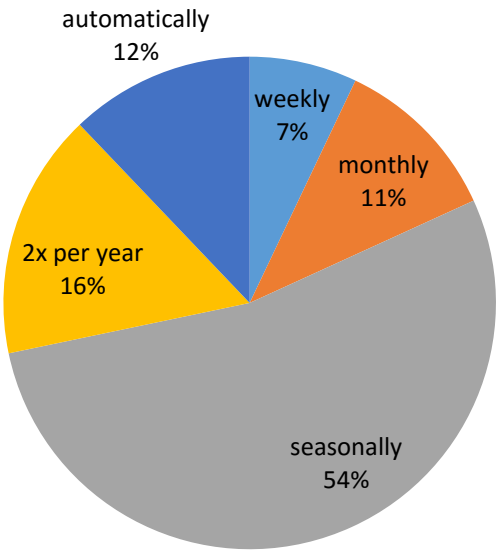

Figure 10. How often the schedule is adjusted (self-reported).

There are a variety of educational opportunities available to customers within Orange County. Two percent of the sample set were already subscribers to the California Sprinkler Adjustment Subscription Service (CSANS), hosted by MWDOC and funded through a previous USBR grant award, or similarly the Water Dex Program offered through Retail agencies such as Irvine Ranch Water District and Santa Margarita Water District.

Additionally, 13% have attended California Friendly Landscape Trainings (CFLT) funded by Metropolitan and host by the local retail water agencies. Thought the follow-up survey, 44% of the participants attended a CFLT course as a result of the Home Water Audit Report.

Follow-up Questionnaire Results

As part of the Home Water Audit Report, the participant was given to opportunity to amend their score and attain certification by completing a follow-up survey form noting the changes (including proof) made as a result of this program. Of the relatively small response rate (5% overall), all of the respondents had the indoor plus outdoor audit initially. Of these, 44% of the participants made indoor water savings modifications. Of the retrofits made within the home, upgrades to showerheads was the most common, followed by fixing leaks.

Of the 56% that reported upgrading aspects relating to outdoor water savings (Figures 11 and 12), the replacement of conventions spray heads to high efficiency nozzles or drip irrigation was the most common retrofit.

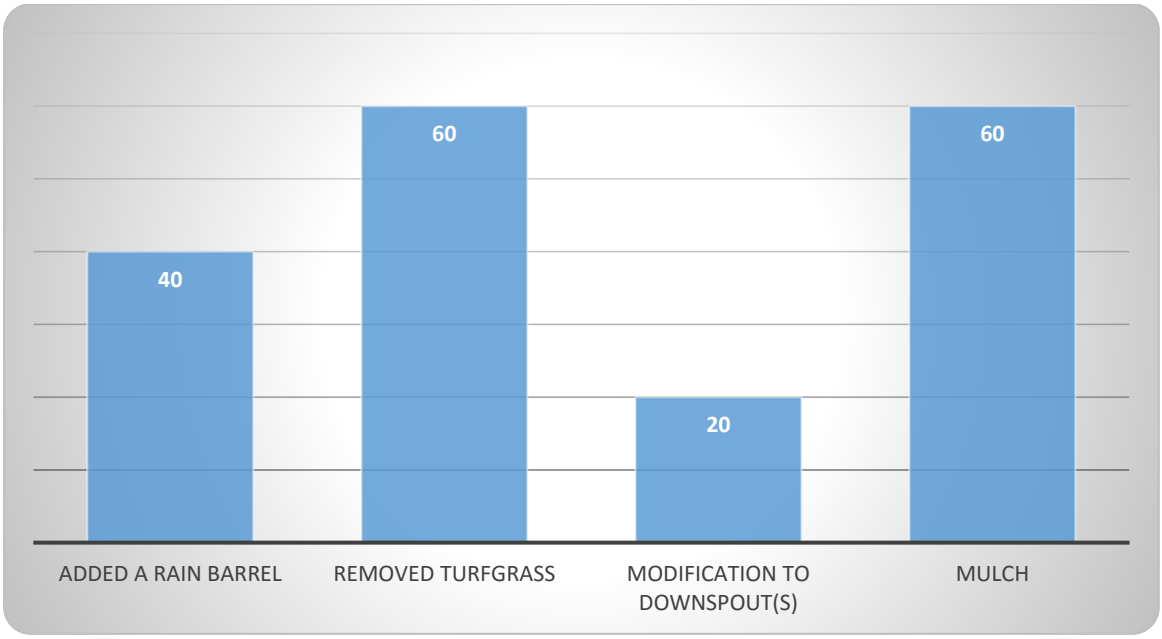

Figure 11. Self-reported landscape design modifications (%).

