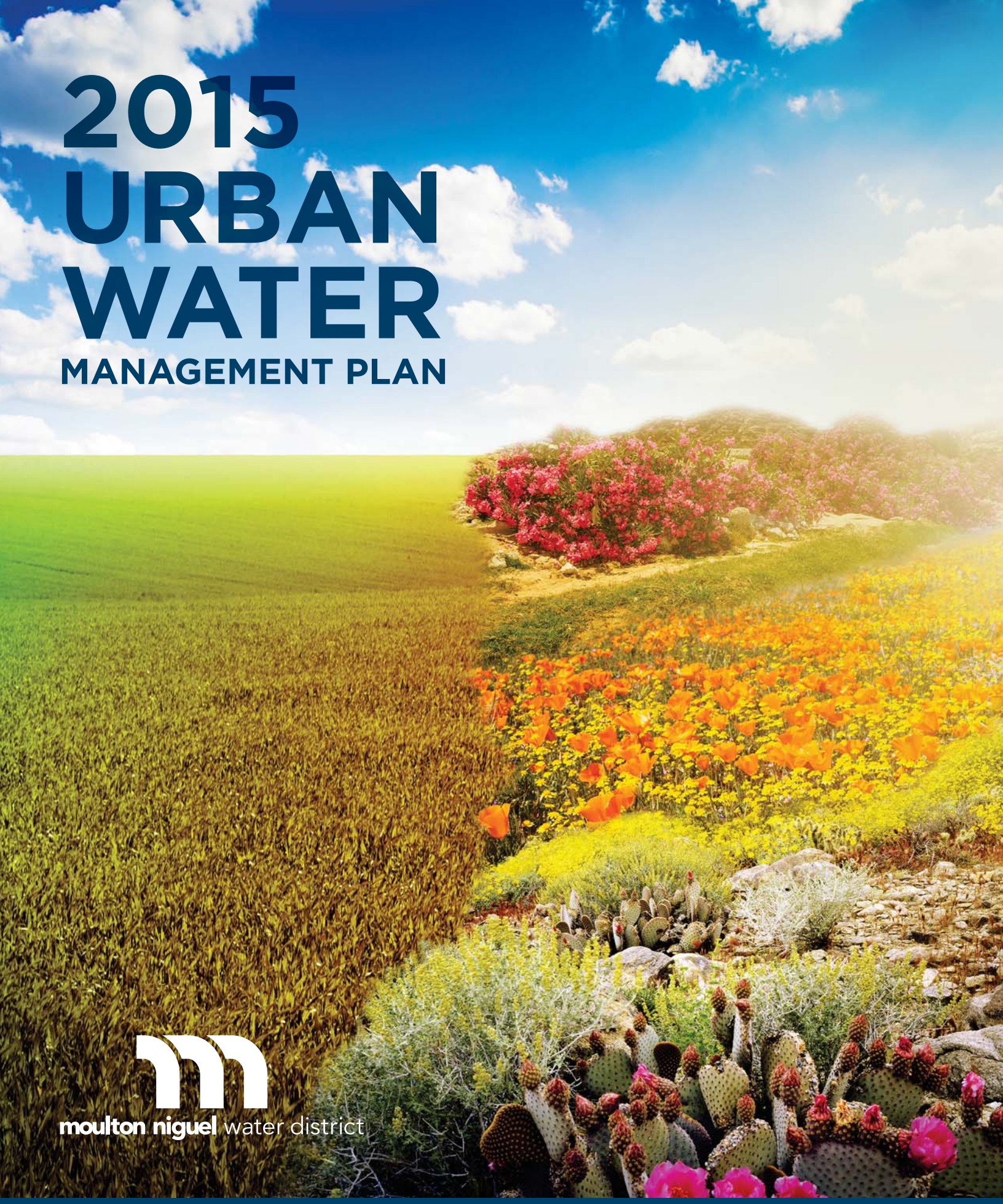
2015 URBAN WATER MANAGEMENT PLAN



moulton niguel water district

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Abbreviation	Definition
AF	Acre-Foot
AFY	Acre-feet per Year
TAF	Thousand Acre-Feet per Year
MAF	Million Acre-Feet per Year
cfs	Cubic Feet per Second
gpf	Gallons per Flush
hcf	Hundred Cubic Feet
GPCD	Gallons Per Capita per Day
MGD	Million Gallons per Day
AMI	Advanced Meter Infrastructure
AMP	Allen-McColloch Pipeline
AMSL	Above Mean Sea Level
AWE	Alliance for Water Efficiency
AWT	Advanced Wastewater Treatment
AWWA	American Water Works Association
BMP	Best Management Practices
BU	Billing Unit = 748 gallons or 100 Cubic Feet of Water
CDR	Center for Demographic Research
CEC	California Energy Commission
CII	Commercial, Industrial, and Institutional
COG	Council of Government
CUWCC	California Urban Water Conservation Council
CY	Calendar Year
DDW	The SWRCB's Division of Drinking Water
DPR	Direct Potable Reuse
DWR	Department of Water Resources
EOCF #2	East Orange County Feeder No.2
ET	Evapotranspiration is both the evaporation of water from the land surface and the transpiration of water through plants into the atmosphere
ETM	Eastern Transmission Main
ETWD	El Toro Water District
HET	High Efficiency Toilet
FY	Fiscal Year
GMFP	Groundwater Management & Facility Plant
GWRP	San Juan Groundwater Recovery Project
HECW	High Efficiency Clothes Washer

Abbreviation	Definition
IRP	Integrated Water Resource Plan
IPR	Indirect Potable Reuse
IRWD	Irvine Ranch Water District
JPA	Joint Powers Authority
JRTP	SOCWA's Joint Regional Treatment Plant
MNWD or District	Moulton Niguel Water District
MOU	Memorandum of Understanding Regarding Urban Water Conservation in California
MWDOC	Municipal Water District of Orange County
MWDSC	Metropolitan Water District of Southern California
RHNA	Regional Housing Needs Assessment
RSN	Rotating Spray Nozzles
SBX7-7	Senate Bill 7, Water Use Reduction Target
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCP	South County Pipeline
SCWD	South Coast Water District
SJBA	San Juan Basin Authority
SMWD	Santa Margarita Water District
SOCWA	South Orange County Wastewater Authority
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
UHET	Ultra High Efficiency Toilet
USBR	U.S. Department of the Interior, Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
UWMP	Urban Water Management Plan
WBBRS	Water Budget Based Rate Structure
WBIC	Weather Based Irrigation Controller
WUE	Water Use Efficiency
Allocation	Personalized Water Budget per Customer
Plant Factor	Water Needs of Specific Types of Plants

Executive Summary

Purpose

The California Urban Water Management Planning Act (enacted on January 1, 1984) requires that all urban water suppliers prepare and adopt an Urban Water Management Plan (UWMP) every five years. Since its enactment, there have been several amendments to the Act; most notably, the requirement that suppliers meet a 20 percent reduction in water use, measured in gallons per capita per day (GPCD) from an individualized agency baseline. The main goals of the UWMP are to: forecast future water demands and water supplies over the next twenty years under average, single-dry, and multiple-dry year conditions; identify plans for future water supply reliability projects; provide a summary of demand management actions, both implemented and planned; and provide both single and multi-dry year management strategies.

The integrated planning efforts required to develop an UWMP and meet the identified demand reduction goals have long been a part of the Moulton Niguel Water District's (MNWD or District) operations and planning. Organizationally, the cross departmental collaboration feeds into every planning document from the following:

- Long Range Reliability Plan to provide an adaptive management plan for ensuring reliable water supplies for the District's customers;
- Long Range Financial Plan to ensure the proposed projects and strategies represent the most cost effective approach;
- Recycled Water Master Plan to identify opportunities to further utilize wastewater for beneficial use; and now,
- UWMP, for which the 2015 update is the first UWMP the District has completed internally, which takes that collaborative cross-agency and regional approach that the District always strives towards.

Based on the innovation of the past and constant evolution in successful action, the District is well prepared to meet the existing and projected demands for the 20 year outlook of the 2015 UWMP. As shown in Figure ES 1, the District met its SBx7-7 2020 target of 173 GPCD by 2010. Despite having met its 2020 target a full decade early, the District is always mindful of the potential risks and uncertainty related to its water supply which may impact both long-term and emergency reliability. The District is also mindful of the potential impact increased reliability investments can have on customers as project costs are incorporated into their rates. To ensure continued reliability improvements without overburdening customers, the District has focused on increasing water use efficiency: the efficient use of water within the service area increases the reliability of existing supplies, which in turn maintains lower rates by offsetting the need for expensive capital projects to address supply shortfalls. This UWMP highlights many of the integrated and comprehensive strategies the District has utilized to

mitigate potential supply risks through demand management and cost-effective reliability investment.

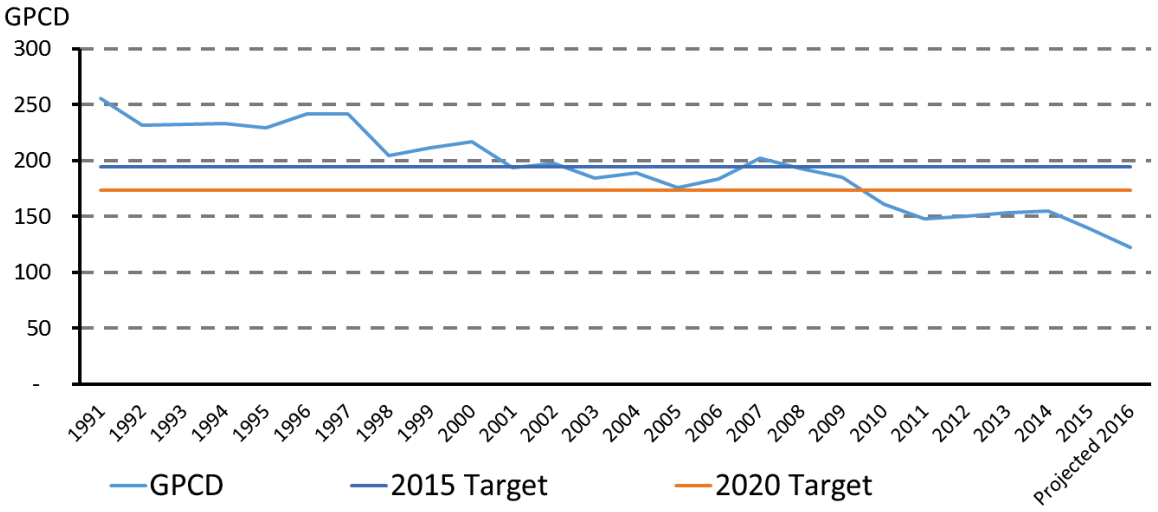

Figure ES 1: Target & Historical GPCD

Evolution of Reliability Planning

In the five years since the 2010 UWMP was published, the District's approach to maintaining water reliability has evolved from supply-driven projects into a comprehensive portfolio of both demand management strategies and sustainable supplies. This shift in focus reflects the need for both reliable infrastructure and efficient water use when planning to achieve cost effective long-term water reliability. Currently, the District's potable water demand is met entirely through deliveries of imported water from the Colorado River and the Sacramento Bay Delta provided by the Metropolitan Water District of Southern California (MWDSC). Significant uncertainties surround the continued reliability of both supply sources: the potential impacts of climate change, population growth, and natural disaster threaten to exacerbate the strain on this already scarce resource. While challenging, these uncertainties have represented an opportunity for the District to continue its history of innovation while becoming a statewide leader in demand management.

In 2007, the District had fewer than 2 days of average day demand in available supplies in the event that a catastrophic earthquake disabled the District's access to the MWDSC importation system or the Deimer Water Treatment Plant. Recognizing the risk such an event posed to the service area populace, the District's Board of Directors (Board) voted to adopt Resolution 08-38, which set a policy establishing a system reliability goal of 31 days of average day demand. Since the policy's adoption in 2008, the District has emphasized a combination of demand management and supply development in order to increase system reliability without unduly burdening its rate payers. In tandem with comprehensive demand management, the District has invested over $70 million in system reliability projects since 2008. The proactive foresight and action by the District's Board of Directors to make investments in regional system reliability projects such as the Upper Chiquita Reservoir, the Baker Water Treatment Plant and the Irvine Ranch Water District (IRWD) Intertie brought average day demand up to nearly 15 days of average day demand. Water reliability infrastructure investments in combination with active demand management programs have transformed the long-term system reliability outlook for the District,

shown in Figure ES 2. As of March 2016, the District has reached over 24 days of average day demand to provide water to customers in the event of an emergency outage from MWDSC imported water delivery facilities.

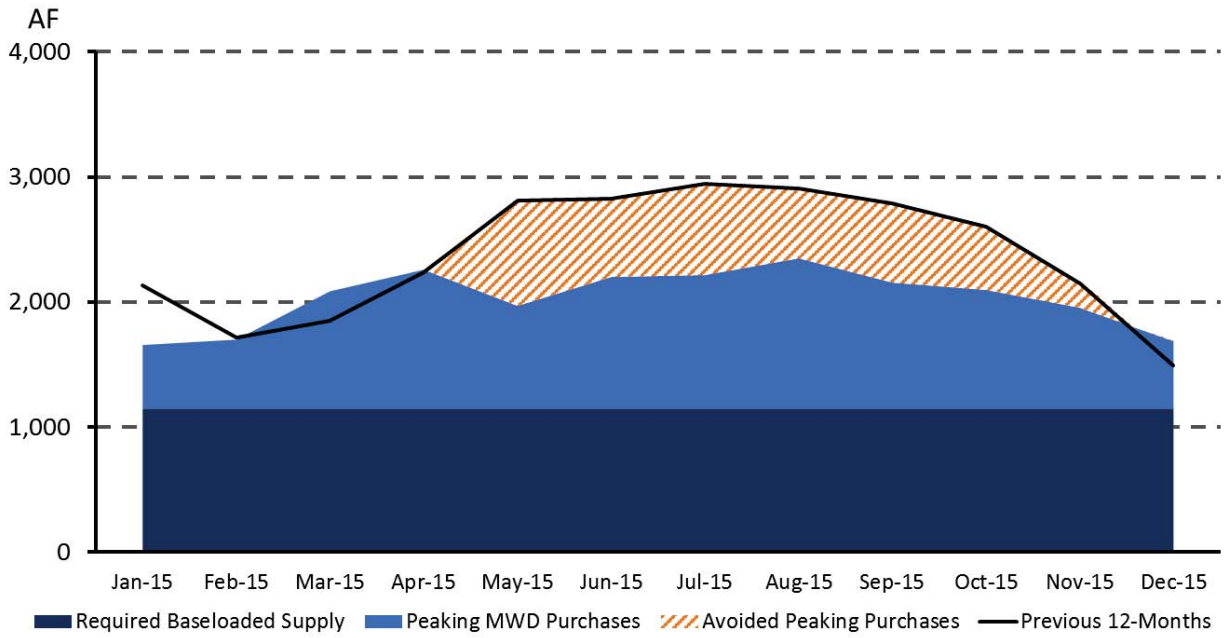

Figure ES 2: Reliability Benefits of Demand Management

The reliability benefits of the District's demand management efforts are illustrated in Figure ES 2. The orange striped area represents over 4,000 AF of summer peaking purchases that were avoided as a result of demand management. Figure ES 2 also shows a breakdown of 2015 water purchases by supply types. The dark blue area represents the required base loaded supplies that the District must maintain or risk paying fixed costs without receiving the full reliability benefit of its investments, i.e. the base-loaded supply that is utilized by past reliability projects. The light blue area represents the peaking imported water purchases which could potentially be offset by new reliability projects. Given winter demand reductions of over 30% in the past 10 years and expected future indoor efficiency gains of up to 17%, the margin of opportunity for new supplies to improve reliability is limited unless they offset existing base loaded supplies. As the District evaluates system reliability projects to meet the Board adopted policy of 31 days of average day demand, consideration must be made for the impacts of future demand management to winter demands and whether the proposed projects offset the dark blue area or the light blue area in Figure ES 2.