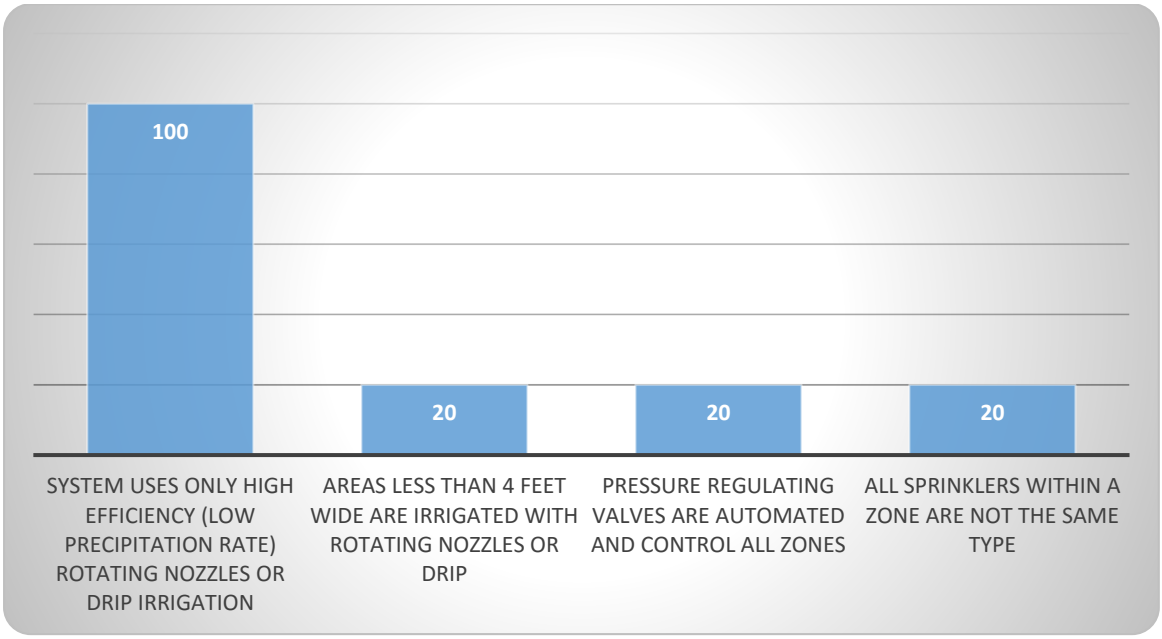

Figure 12. Self-reported irrigation system upgrades (%).

Through this follow-up survey, a number of questions were asked relating to choices on upgrades and retrofits (Table 5).

Table 5. Outdoor water saving component modified following participation in the program.

Component	Yes
Reduction of overspray to less than 12 inches	20%
Reduction of runoff (no runoff within 5 minutes of system running)	10%
Conversion to Drip/Micro-Irrigation	40%
Addition of a Weather-based Irrigation Controller	30%
Addition of a Soil-moisture Sensor	30%
Learned how to use the percent adjust feature	20%

As part of this program follow-up, MWDOC's outdoor rebate programs database was mined for the participants of this program. From this, it was observed that 19% of the participants who received a Home Water Audit Report participated in at least one other rebate program at a later date, and 7% participated in two programs.

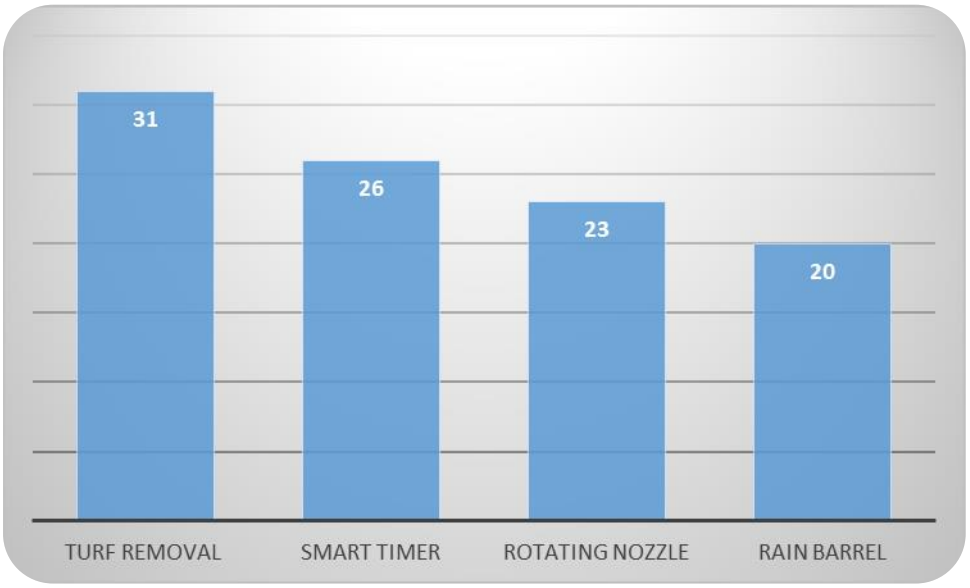

Figure 13. Rebate programs that customers participated in following the Home Certification Program (%).

Evaluation Conclusion

This Program evaluation utilized both follow-up self-reported results and well as mining MWDOC's outdoor rebate programs database to draw conclusions relating to the effectiveness of the Home Water Audit Reports. Through a comparison of the methods, it appears that the incentive of certification was not appealing enough to prompt follow-up through the online form to gain certification. However, the report did effectively result in participation in the associated rebate programs. The overall net water savings as a result of the Home Water Audits was 125 gallons per day. This is believed to be a

sustainable savings as result of fixture and appliance upgrades, this will result in a lifetime water savings of 1.4 acre-feet.

Concurrently, over the two-year term of the Project, MWDOC used a rebate program format to facilitate the installation of 1,055 residential smart timers and 112,526 rotating nozzles with verification. Overall, the Program exceeded the proposed goals of by 457%. Based on results of previous statistical evaluations, the projected water savings for this project was 138 acre-feet per year with a lifetime water savings of 1,292 acre-feet.