The comprehensive supply and demand actions implemented since 2008 are a reflection of the District's history of innovation and promotion of efficient water use through the early adoption of recycled water through partnerships with its customers. The District was a pioneer in utilizing treated secondary effluent to irrigate golf courses in the late 1960s. Since that time, the District has continued to expand the use of recycled water throughout its service area. The District pursues irrigation customers that are ideal candidates for conversion to recycled water and, to date, approximately 25 percent of the District's

total demand and over 70 percent of water demand of dedicated irrigation meters is supplied by recycled water.

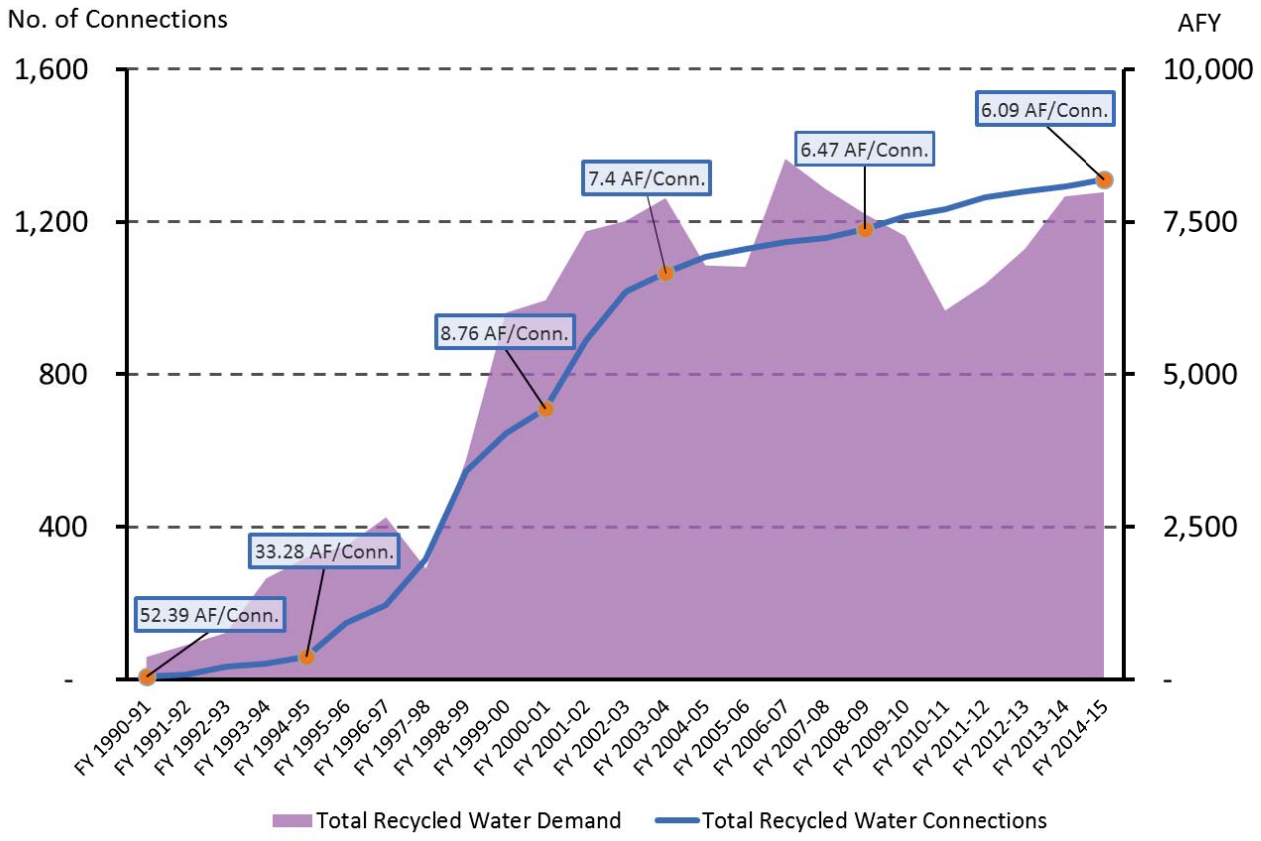

Figure ES 3: Recycled Water System Expansion Summary

Figure ES 3 shows the expansion of recycled water to customers, represented by the blue line, alongside total annual recycled water usage, represented by the purple area. The data labels shown in Figure ES 3 identify the AF of recycled water demand per connection for a given fiscal year. As a result of the demand management policies the District has implemented, recycled water customers have dramatically increased their water use efficiency as shown by the decrease in usage per connection over the past twenty-five years. The development and utilization of this locally created supply directly contributes to system reliability: each gallon of recycled water produced within the District represents a gallon of potable water that can now be stored for other essential use. Today, over two-thirds of all wastewater generated within the District's service area is put to beneficial reuse on landscapes.

However, as the recycled water system has expanded and customers have installed efficient indoor devices, the supply of recycled water in the summer has been unable to keep up with peak demand. Irrigation customers typically use six to eight times more water in the summer than they do in the winter, creating a strong summer peaking of demand: conversely, the wastewater used to produce recycled water is generated uniformly throughout the year because indoor water usage does not vary seasonally. The disparity between the demand for recycled water to be used for irrigation and the

supply of available wastewater used to meet that demand limits the total amount of recycled water that can be used on-demand within the District. Moving forward, the District will continue to consider wastewater a valuable resource and evaluate cost-effective means to put unutilized supplies to beneficial use. As part of the District's comprehensive planning efforts, a regional Recycled Water Master Plan is under development which will identify opportunities to work across agency boundaries to utilize wastewater for beneficial reuse regardless of which service area it is generated in. A number of recycled water projects are under consideration for the future including seasonal storage to increase peak recycled water supply and potential indirect or direct potable reuse opportunities that may become possible as regulations develop.

Expansion of the recycled water system will continue to be a major component of the District's reliability improvements, but not without cost. It is imperative that the District continue to encourage the efficient use of recycled water so as to minimize the size, and ultimately cost, of future reliability projects to minimize impacts to rates.

Demand Management: Past, Present and Future

Implementation of the current comprehensive demand management programs did not happen overnight. In an effort to reduce water usage during the 2009 to 2010 drought, the District issued a mandate specifying which days of the week customers could irrigate. The mandate was paired with a strong enforcement effort, which resulted in nearly 20,000 warning letters and fines being issued to customers. Ultimately, the strategies resulted in negligible water usage reductions, as many customers would over-irrigate on watering days, and created resentment from customers who now viewed the District as "water cops". The experience taught the District that any demand management policy must maintain customer choice and equity in order to provide disincentive for water waste. The goal of an effective demand management policy should be to achieve demand reductions through informed decisions by customers about how they choose to use water. The first step in implementing the District's demand management portfolio began on July 1, 2011 with a strong pricing signal for customers to be efficient through a water budget based rate structure.

As an immediate follow-up to the creation of the water budget-based rate structure, the District created a rebate program to reduce the cost of customer compliance with their individually calculated water budgets. Rebates are offered for transforming landscapes to low water use plants, and for both irrigation efficient devices and indoor water efficient devices. Customer participation since 2010 has been tremendous with over 17,000 rebates sent out for conservation actions through the end of 2015.

The five year period since the 2010 UWMP marked one of the driest periods in California history: the 2014 hydrologic year was one of the driest in the past century, and 2015 had the lowest snowpack in 500 years. Concern that the drought would continue beyond the five year mark, as happened in Australia, has led to unprecedented policy actions at the State level. In the summer of 2014, Governor Brown tasked the State Water Resources Control Board (SWRCB) with implementing statewide mandatory conservation actions after Californians failed to meet voluntary conservation targets that had been established in January 2014. To meet this task, the SWRCB identified and restricted several

types of “wasteful” outdoor watering activities. Effective August 2014, local water agencies were required to enforce the SWRCB restrictions; however, an alternative compliance mechanism was created which exempted agencies from the mandatory two days per week watering restriction in the event that they had “superior” conservation measures in place, such as a water budget-based rate structure. The District submitted an Alternate Plan for Demand Reductions that outlined a comprehensive drought response strategy. The plan included:

- Improving water loss detection and system real loss reductions
- Expansion of water use efficiency programs including doubling the budget for conservation based rebates and programs
- Expansion of water conservation education and outreach
- Increased recycled water use through dedicated landscape conversions
- Improvements to the water budget-based rate structure including
    - Plant factor reduction
    - Indoor allocation reduction
    - A drought penalty mechanism

The District’s Alternate Plan was one of only two Alternate Plans to be approved, and the integrated drought response strategy outlined in the District’s Alternate Plan has received accolades from the SWRCB as a best practice in the industry in rate design and as a case study in the appendices of the 2015 Urban Water Management Plan Guidebook by the California Department of Water Resources.

As part of the rate rollout and due to the historic low snowpack, the District implemented a targeted and strategic marketing strategy based on much of the information collected through the rate structure. Targeted messages were sent via postcards and email blasts to customers who met certain criteria (such as having more than 1,000 square feet of irrigable area and falling within 2 ccf of going over their individually calculated water budget). For instance, customers without yards were targeted with messages to look for indoor leaks while customers with yards were targeted with outdoor conservation actions. By utilizing the account information collected to calculate customer water budgets, the District was able to not only ensure the right message was sent to the right customers, but also that postage and printing costs were kept to a minimum. Additionally, the District has ventured into targeted digital marketing through Facebook and Linkedin. Partnerships with local Cities and Chamber of Commerce has been critical to the success of getting the word out to customers. Through these partnerships, the District has lead collaboration efforts on events such as the now annual LiveSmart event as well as community ads for conservation through such venues as street banners. *Figure ES 4* depicts the recent implementation of integrated demand management programs, including: rate modifications, and penalties for wasteful use alongside the District’s marketing efforts.

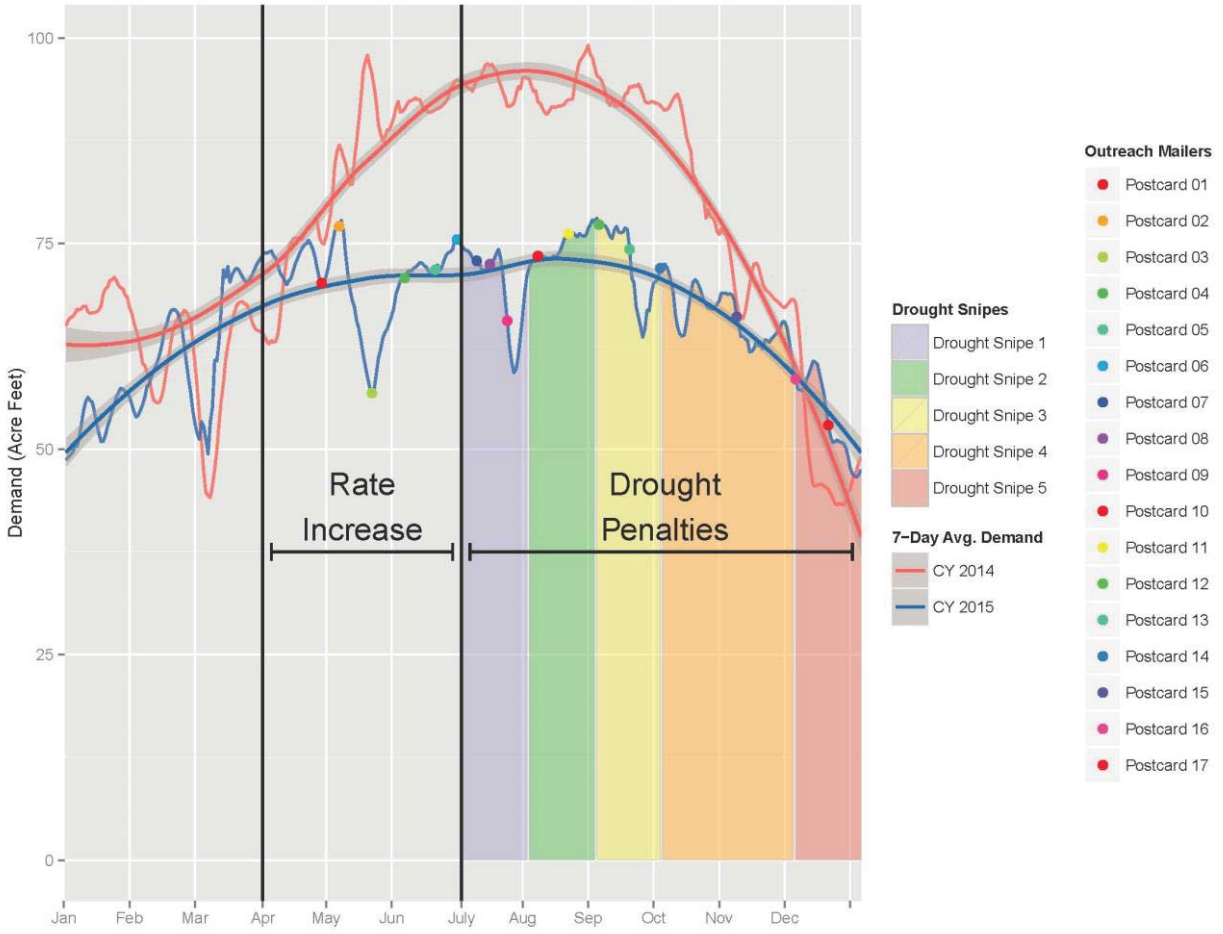

Figure ES 4: Summary of 2015 Demand Management Actions' Impact

Providing customers with the opportunity to make informed decisions about their water usage has created profound reliability benefits: customers' response to the combination of strong price signals and timely outreach materials resulted in a reduction of over 4,000 AF in peak summer water use. Targeted marketing and education materials in combination with drought penalties for wasteful use led to the most efficient level of water usage amongst single family residential customers in the District's history.

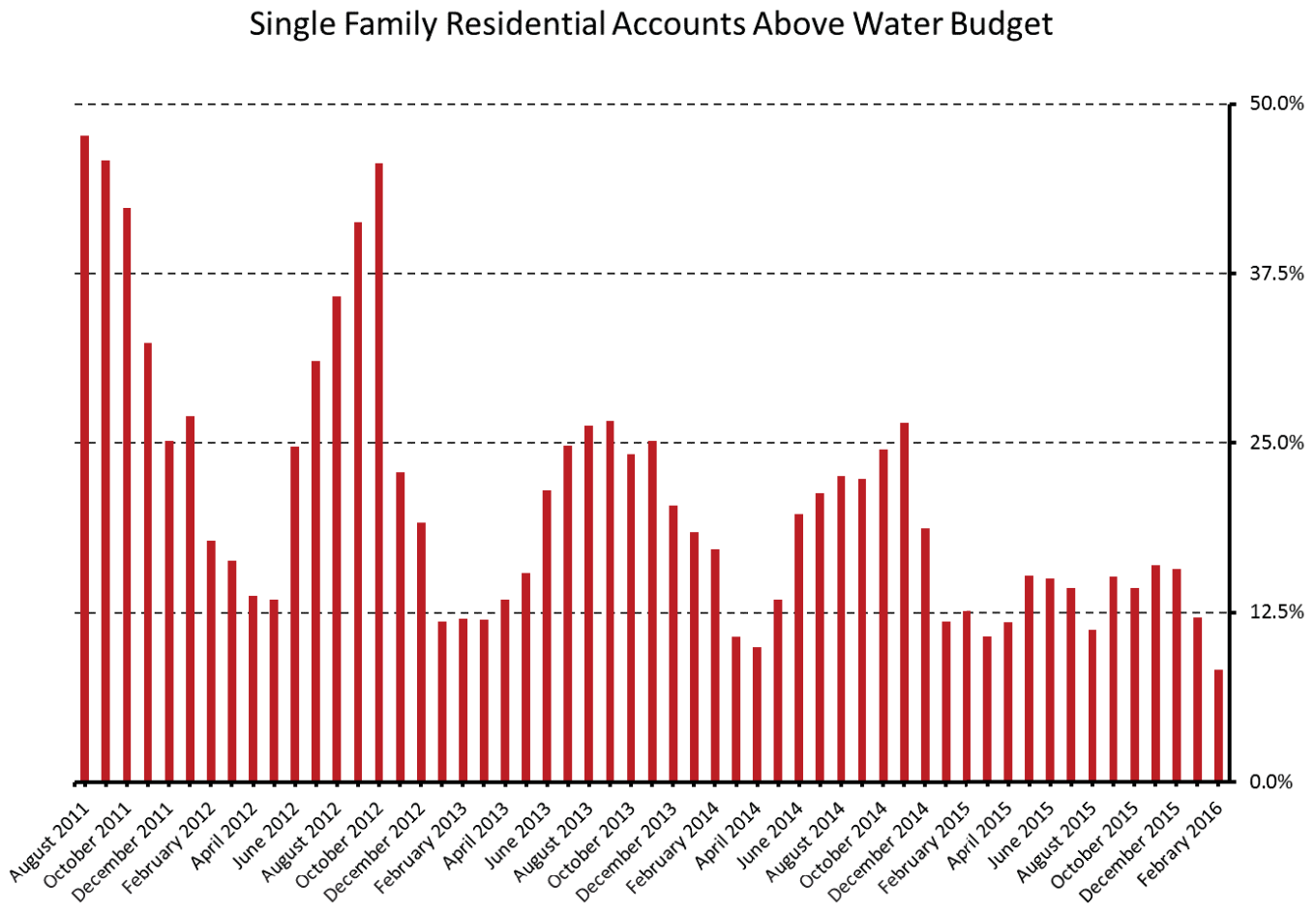

Figure ES 5: Single Family Residential Customers Over-Budget

Figure ES 5 above shows the percentage of single family residential accounts which used water in excess of their individually calculated water budget. The historic level of efficiency occurred during February 2016 and is part of an overall decrease in the percentage of inefficient single family residential accounts.

The impact of both the expansion of the recycled water system and demand management program expansion since 2010 are shown in *Figure ES 6*.

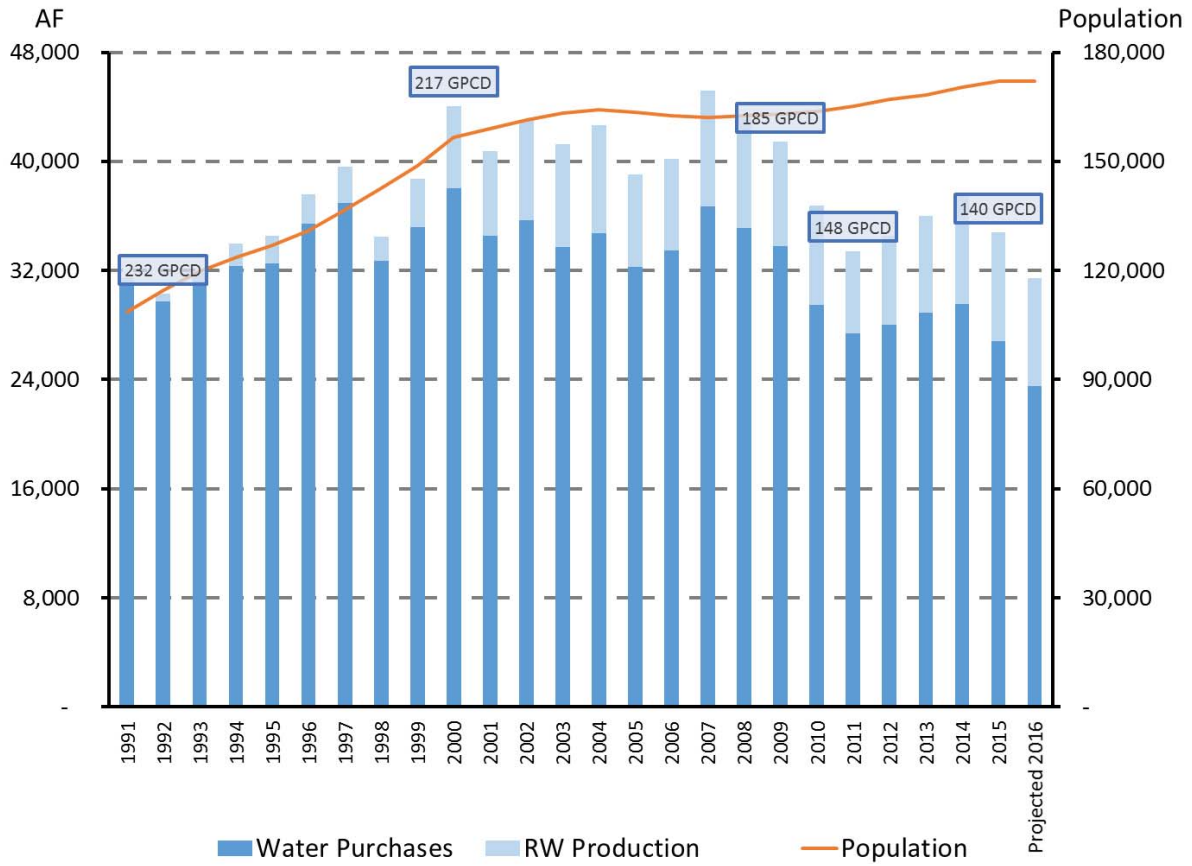

Figure ES 6: Historical Recycled Water and Imported Water

The reliability benefits of the District's integrated and comprehensive approach to demand management are evident in its changing water usage and production characteristics. Total water use is about the same today as it was in 1991; however, the District's reliance on imported water purchases has decreased substantially. Expansion of the recycled water system has created a local supply that reduces the District's dependence on imported water to 75 percent of it was in 1991. Another key distinction between water usage today and that of 1991 is that the District now serves approximately 64,000 more people, a near 60 percent increase in population. Because customers today are using approximately 55 percent of the water their 1991 counterparts were, the District has been able to keep the size and cost of reliability projects lower than they would be otherwise. The District is more reliable today because of its reduced dependence on imported water through capital investment, and has been able to do so cost-effectively because customers are using water much more efficiently.

The District recognizes that there are always ways to improve and learn how to be more cost effective in the policies and programs implemented. To that effect, the District has engaged in three key partnerships:

- The District is working with Stanford University to evaluate the impact of conservation messages on residential water use to better inform targeted marketing

- The University of California at Riverside is evaluating the impact of both the rate structure and conservation-based incentives on reducing water use and the factors that lend to a higher customer participation rate.
- Lastly, the District is working with agencies across the State to support sustainable water efficiency statewide by centralizing customer level water usage data. Modern data science tools have tremendous value and create economies of scale for evaluating past demand management programs and setting future policies. This initiative envisions continuing to work together collaboratively across water utilities to achieve the vision of integrating the entire lifecycle of California's water data to meet the Governor's Water Action Plan goal of making "conservation a way of life."

Conclusion

The District is well prepared to meet the water reliability needs of future droughts through the proactive and integrated planning highlighted in this UWMP. In July of 2015, the District was nearly 20 percent below its 2020 target, and is projected to meet the future water needs of its customers. However, the District recognizes that potential risks posed to current supply by climate change and regional growth will only continue to increase and that the availability of water supply will only to deteriorate without forward thinking action. Because of current reliance on imported water, the greatest risk to the District is a systemic Bay Delta levee failure or major earthquake knocking out the MWDSC importation system. Developing local base loaded supplies will be critical to improving system reliability in order to mitigate the risk of an importation system outage.

As it moves through the UWMP planning period, the District will draw on its partnerships with customers and cities to further improve its demand management programs and adaptively fill in supply gaps with sustainable water resource projects. These partnerships will be critical to providing the greatest level of reliability at the lowest cost to customers. Looking beyond the UWMP 2040 planning horizon, the District envisions a transformed area landscape made possible by continued implementation of its proven demand management strategies. The District with continue to mitigate future risk by utilizing its rate structure to adjust water budgets in response to supply conditions, and increasing the adoption of water efficient technologies through rebates and education while pursuing opportunities to maximize recycled water production potential in combination with other water supply alternatives. Lastly, continued pursuit of statewide and local partnerships will be critical for managing water toward the public good because we as Californians are in this together.

Chapter 1 Introduction

Section 1.1 Urban Water Management Plan Requirements

Water Code Sections 10610 through 10656 of the Urban Water Management Planning Act (Act) require every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an Urban Water Management Plan (UWMP) with the California Department of Water Resources (DWR) every five years in the years ending in zero and five. The 2015 UWMP updates are due to DWR by July 1, 2016.

This UWMP provides DWR with a detailed summary of present and future water resources and demands within the Moulton Niguel Water District (MNWD) service area and assesses its water resource needs. Specifically, the UWMP provides water supply planning for a 20-year planning period in five-year increments and identifies water supplies needed to meet existing and future demands. The demand analysis must identify supply reliability under three hydrologic conditions: a normal year, a single-dry year, and multiple-dry years. MNWD's 2015 UWMP updates the 2010 UWMP in compliance with the requirements of the Act as amended in 2009, and includes a discussion of:

- Water Service Area and Facilities
- Water Sources and Supplies
- Water Use by Customer Type
- Demand Management Measures
- Water Supply Reliability
- Planned Water Supply Projects and Programs
- Water Shortage Contingency Plan
- Recycled Water Use

Since the original Act's passage in 1983, several amendments have been added. The most recent changes affecting the 2015 UWMP include Senate Bill 7 as part of the Seventh Extraordinary Session (SBx7-7) and SB 1087. SBx7-7, or the Water Conservation Act of 2009, is part of the Delta Action Plan that stemmed from the Governor's goal to achieve a 20 percent statewide reduction in urban per capita water use by 2020 (20 by 2020). Reduction in water use is an important part of this plan that aims to sustainably manage the Bay Delta and reduce conflicts between environmental conservation groups and water supply providers; it is detailed in Section 3.2.3. SBx7-7 requires each urban retail water supplier to develop urban water use targets to achieve the 20 by 2020 goal and the interim ten percent goal by 2015. Each urban retail water supplier must include in its 2015 UWMPs the following information from its target-setting process:

- Baseline daily per capita water use
- 2020 urban water use target
- 2015 interim water use target compliance
- Compliance method being used along with calculation method and support data
- An implementation plan to meet the targets

Retail water suppliers such as MNWD are required to include an assessment of present and proposed future measures, programs, and policies that would help achieve the 20 percent water use reduction by the 2020 goal. The District is currently well below its 2020 target but aims to implement further measures towards further increasing water reliability in the service area.

The other recent amendment, made to the UWMP Act on September 19, 2014, is set forth by SB 1420, Distribution System Water Losses. SB 1420 requires water purveyors to quantify distribution system losses for the most recent 12-month period available. The water loss quantification is based on the water system balance methodology developed by the American Water Works Association (AWWA).

This 2015 Plan also incorporates MNWD's current and planned water use efficiency efforts pursuant to the *Memorandum of Understanding Regarding Urban Water Conservation in California* (MOU). MNWD became a signatory and adopted the MOU in 1991.

An UWMP may serve as a foundational document and source of information for a Water Supply Assessment, (CA Water Code Section 10910 et seq.), and a Written Verification of Water Supply, (CA Water Code Section 66473.7). Both statutes require detailed information regarding water supply availability be provided to city and county decision makers prior to approval of specified large development projects. Additionally, a UWMP also serves as a

- Long-range planning document for water supply;
- Long-range planning documents for water use efficiency;
- Source data for development of a regional water plan;
- Source document for cities and counties, as they prepare their General Plans;
- Key component of an Integrated Regional Water Management Plan; and
- Condition to qualify for receipt of certain State grant funds.

Table 1-1: DWR Table 2-2: Plan Identification

DWR Table 2-2: Plan Identification (Select One)		
☑	Individual UWMP	
☐	Regional UWMP (RUWMP)	
	Select One:	
	☐	RUWMP includes a Regional Alliance
	☐	RUWMP does not include a Regional Alliance
NOTES:		

The sections in this UWMP correspond to the outline of the Act, specifically Article 2, Contents of Plans, Sections 10631 through 10634. The sequence used for the required information, however, differs slightly in order to present information in a manner reflecting the unique characteristics of MNWD. The

UWMP Checklist, which identifies the location of Act requirements in this Plan, is included in Appendix 1. This is an individual UWMP for a retail agency, as shown in Table 1-1 and Table 1-2. Table 1-2 also indicates the units that will be used throughout this document.

Table 1-2: DWR Table 2-3: Agency Identification

DWR Table 2-3: Agency Identification	
Type of Agency (select one or both)	
☐	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables Are in Calendar Years
☑	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Day that the Fiscal Year Begins	
7/1	
Units of Measure Used in UWMP (select one)	
☑	Acre Feet (AF)
☐	Million Gallons (MG)
☐	Hundred Cubic Feet (CCF)
NOTES: Fiscal year begins on July 1st of each year.	

Chapter 2 System Description

The Moulton Niguel Water District (MNWD) was formed on November 16, 1960, under the provisions of the California Water District Law, Division 13, of the Water Code of the State of California, commencing with Section 34000. Prior to the formation of the water district, the lands within the service area were primarily utilized for livestock grazing, with a small area devoted to citrus and field crop production limited by the lack of adequate local water supplies. The District was initially formed by local ranchers in order to secure a reliable water supply for their herds.

In 1961, the District entered into several agreements with surrounding water agencies to bring reliable supplies of water to the area including an agreement to bring treated water to the District from East Orange County Feeder Number 2 through the Tri-Cities Transmission Main. The District sold its first waterworks bond for $6,700,000 to fund construction of the imported water pipelines. The construction of the transmission main was a joint project between the District, Tri-Cities Municipal Water District (a district that dissolved in 2000 and South Coast Water District assumed operation of the pipelines and infrastructure on a contract basis for what is now identified as the Joint Regional Water Supply System), Irvine Ranch Water District (IRWD), and Orange County Water Works #4 (now the City of San Juan Capistrano). This transmission line was the District's only source of water for many years. The current transmission mains are described in more detail in Chapter 5.

In 1964, an amendment to the California Water District Act was passed with respect to granting water districts the power to enter into sewage treatment and water reclamation activities. As early as 1968, a study was authorized to consider the use of treated secondary wastewater effluent for use as irrigation for the El Niguel Golf Course. In 1976, the District's 3A treatment plant was the site for the pilot "Bullrush Project" undertaken in conjunction with the Biological Water Purification Company to do advanced "tertiary" treatment of wastewater for use on landscapes. Water demands increased as the population growth continued to rise throughout the 1970s and 1980s.

The District has grown tremendously since its creation: initially formed by local ranchers to provide water service to a mere eight accounts, the District now provides water, recycled water, and wastewater service to more than 170,000 people within a 37 square mile service area covering portions of six cities in southern Orange County.

As of July 2015, the District service area is largely built-out and includes portions of the cities of Aliso Viejo, Laguna Niguel, Laguna Hills, Mission Viejo, San Juan Capistrano, and Dana Point. While its operations have evolved along with the growth of its service area, the District's primary focus has remained largely unchanged: ensuring ratepayers have a reliable, sustainable, and economical water supply for the future. Figure 2-1 shows the service area and the portions of the six cities served by MNWD.

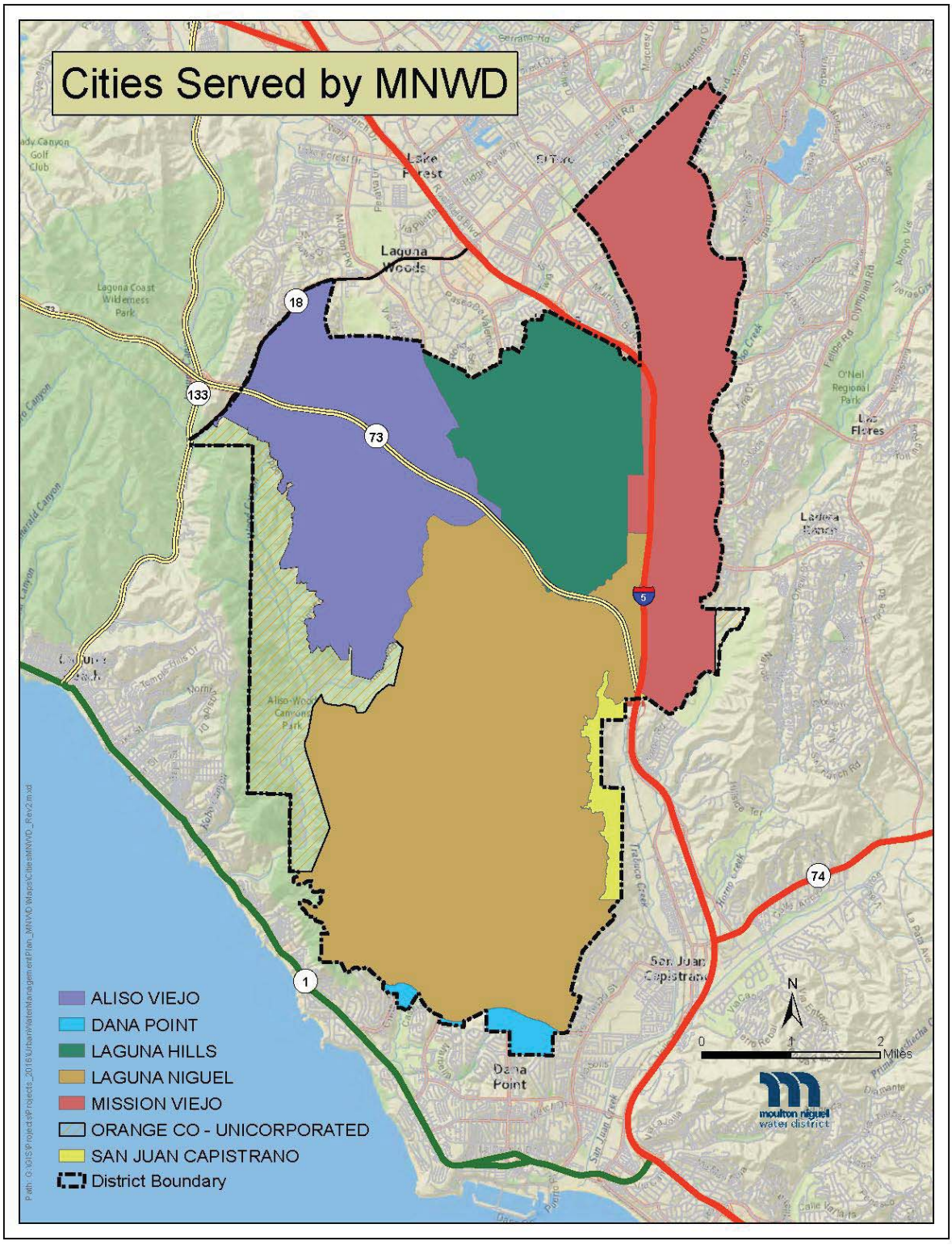

Figure 2-1: Cities Served by MNWD

Section 2.1 Water Supply and Services

The District's current water needs are met by a combination of imported potable water and recycled water. The District's potable demands are supplied from imported sources via Metropolitan Water District of Southern California (MWDSC). The recycled water supply is locally sourced and has steadily increased to account for almost 25 percent of the overall water supply in the District.

The District has experienced a decrease from its peak water demands in 2007 and is well below the SBx7-7 target of 20 percent reduction:

- Overall reduction in total water demands of over 23 percent since the peak in 2007
- Reduction in potable demands of over 26 percent directly attributable to water conservation programs and implementation of an allocation-based rate structure.

This dramatic decrease occurred concurrently with a population increase of almost 3 percent since 2007 and a sustained economic recovery.

The District's water demands vary seasonally, creating peak demands in the summer. The District's service area has experienced below average precipitation over the last four years which typically would increase outdoor watering for landscapes. However, potable demands have decreased. This has been accomplished by implementing an effective, and proven demand side management strategy. The key to the District's success in reducing water demands has been the implementation of an allocation-based rate structure, also known as a "Water Budget Based Rate Structure" (WBBRS). In concert, the District has utilized various conservation programs which focus on incentives and outreach, and an ambitious schedule for converting potable irrigators to recycled water.

Section 2.1.1 Potable Water Service

As noted above and as further discussed below, the District imports all of its potable water from MWDSC through its member agency, the Municipal Water District of Orange County (MWDOC), a wholesale importer of water from MWDSC. In an average year, approximately 43 percent of the District's imported water supply is delivered via the State Water Project and the remaining 57 percent is delivered via the Colorado River Aqueduct. All of the District's potable water is currently treated at the Robert B. Diemer Filtration Plant in Yorba Linda. Starting in the fall of 2016, nearly one-third of the potable water used at the District will be treated at the Baker Water Treatment Plant in Lake Forest. The treated water is then delivered through three major transmission facilities: the South County Pipeline, the East Orange County Feeder #2, and the Allen-McColloch Pipeline (AMP).

The District operates and maintains approximately 663 miles of potable water distribution pipelines. In addition, the District has 26 steel and 2 pre-stressed concrete operational storage reservoirs for a total potable water storage capacity within the District of approximately 70 million gallons. The District owns capacity rights in several adjoining water agencies' reservoirs and pipelines such as El Toro Water District R-6 Reservoir; Santa Margarita Water District (SMWD) Upper Chiquita Reservoir; Joint Transmission Main (a joint powers agreement between the District and other water agencies); Eastern Transmission Main jointly owned by the District and the City of San Juan Capistrano; and the South County Pipeline, which conveys water from the AMP to several south county water agencies. The

District also operates 22 pump stations to pump water from lower pressure zones to the higher pressure zones and 20 pressure reducing stations and flow control facilities to convey water from high to low zones. Figure 2-2 shows the main takeout structures, pump stations and reservoirs for the potable water system.

Figure 2-2: MNWD - Potable Water System

Section 2.1.2 Wastewater Services

The District maintains approximately 504 miles of wastewater collection pipelines. The District's wastewater system has 16 lift stations that pump wastewater over the ridge lines to the various treatment plants for treatment and recycling. The District participates in the South Orange County Wastewater Authority (SOCWA), a joint powers agency comprised of ten governmental agencies, which operates three regional treatment plants which the District owns capacity in and two ocean outfalls. The District also owns a fourth wastewater treatment plant, Plant 3A, which is operated by SMWD by agreement. Figure 2-3 shows the wastewater trunk lines, lift stations and treatment plants.

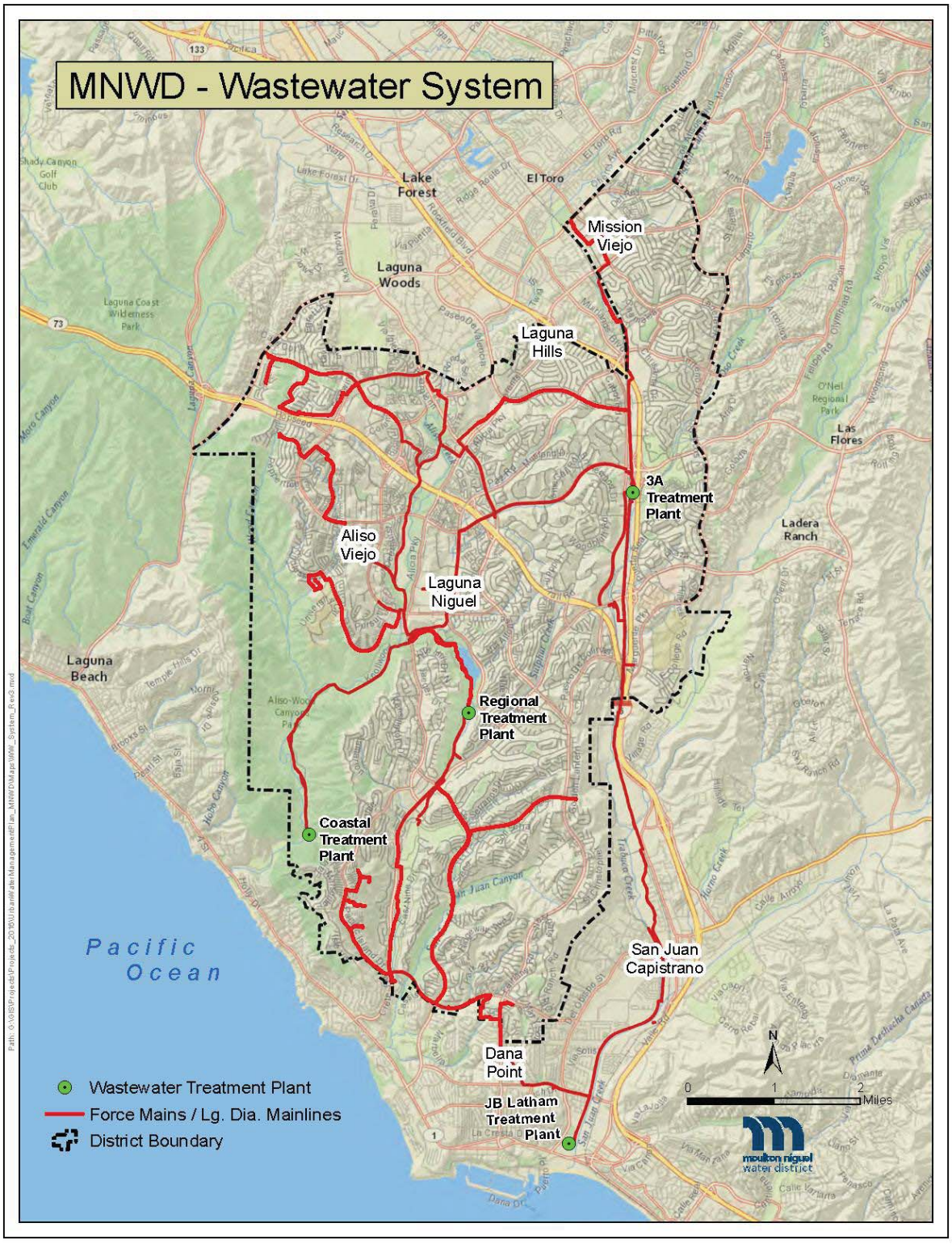

Figure 2-3: MNWD - Wastewater System

Section 2.1.3 Recycled Water Supply and Services

It is the policy of the District to promote the use of recycled water to provide for the conservation and reuse of all water resources, and to utilize this resource for any approved purpose to the maximum extent possible under the laws of the State of California. As described throughout this 2015 UWMP, this policy and practice enables MNWD to substantially minimize the need to import water from other regions. In 1974, the District became one of the first water providers in Orange County to deliver recycled water for irrigation use.

Today, the District owns two Advanced Wastewater Treatment (AWT) facilities providing expansive recycled water service for landscaping. The District has constructed approximately 140 miles of recycled water distribution pipelines with five pre-stressed concrete and six steel storage reservoirs to service the recycled water system. The District operates 10 recycled-water pump stations. In addition, the District owns 1,000 acre-feet of capacity rights in the Upper Oso recycled water reservoir, owned by Santa Margarita Water District. The projected annual demand of the recycled water system will be approximately 8,000 acre feet per year over the next few years.

During the development of the Long Range Water Reliability Plan, the District identified recycled water as its highest priority alternative water supply source. The District has initiated a Recycled Water Master Plan to evaluate additional recycled water supply sources and available opportunities to expand its system while maximizing all available wastewater resources. In addition to evaluating opportunities within the District, regional recycled water systems were integrated into the analysis to evaluate opportunities to think about how to utilize recycled water across agency boundaries. Currently, approximately 50% of dedicated irrigation meters are served with recycled water and about two-thirds of all dedicated irrigation water use is met with recycled water. The largest irrigation sites were historically first targeted for recycled water conversion due to the economy of scale in meeting larger water consumers' demands. Figure 2-4 shows the recycled water transmission mains, pump stations and reservoirs.

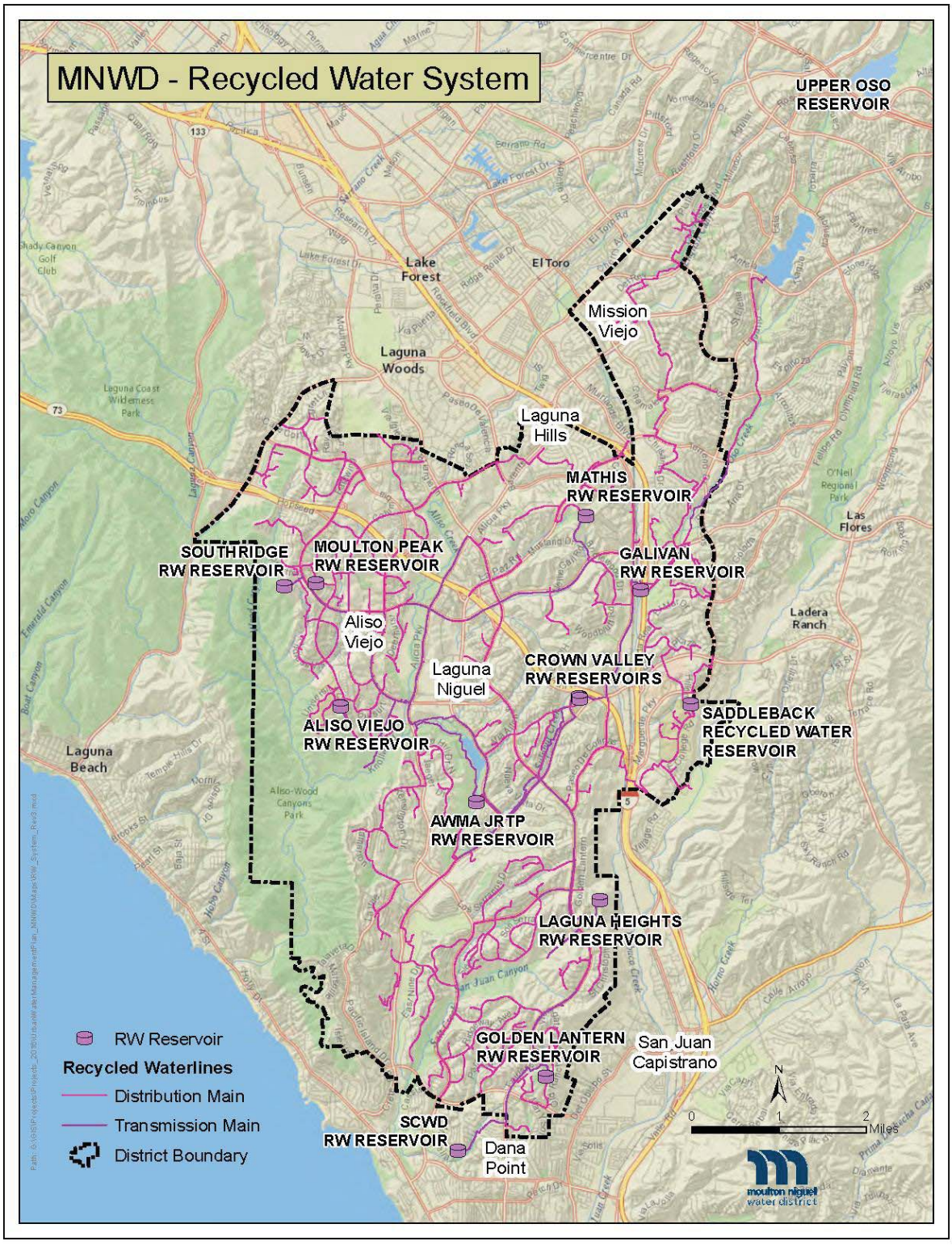

Figure 2-4: MNWD - Recycled Water System

Section 2.2 Service Area Climate

Located in an area known as the South Coast Air Basin (SCAB), the District's urban service consists primarily of residential customers and is characterized by mild, dry summers and winters. The SCAB is a semi-arid environment with mild winters, dry, warm summers and moderate rainfall. The rainy seasons occur in the semi-permanent, high pressure zone of the Eastern Pacific Ocean. The usually mild climatological pattern is interrupted by periods of extremely hot weather, winter storms, or Santa Ana winds.

Temperatures in the District's service area range from an average of 55 degrees Fahrenheit in January to 73 degrees Fahrenheit in August with an average annual temperature of 63 degrees Fahrenheit. Annual precipitation is typically 14 inches, occurring mostly between November and March. The average actual reference evapotranspiration (ETo) is almost 50 inches per year, which is four times the annual average rainfall, as shown in Table 2-1.

Table 2-1: Monthly ETo Average:

Month	Monthly Average ETo (in) [1]	Average Total Rainfall (in) [2]
January	2.84	1.72
February	2.75	1.85
March	4.00	1.07
April	4.74	0.47
May	5.21	0.31
June	5.24	0.01
July	5.58	0.06
August	5.63	0.01
September	4.89	0.08
October	3.81	0.97
November	2.74	0.90
December	2.00	3.34
Note: [1] The monthly average in the above table is over FYs 2007-2015. ET data is the average across all District microzones. ***[2] Rainfall is from:*** **http://ocwatersheds.com/rainrecords/rainfalldata/historic_data**		

The service area ranges in elevation from approximately 140 feet above mean sea level (AMSL) to approximately 930 feet ASL. To reflect the significant variation in elevation over 110 micro-zones were created within the District, each with distinct water needs that can be derived from ETo. Figure 2-5 illustrates this variability.

Recent measurements across micro-zones of ETo ranged from a minimum of 40.2 inches per year and a maximum of 55.3 inches per year. This variability in ETo translates to fluctuating watering needs for landscape irrigation for homes, commercial properties, parks, and golf courses between the various

micro-climates (see Figure 2-6). In addition to the innate water variability within the District's service area, the last few years have been among the hottest on record, affecting water needs even more.

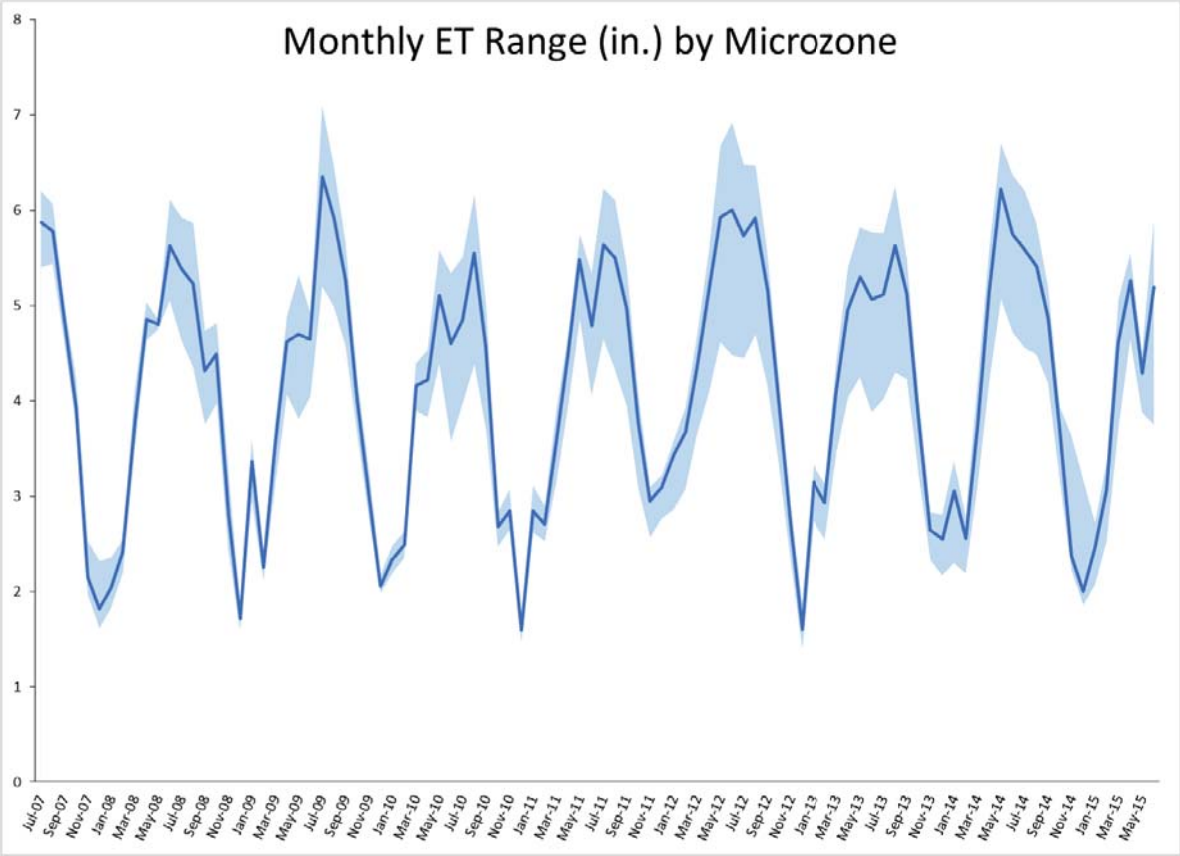

Figure 2-5: Monthly ET Range by Microzone

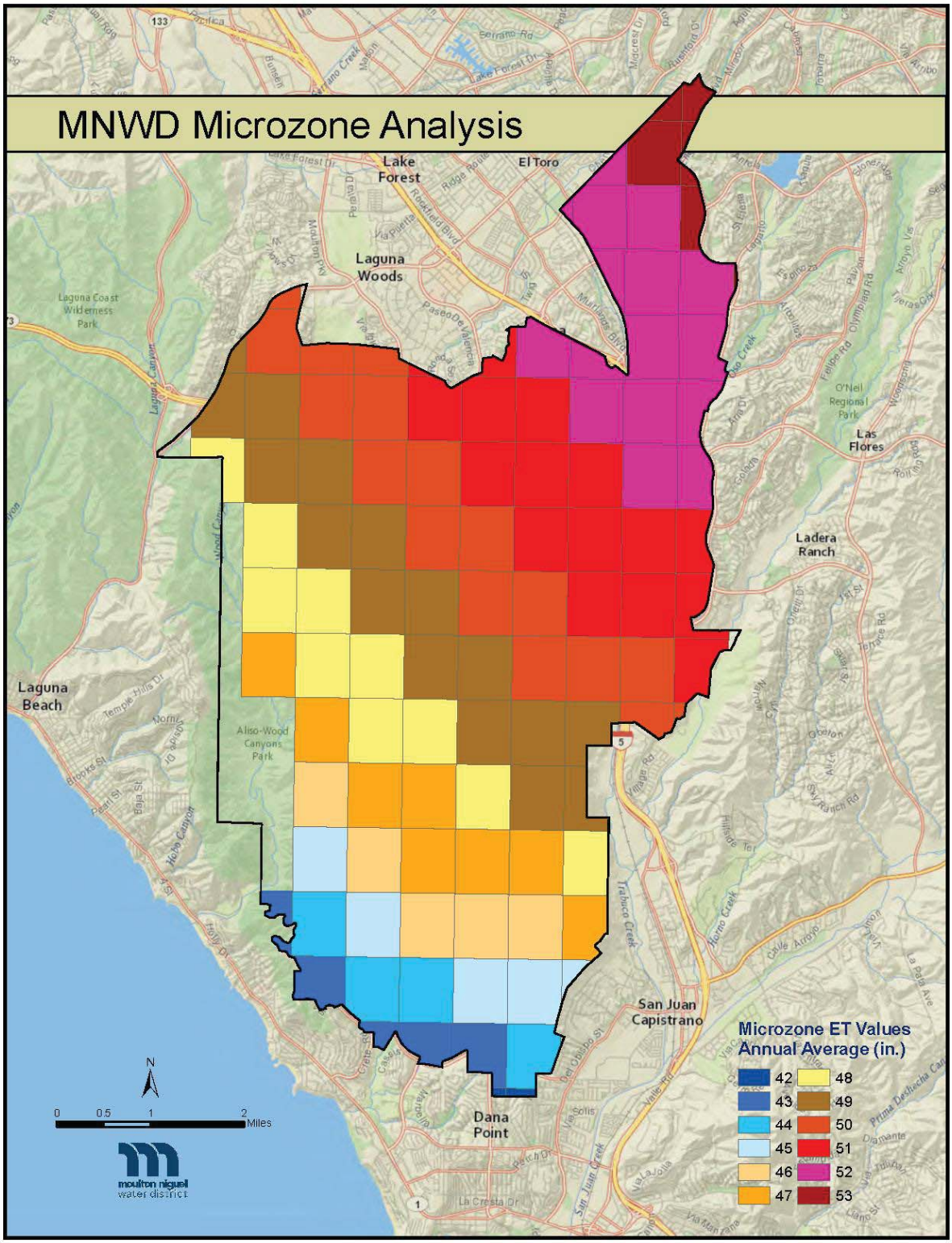

Figure 2-6: MNWD - Microzone Analysis

Section 2.3 Service Area Population and Demographics

The District provides service to an estimated 2015 population of 170,326. The current population estimate is approximately 2.3 percent lower than what was projected in the District's 2010 UWMP. While growth in the District's service area has slowed since the 2010 UWMP, the difference in projections is the result of 2010 population calculations which incorporate updated United States Census Bureau data. The service area population estimate was calculated by The Center for Demographic Research (CDR) at California State University Fullerton based on California Department of Finance data for its estimates and projections. District service area population has increased from 164,409 in 2010 to 170,326 in 2015, a 3.6 percent increase, and is projected to increase an additional 4.2 percent over the next 25 years, to 177,425 residents. As indicated above, the District's service area is largely built-out, and minimal changes in land use are anticipated over the next 25 years.

Table 2-2 shows the population projections in five-year increments to the year 2040.

Table 2-2: DWR Table 3-1: Population - Current and Projected

DWR Table 3-1 Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040*(opt)*
	170,326	172,876	174,115	175,512	176,539	177,425
NOTES: Provided by the California State University at Fullerton Center for Demographic Research.						

Section 2.3.1 Land Use

Figure 2-7 is based on the general plan data provided by the cities within the service area. Each city has its own land use codes which were standardized to provide a single land use code for the entire service area. Notably, most of the service area is single family residential consistent with the meter data with 85 percent of the meters in the service area as single family residential. The primary change from the previous Urban Water Management Plan is an increase of infill and redevelopment projects, increasing the density and number of both multi-family and mixed use developments over the next 10 years.

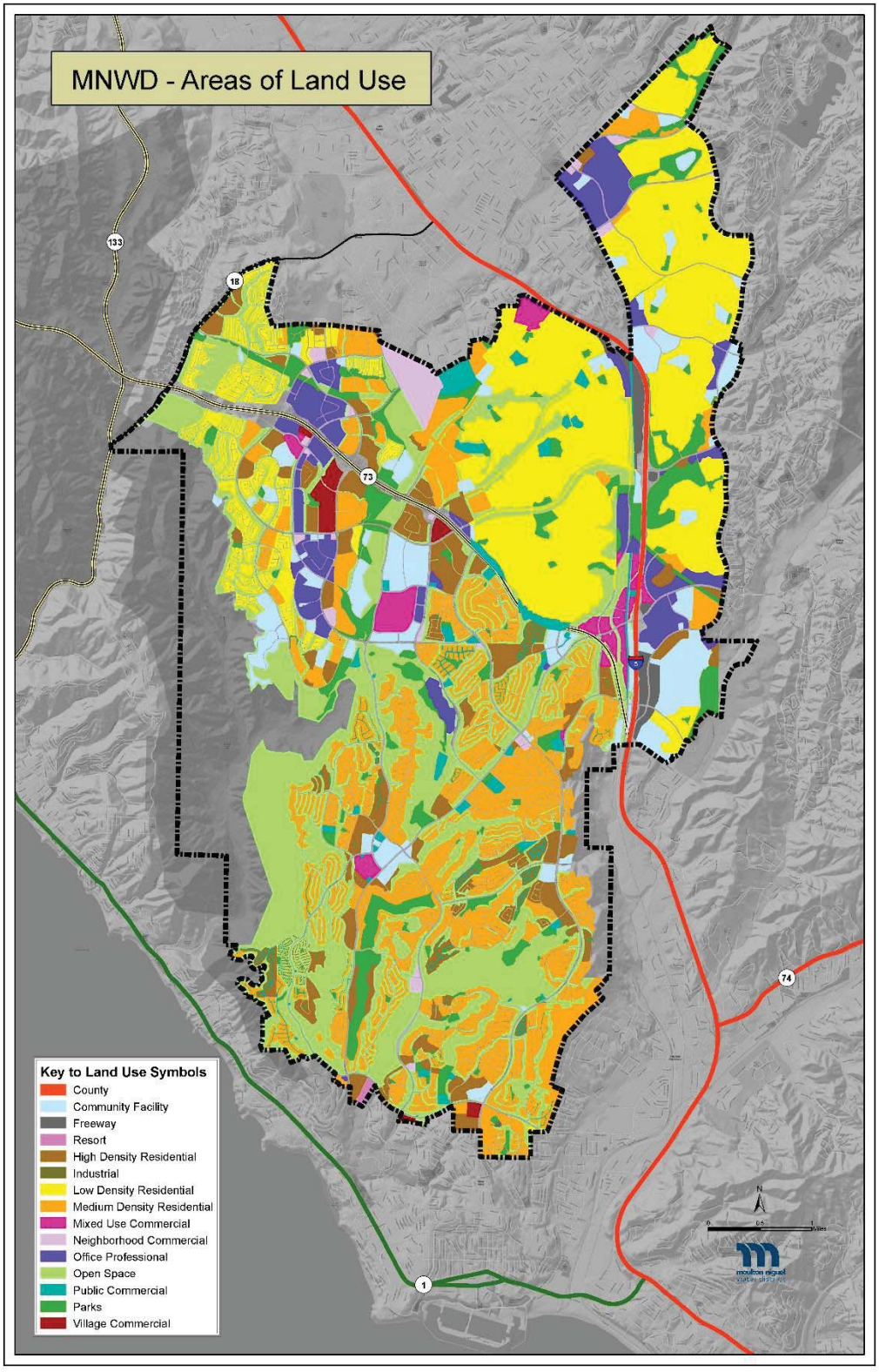

Figure 2-7: MNWD - Land Use Map

Chapter 3 System Water Use

Section 3.1 Water Demand

MNWD's current water needs are met by a combination of imported potable water and locally produced recycled water. Recycled water use, discussed in Chapter 5, has steadily increased to account for almost 25 percent of the overall water demand in the District. The District's potable demands are supplied from imported sources via Metropolitan Water District of Southern California (MWDSC). The District does not supply raw, untreated water.

Section 3.2 Water Uses by Sector

This section provides an overview of potable system water use by demand sector in 2005, 2010, and 2015, as well as demand forecasts for 2020 to 2040. The demand sectors are categorized as follows: single-family residential, multi-family residential, commercial/industrial/institutional (CII), and dedicated landscape. MNWD does not currently use or project to have any water use towards saline water intrusion barriers, groundwater recharge, or conjunctive use. Other water uses including sales to other agencies and non-revenue water are also discussed in this section and in Table 3-1, which compares projected 2015 usage in the 2010 UWMP to actual 2015 water usage.

Table 3-1: FY 2015 Potable Water Demands - Projected and Actual

Use Type	2010 UWMP Projection	Actual FY 2015 Usage
Single Family	21,100	16,426.0
Multi-Family	3,118	2,218.0
CII[1]	3,212	2,450.0
Landscape[2]	4,670	3,641.0
Losses[3]	2,842	1,700.0
Other- Apparent Losses		183.0
Sales/Transfers/Exchanges to other agencies	-	18.6
Other- Makeup to RW System	-	187.0
Total	34,942	26,823.6

NOTES: 1) The District does not have any industrial water use in the service area. Institutional is not tracked separately from commercial water use, hence they are grouped together.
2) 2010 UWMP projected landscape potable usage was calculated by subtracting 8,500 AF of recycled water usage.
3) Losses reported are "real losses", there are 183 AF of apparent losses to meet the requirements of AB-1420 to quantify distribution system water losses. The 2010 projection did not break out real from apparent losses.

System water use totaled 26,823.6 AF in FY 2015 (shown in Table 3-1), which is 8,118.4 AF below the 2010 UWMP projection for 2015 of 34,942 AF. While partially driven by state-mandated emergency

usage reductions, the 23% difference between projected and actual 2015 usage is significant because it also reflects evolving attitudes toward water use which have developed as a result of the historic drought in California. As such, the methodology for projecting future water use has been adjusted to account for this new and changing approach to statewide, regional, and local demand management. For the 2015 UWMP, water use projections are based on a range of growth and climate change driven projections, represented by the blue line in Figure 3-1, and new active demand management projections which reflect recent changes in technology and conservation awareness within the District, represented by the green line in Figure 3-1. Projections reported in this 2015 UWMP, represented by the red line in Figure 3-1, were calculated as the median of the CDM Smith projection (effectively the upper-bound of future demand) and the continued demand management projections (effectively the lower-bound of future demand).

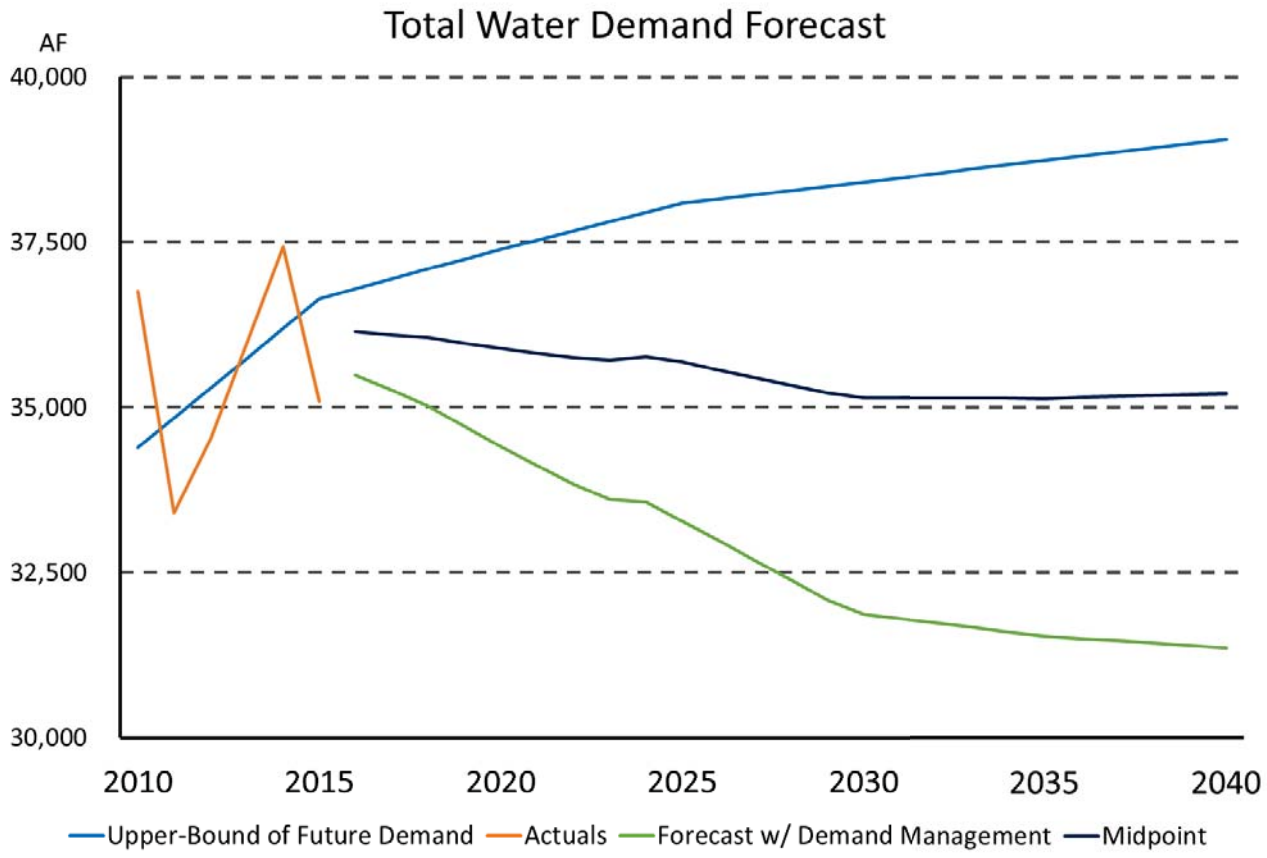

Figure 3-1: Total Water Demand Graph

The upper bound of future demand and Active Demand Management assumptions are described in Section 3.2.1.

Section 3.2.1 Water Demand Model Projections (Upper-bound of future demand)

As part of its Long-Range Water Reliability Plan, MNWD retained CDM Smith to develop a robust, econometric water demand model. This model was recently updated to include all of FY 2013 and 2014

data. The model represents a multivariate statistical regression of total monthly water production and the following explanatory variables:

- Annual Population
- Monthly Unemployment Rate (a proxy for economic activity)
- Presence of Active Drought Education/Voluntary Conservation during the Month
- Monthly Precipitation
- Previous Month's Precipitation
- Average Maximum Temperature for each Month
- Average Single-Family Water Bill, expressed in Constant 1990 Dollars
- Select Monthly Binaries (to account for Seasonal Variations)

These upper bound of future demand projections reflect the increase in total water demand as both new and existing customers use more outdoor water as a result of rising temperatures driven by climate change by watering more, growth in population, and with some considerations for ability to pay and other seasonal factors that would affect monthly demand. The model also assumes that customer drought response is temporary and will revert back to historical average levels.

Section 3.2.2 Active Demand Management Projections (Lower-bound of demand projections)

The Active Demand Management Projections are intended to serve as a goal for future water use within the District. Because of its reliance on imported water deliveries to meet potable demands, the District has developed a comprehensive portfolio of demand management strategies. Major components of this portfolio include the District's water budget-based rate structure and rebate programs. In order to reflect the District's demand management strategies, the Active Demand Management Projections were developed to incorporate the District's policy approaches for conservation (e.g., budget-based rates and rebate programs), improvements in technology (and adoption and implementation of new water saving technologies), revisions in usage estimates for new development, and long term adjustments in demand as customers respond to pricing signals.

Several main assumptions were made for this forecasting model and are discussed below.

A. Demand Management: Conservation

It was assumed that active indoor and outdoor conservation will continue to occur as the result of ongoing demand management. Assumed indoor conservation is captured by decreasing the daily gallons per capita from the 2015 indoor water budget factor of 60 gpcd to 50 gpcd in 2040. Based on wastewater flow estimates from the District's 2016 Recycled Water Master Plan, current average indoor residential usage is approximately 58 gpcd. Assumed outdoor conservation is captured by decreasing the outdoor plant factor for accounts which use potable water use. The District's plant factor is a combination of the crop coefficient and the irrigation efficiency factor. In other words, it is the applicable ETo required to apply to a plant. The plant factor was reduced from the current 0.7 to 0.5 in 2040, an average of the new DWR Model Water Efficient Landscape Ordinance (MWELO) requirements on new development. Additionally, the District's successful turf removal program is assumed to be

continued with the removal of 500,000 square feet per year that saves 15 gallons per square foot in the first year after removal and 40 gallons per square foot thereafter, equating to average water savings of 23 AF for 2015 and 62 AF for all subsequent years, and lastly conversion to devices such as weather based irrigation timers and drip irrigation resulting in an average savings of 30 AF/yr.

B. Demand Management: Budget Reductions

It is assumed that customers will respond to future budget reductions in a manner consistent with customer response to both implementation of budget-based rates and past reductions to water budgets. In a study conducted by University of California Riverside (UCR), it was determined that customers in the Eastern Municipal Water District (EMWD) who were considered inefficient (i.e. used water in excess of their water budget) reduced their water usage in response to the implementation of a water budget-based rate structure. This result from the UCR study serves as the basis for the assumption that existing customers will maintain efficiency and new customers will become efficient as a result of the water budget-based rate structure the District implemented in July 2011. In April 2015, indoor water allocations were reduced from 65 gpcd to 60 gpcd and outdoor plant factors were reduced from 0.8 to 0.7. Most customers responded to these budget reductions by reducing their usage until they were back within budget. Demand management assumed a linear savings through budget reductions out to 2040 with demand response from customers expected to be smoothed out similar to the UCR EMWD research with new rate structures implemented with tighter budgets January 1 of 2018, 2021, 2024 and finally in 2027.

C. New Demand: Private Development and Population Growth

As the District is nearly built-out, new development is primarily related to infill and denser utilization of lands. These new infill and increased density projects will replace vacant, low density commercial and residential areas. In close collaboration with the cities within the District, the private development team at the District develop a 10-year projection of new development which is based on planned projects to develop FY 2015-2025 projections, assuming that high density redevelopment of low density land use will replace current water demand at each location. The specific projects are included in Appendix 8 and are all included in the demand projections for the 2015 UWMP. For the FY 2025-2040 period, demand is escalated proportionally with population growth projections from the Cal State Fullerton Center for Demographic Research.

D. System Losses

Lastly, real system losses which include distribution system losses per Water Code 10631(e)(1)(J) are assumed to decrease linearly from 6.3% in FY 2015 to 5.8% in 2040. In order to maintain consistency with losses reported in other sections of Chapter 3, real system losses are used for projections in this forecasting model. Please refer to Section 3.3 for the method for determining current real system losses.

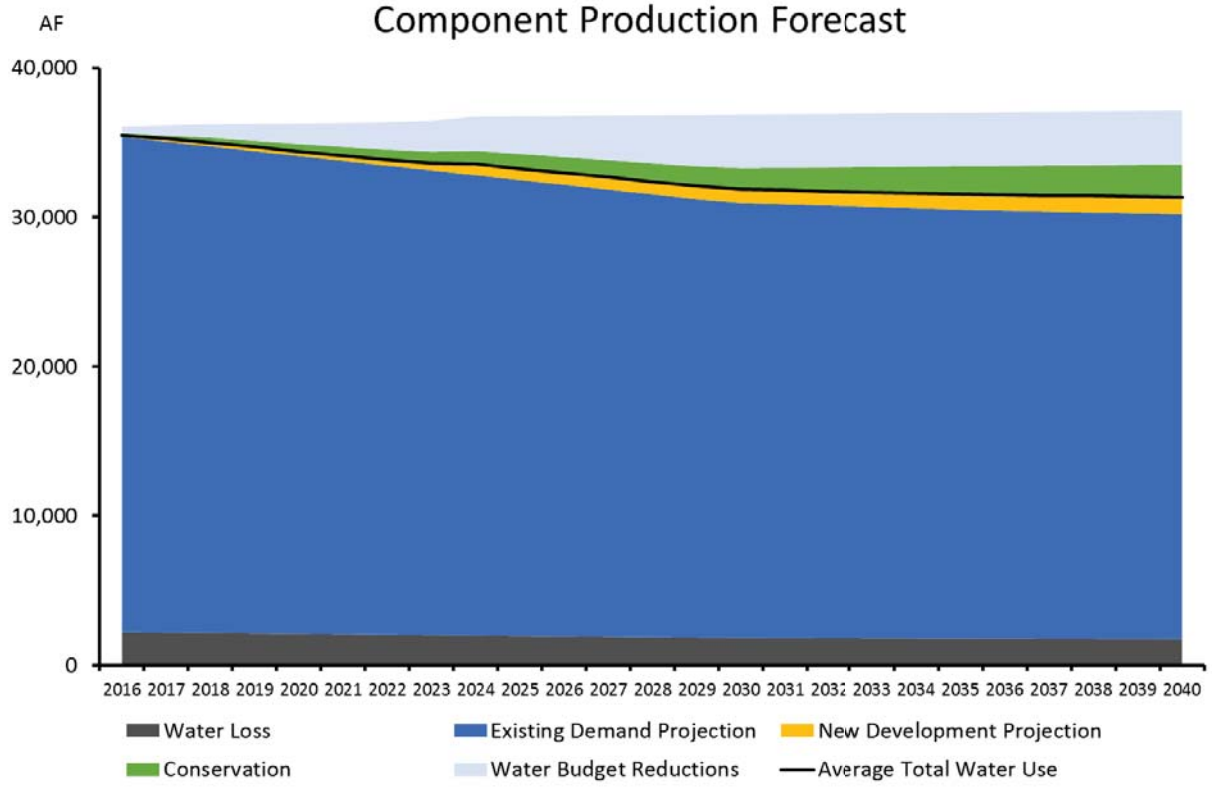

Figure 3-2: Component Demand Projections Graph

Figure 3-2 shows graphically the component demand projections broken into six subsections. In the absence of active demand management, total demand continually increases from now until 2040, which is consistent with the District's demand model projections. The area of the graph related to budget reductions and other conservation represent the volume of water that would otherwise have been used had active demand management not occurred. These two components of demand management drive down average total water use, even in the face of increasing population and a warming climate.

Section 3.2.3 2015 UWMP Water Use by Sector

The underlying assumptions of the Active Demand Management Projections reflect the continuation of demand management efforts the District implemented in 2011. Customer response to active demand management has only intensified in reaction to the ongoing drought. The District will continue to actively manage demand with the goal of reaching the level of total water demand identified in the Active Demand Management Projections. However, as a municipal water supply planner, the District must incorporate multiple outcomes into its policy making to effectively anticipate scenarios and plan for them. Hence, the District utilized the CDM demand model projections to represent a potential reversion to pre-2010 customer behavior and serve as an upper bound on total demand. Similarly, the Active Demand Management Projections consistent with the District's current direction are forecast as a lower bound. The projections presented in Table 3-2 represent a synthesis of past behavior and potential efficiency.

Table 3-2: Actual and Projected Retail Demands for Potable and Raw Water

Use Type	Actual		Projected				
	2010	2015	2020	2025	2030	2035	2040
Single Family	17,589	16,426	16,737	16,454	16,221	16,241	16,296
Multi-Family	2,600	2,218	2,656	3,031	2,997	3,000	3,008
Commercial	2,678	2,450	2,537	2,517	2,482	2,485	2,494
Irrigation	3,201	3,641	3,933	1,949	1,787	1,801	1,839
Real Losses	2,369	1,700	1,727	1,542	1,478	1,447	1,420
Apparent Losses		183	196	178	175	175	175
Total	28,437	26,618	27,786	25,850	25,319	25,331	25,850
Notes: In 2010, the District did not separate out apparent and real system water losses. Real losses meet the requirements of AB-1420 to quantify distribution system water losses.							

Table 3-2 breaks down the demands for potable water use by sector. In all sectors, water usage decreases from 2015 until 2025, although at a decreasing rate. Usage from 2025 to 2030 slightly increases. This is due to the tightening of water budgets until 2025 that will then remain constant through 2030 and continued moderate population increases.

Section 3.3 Distribution System Water Losses

MNWD retained Water Systems Optimization (WSO) to review current water auditing practices, to make recommendations for improving water audits in a manner consistent with American Water Works Association (AWWA) methodology, and to make general recommendations for improving the District's water loss control strategy. Distribution system losses which is equivalently used as real water losses consistently with the 2015 UWMP Guidebook were determined by the AWWA Water Loss Tool using the system parameter assumptions provided by WSO.

Aside from system repairs, loss projections differ considerably from the 2010 UWMP for two main reasons: considerations of change in storage, and reporting real losses as opposed to non-revenue water. During its analysis, WSO determined that changes in storage levels had likely not been taken into account in past water audit calculations. Consistent with AWWA guidelines, the losses reported in the 2015 UWMP do take this change in storage into consideration.

Real system losses are reported in this 2015 UWMP whereas non-revenue water is reported as system losses in the 2010 UWMP. Non-revenue water consists of three components: unbilled authorized consumption (e.g. hydrant flushing, and fire-fighting), real losses (e.g. leakage in mains and service lines), and apparent losses (unauthorized consumption and metering inaccuracies). Real Losses represent the volume of physical water lost from the distribution system, consisting of all types of leaks, breaks, and overflows. The volume of Real Losses is determined by subtracting the total Apparent Losses from the total Water Losses volume. The magnitude of the difference between reporting metrics can be seen in Table 3-3. MNWD's non-revenue water amounts to approximately 7.1% of MNWD's total water supplied, a level consistent with 2010 UWMP reported values. MNWD's real losses account for

approximately 6.3% of MNWD's total water supplied and based on the water loss audit model prepared by WSO. The District assumed to decrease to 5.8% by FY 2040 as a goal.

Table 3-3: System Water Loss Calculation Components

Definition	2015 Volume (AFY)	Percent of Total Water Supplied
Water Supplied	26,819	100%
Billed Consumption	24,910	92.9%
Unbilled Consumption	26	0.1%
Authorized Consumption ***(Billed Consumption + Unbilled Consumption)***	24,937	93%
Water Losses ***(Water Supplied - Authorized Consumption)***	1,883	7.0%
Apparent Losses	183	0.7%
Real Losses ***(Water Losses - Apparent Losses)***	1,700	6.3%
Non-Revenue Water ***(Water Losses + Unbilled Consumption)***	1,909	7.1%

Section 3.4 Water Use for Lower Income Households

As part of the 2015 UWMP, retail water suppliers are required to develop water use projections for "low-income" households at the single family and multi-family levels, as was done in the 2010 UWMP. These projections assist retail suppliers with compliance with Section 65589.7 of the Government Code, which requires suppliers to grant a priority for the provision of service to developments that include housing units affordable to lower income households. Consistent with this State requirement, a low-income household is defined as a household earning 80% of the County of Orange's median income or less.

DWR guidance provides that retail water suppliers should determine the number of lower income single family and multi-family housing units projected for the service area, as identified in the housing elements of city or county General Plans. Because portions of six cities are contained with the District's service area, low-income housing projections specifically related to the District are not identified in city or county general plans. For this reason, low-income housing projections within the District were determined using information contained in the Regional Housing Needs Assessment (RHNA).

Developed by the local council of governments (COG) in coordination with the California Department of Housing and Community Development, the RHNA process quantifies the need for housing by income

group within each jurisdiction during specific planning periods and is used in Housing Element and General Plan updates. COGs are required by the State Housing Law to determine the existing and projected regional housing needs for persons at all income levels. The RHNAs goals are to prioritize local resource allocation and to help decide how to address existing and future housing needs.

Existing and projected housing needs for Orange County were incorporated into the Southern California Association of Governments' (SCAG) 5th Cycle Regional Housing Needs Allocation Plan (2013 RHNA Plan). The 5th Cycle RHNA Allocation Plan, which covers the planning period from October 2013 to October 2021 was adopted by the Regional Council on October 4, 2012.

The projected increase in water demands for low-income households in the MNWD service area was estimated by calculating the percentage of projected low income units in the service area as a percentage of the total projected units from the 2013 RHNA Plan. Given that MNWD's service area covers portions of six cities within Orange County, a weighted average of the RHNA projection for each city served by MNWD was calculated based on the proportion of each city within the District. For example, as summarized in Table 3-4, approximately 27% of MNWD's service area lies within the City of Aliso Viejo. Based on the 2013 RHNA Plan, of the 39 households projected to be developed, 16 are identified as low-income households. Therefore, the area weighted projected low-income households for the City of Aliso Viejo is four (27% times 16) out of 11 (27% times 39), which represents 3.13% of total housing needs (4 divided by 128). The same procedure is repeated for all cities within MNWD's service area, which results in an overall projected housing need for low-income households of 40.63% as a percentage of RHNA identified development needs.

Table 3-4: Weighted Percentage of Low-income Household Needs within MNWD's Service Area

City	Percent of Area Served	No. Low-income Households by City (RHNA)	No. Households by City (RHNA)	No. Low-income Households (w/in Service Area)	No. Households by City (w/in Service Area)	Weighted Percent Low-income Households
Aliso Viejo	27%	16	39	4	11	3.13%
Dana Point	1%	129	327	1	3	0.78%
Laguna Hills	12%	2	2	1	1	0.78%
Laguna Niguel	41%	73	182	30	75	23.44%
Mission Viejo	18%	71	177	13	32	10.16%
San Juan Capistrano	1%	251	638	3	6	2.34%
Total	100%	542	1,365	52	128	40.63%

It is important to note that the percentages of low income household by city provided by RHNA represent "targeted" and not actual percentages of planned low-income households. As the District anticipates development beyond what is identified in the RHNA, demands attributable to new low-

income development must be determined as the proportion of demands attributable to planned development. As was noted in Section 3.2 , growth related demand is determined using a combination of planned development (FY 2015 – 2025) and population growth (FY 2026 – 2040). The RHNA low-income development needs are projected through 2021 and are captured by the planned development estimates. The proportion of planned development attributable to needed low-income development is calculated in Table 3-5.

Table 3-5: Percentage of Projected Development Attributable to Low - Income Development

Total Effective Dwelling Units (EDUs)	3,745
Single Family EDUs	*80*
Multi-Family EDUs	*3,665*
RHNA Identified Low-Income Households	52
% of Projected Residential Development	1.39%
Single Family - % Low-Income	*0.03%*
Multi-Family - % Low-Income	*1.36%*

Table 3-6 provides a breakdown of the projected water demands for needed low-income single family and multifamily units. As noted above, the planned development projections used to determine growth related demand are assumed to capture new low-income development, thus low-income demand is held fixed after FY 2025. The projected water demands shown here represent 1.39% of the growth-related projected water demand, shown in Figure 3-2. For example, 3.65 AF of the 263 AF of growth-related residential demand projected in 2020 is attributable to low-income households and 13.91 AF of the 777 AF projected in 2025 which is shown in Table 3-6.

Table 3-6: Projected Water Demands for Housing Needed for Low-Income Households (AFY)

New Planned Development Related	2020	2025	2030	2035	2040
Residential Demand	263	706	828	954	1,084
Total Residential - Low-Income Demand	3.65	9.80	11.50	13.25	15.05
Single Family - Total Demand	27	31	36	42	47
Single Family - Low-Income Demand	0.08	0.21	0.25	0.28	0.32
Multi-Family - Total Demand	236	675	792	912	1,036
Multi-Family - Low-Income Demand	3.57	9.59	11.25	12.96	14.73

The projected demands attributable to existing low-income housing are assumed to be proportional to the percentage of low-income households in the District. The percentage of low-income households effectively serves as an upper-bound of low-income demand, as demand characteristics for low-income households are likely considerably different than those of other households. Currently, approximately 29% of the households served by MNWD are classified as low-income based on the six cities' Housing

Element. Table 3-7 provides a breakdown of the projected water needs for existing low-income single family and multifamily units.

Table 3-7: Projected Water Demands for Existing Low-Income Households (AFY)

Existing Development Related	2020	2025	2030	2035	2040
Residential Demand	19,130	18,803	18,536	18,559	18,622
Total Residential - Low-Income Demand	5,475	5,381	5,305	5,312	5,330
Single Family - Total Demand	16,710	16,424	16,191	16,211	16,266
Single Family - Low-Income Demand	4,782	4,701	4,634	4,640	4,655
Multi-Family - Total Demand	2,420	2,379	2,345	2,348	2,356
Multi-Family - Low-Income Demand	693	681	671	672	674

The total projected demands for low-income households are calculated as the sum of the projected annual demand for the RHNA identified low-income housing needs and the projected annual demand for the assumed existing low-income households. The projected demands are shown in Table 3-8 which is the addition of Table 3-7 and Table 3-6.

Table 3-8: Total Projected Water Demands for Low Income Households (AFY)

Total Residential Development Related	2020	2025	2030	2035	2040
Residential Demand	19,393	19,509	19,364	19,513	19,706
Total Residential - Low-Income Demand	5,479	5,391	5,317	5,325	5,345
Single Family - Total Demand	16,737	16,455	16,227	16,253	16,313
Single Family - Low-Income Demand	4,783	4,701	4,634	4,640	4,656
Multi-Family - Total Demand	2,656	3,054	3,137	3,260	3,392
Multi-Family - Low-Income Demand	696	690	682	685	689

Chapter 4 Baselines and Targets

This section describes the base period ranges used to establish the baseline per capita water demands. In conformance with SBX7-7, the compliance water use target is described for 2020 and the interim water use target for 2015. Although the UWMP uses acre-feet as its unit of measurement throughout this document, gallons per capita per day (gpcd) is used frequently in this chapter in accordance with the calculations required by SBX7-7. The gpcd is calculated by dividing total District water production by population, not just residential water use.

Section 4.1 Establishing Baselines

Table 4-1 presents the base period ranges for the District's 10 year (1990-91 through 2004-05) and five year (2003-04 through 2007-08) periods. A 15 year base period range was used because the District recycled water use was at least 10 percent of the total water deliveries in 2008. The baseline daily per capita consumption for the 15-year period was 216 gpcd. This is an important number as the targets are based on reducing this consumption level.

Table 4-1: DWR Table 5-1: Baselines and Targets Summary

DWR Table 5-1 Baselines and Targets Summary *Retail Agency or Regional Alliance Only*					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*FY 1991*	*FY 2005*	*216*	*194*	*173*
5 Year	*FY 2004*	*FY 2008*	*191*		
*All values are in Gallons per Capita per Day (GPCD)					
NOTES:					

The SB X7-7 worksheets were prepared and submitted to DWR as a component of the District's 2015 UWMP. In these worksheets, found in Appendix 3, the District population served, water supplied, and per capita consumption for each of the years within the 15-year range and the 5-year range were documented. The population estimates from the 2010 UWMP were recalculated to reflect updated Department of Finance estimates; MWDOC provided the population estimates from CDR which reflected a change in population from 2000 through 2015. Data were reviewed to determine if a different 15-year baseline would be applicable but the period selected for the 2010 UWMP, presented in Table 5-1, was found to still be the most appropriate. The resulting 15-year baseline did not change substantially between the 2010 UWMP and this 2015 UWMP, from 215 to 216 gpcd; the 5-year baseline increased from 183 to 191 gpcd.

The five-year baseline is a target confirmation. It is needed to determine whether the 2020 target meets the legislation's minimum water use reduction requirements of at least a five percent reduction per capita for a five-year continuous period that ends no earlier than December 31, 2007 and no later than December 31, 2010. The baseline daily per capita consumption for the five-year period was 191. Ninety-

five percent of the five-year base is 181 gpcd. As discussed next under targets, 181 gpcd is higher than the 2020 target for the District of 173 gpcd, thus the District 20 percent reduction from the 15 year baseline is greater than a five percent reduction per capita over the five-year period.

Section 4.2 Establishing Targets

In connection with the 2010 UWMP process, SBX7-7 and DWR provided four different methods to establish water conservation targets, where each retail urban water supplier may elect in its sole discretion what method to use.

- **Method 1– Baseline Reduction Method.** The 2020 water conservation target of this method is defined as a 20 percent reduction of average per capita demand during the ten-year baseline period described above. This equates to a 2020 target of 173 gpcd for the District.
- **Method 2 – Efficiency Standard Method.** This target is based on calculating efficiency standards for indoor use separately from outdoor use for residential sectors and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target.
- **Method 3 – Hydrologic Region Method.** This method uses the ten regional urban water use targets for the state. A static water use conservation target for both 2015 and 2020 is assigned for Region 4: South Coast. The target for the entire South Coast region is 149 gpcd. Method 3 is based on the District reaching 95 percent of the South Coast Region target or 142 gpcd.
- **Method 4 – BMP Based Method.** This method uses previous water supplier BMPs to establish a conservation target for 2020. Depending on how aggressively the water supplier has pursued water reduction and conservation in the past, a new conservation target for 2020 is assigned.

Section 4.3 Individual District SB X7-7 Targets

Under SBX 7-7, individual agency targets must be established to meet the goal of a statewide 20 percent reduction in per capita use by 2020 and the interim 10 percent reduction by 2015. Although a 2020 target was calculated in the 2010 UWMP, DWR has allowed agencies to update their 2020 target by using a different method than that used in 2010. As noted above, Methodology 1 was selected by the District in 2010, and again here, as the most appropriate methodology for the District to establish water use reduction targets to meet the requirements set forth in SBX7-7. The District chose to utilize Methodology 1 over Methods 2, 3, or 4 to maintain consistency with the previous 2010 UWMP.

Methodology 1 requires a straightforward technical analysis of reducing the baseline per capita consumption by 20 percent for the target. The District baseline per capita consumption identified in SB X7-7 tables is 216 gpcd. A 10 percent reduction by 2015 would result in 194 gpcd. A 20 percent reduction would result in 173 gpcd by 2020. The worksheets to determine these targets are presented in the SB X7-7 Verification Form tables submitted electronically to DWR upon the adoption of this UWMP.

Based on FY 2014-15 water demands, the District's per capita consumption was 140 gpcd (shown below in Table 4-2), a 31% reduction from 2010 levels. The District has worked hard since the last UWMP in targeting conservation efforts to meet its per capita target. Because of these efforts, the District was able to meet its 2015 individual target.

Table 4-2: DWR Table 5-2: 2015 Compliance

DWR Table 5-2: 2015 Compliance *Retail Agency or Regional Alliance Only**								
Actual 2015 GPCD	2015 Interim Target GPCD	**Optional Adjustments to 2015 GPCD** Enter "0" for adjustments not used *From Methodology 8*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
		Extraordinary Events	Economic Adjustment	Weather Normalization	TOTAL Adjustments	Adjusted 2015 GPCD		
140	*194*	*N/A*	*N/A*	*N/A*	N/A	*N/A*	140	Yes
**All values are in Gallons per Capita per Day (GPCD)*								
NOTES:								

Section 4.4 Regional Alliance

As a retail agency, MNWD has the option of complying individually or participating in a Regional Alliance. MNWD chose to participate in a Regional Alliance with MWDOC. Each agency within the MWDOC Regional Alliance calculates its own individual target, as if it were complying individually. The individual targets for each agency are then weighted by the supplier's population to develop a regional target. In the event that the region does not comply with the regional target, an agency may still be in compliance if it meets its own individual target. Information on the Regional Alliance target calculations and compliance is contained within MWDOC's UWMP.

Chapter 5 System Supplies

Section 5.1 Purchased or Imported Water

MNWD currently relies on 26,823.6 AFY of imported water provided by MWDSC through MWDOC. Imported water represents approximately 79% of MNWD's total water supply. MWDSC's water supply originates from two principal sources - the Colorado River via the Colorado Aqueduct and the Feather River watershed/Lake Oroville in Northern California through the State Water Project (SWP). This water is treated at the Robert B. Diemer Filtration Plant located north of Yorba Linda. Typically, the Diemer Filtration Plant receives a blend of Colorado River water from Lake Mathews through the MWDSC Lower Feeder and SWP water through the Yorba Linda Feeder. The water is conveyed to MNWD through two MWDSC-operated transmission mains: the East Orange County Feeder #2 (EOCF #2) and the Allen McColloch Pipeline (AMP). MNWD receives water from the EOCF #2 through the Joint Transmission Main (JTM) and the Eastern Transmission Main (ETM), a branch off the JTM. MNWD receives water directly from take-outs off the AMP and indirectly from the South County Pipeline. These facilities are presented in Figure 5-1.

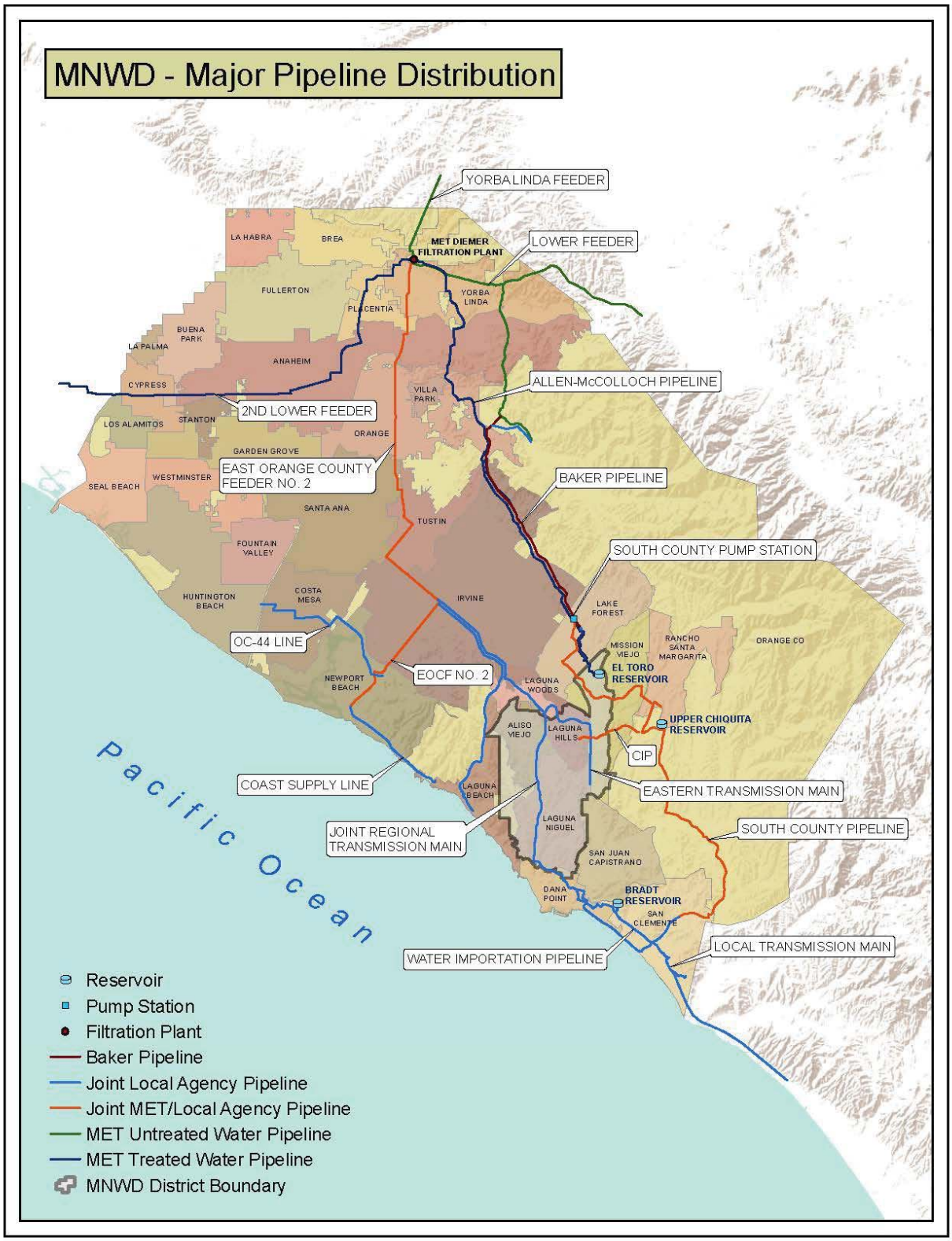

Figure 5-1: MWDSC Feeders and Transmission Mains

Section 5.1.1 Joint Transmission Main

As discussed in Section 2.1 , on June 1, 1961, MNWD sold its first waterworks bond, a $6,700,000 bond to finance its 45 cubic feet per second (cfs) capacity in the Tri-Cities Transmission Main and the EOCF No. 2. Also noted in Section 2.2 , MNWD's service area is arid, with little natural sources of water or precipitation. In order to develop, outside water resources were needed which shows the criticality of the initial investment in imported water pipeline. The Tri-Cities Transmission Main, now known as the Joint Transmission Main (JTM), is jointly owned by MNWD, Irvine Ranch Water District, El Toro Water District (ETWD), City of San Juan Capistrano, City of San Clemente, and South Coast Water District. The EOCF #2 is owned by MWDSC, City of Anaheim, City of Santa Ana, and MWDOC (including MNWD). The JTM conveys imported water from the EOCF #2 (operated by MWDSC) to south Orange County. The JTM is operated under contract by the South Coast Water District. MNWD serves Aliso Viejo, Laguna Niguel, and Dana Point from the JTM. In 1985, MNWD de-annexed Improvement District No. 10 (located on the northwest side of El Toro Road) to ETWD. MNWD transferred 2 cfs of its Joint Regional Water Supply System (JRWSS) capacity to ETWD with the de-annexation, leaving MNWD with 43 cfs of capacity.

Section 5.1.2 Eastern Transmission Main

The Eastern Transmission Main (ETM) begins as a branch off the JTM near Moulton Parkway and Laguna Hills Drive. MNWD owns 10 cfs of capacity in the ETM, with the remaining capacity owned by the City of San Juan Capistrano. The District is the operator of the ETM by agreement with the City of San Juan Capistrano.

Section 5.1.3 Allen McColloch Pipeline

On March 30, 1978, MNWD acquired 30 cfs of water capacity in the AMP, a major water supply line constructed by MWDOC from the Robert B. Diemer Filtration Plant to a terminus in the northern section of Mission Viejo. Originally, the capacity as well as the ownership of the AMP was based on theoretical calculations. In 1988, the actual capacity of the AMP was measured to be significantly higher than the theoretical capacity. This surplus capacity became known as the "splatter capacity" and was allocated to the AMP participants based on capacity ownership. MNWD received an additional 5.1 cfs, giving it a total of 35.1 cfs of capacity in the AMP. In 1995, MWDSC purchased the AMP from MWDOC and now operates the AMP. The AMP terminates in the northeast section of Mission Viejo at the ETWD R-6 Reservoir and conveys water primarily to Mission Viejo and Laguna Hills.

Section 5.1.4 South County Pipeline

Through the AMP Flow Augmentation Project, MNWD obtained 35 cfs of water capacity in the South County Pipeline (SCP). The SCP conveys water from the AMP to SMWD, MNWD, SCWD, and the cities of San Juan Capistrano and San Clemente. MNWD obtains flow from the SCP at MNWD's takeout (SC-2) and delivers flow to Laguna Hills, Mission Viejo, Laguna Niguel, and Aliso Viejo via the Central Intertie Pipeline (CIP).

Section 5.1.5 Baker Water Treatment Plant

MNWD is currently participating in the construction of a potable water treatment facility that receives raw water via the Baker pipeline. The Baker Water Treatment Plant will be a new 28.1 million gallon day plant at the existing IRWD Baker Filtration Plant site in Lake Forest. The Baker Water Treatment Plant will treat imported untreated water from the Santiago Lateral and Irvine Lake through the Baker Pipeline. The

proposed project would provide increased water supply reliability to southern Orange County by providing treated water to customers of IRWD, ETWD, MNWD, SMWD, and Trabuco Canyon Water District (TCWD). It will also help provide a reliable local potable water supply in the event of emergency conditions or scheduled maintenance on the MWDSC treated water delivery system (Diemer Filtration Plant, Lower Feeder Pipeline, or AMP). The Baker Water Treatment Plant is expected to come online by October 2016. MNWD will own 13 cubic feet per second of capacity in the plant.

Section 5.1.6 Contractual Agreements

MNWD also has entitlements and/or written contracts with MWDOC to receive imported (potable) water from MWDSC via the regional distribution system located in Orange County, components of which are described above. Although pipeline capacity rights do not guarantee the availability of water, they do guarantee the ability to convey water when it is available, to MNWD's distribution system and, therefore, operate in tandem with water entitlements and/or contracts to receive supplemental water for purposes of demonstrating not only water supply reliability, but also physical delivery system reliability. All imported water supplies discussed in this UWMP are available to MNWD from existing infrastructure.

The Agreement for Sale and Purchase of the AMP (Metropolitan Agreement No. 4623) among MWDSC, MWDOC, MWDOC Water Facilities Corporation, and certain other identified participants, including MNWD, dated July 1, 1994 (AMP Sale Agreement) requires MWDSC to meet MNWD's requests for water deliveries (subject to the availability of water from MWDSC). The AMP Sale Agreement further requires MWDSC to augment/increase capacity necessary to meet MNWD's projected ultimate service area water demands. Furthermore, the enumerated capacity is the nominal peaking capacity that can be exceeded subject to MWDSC's capacity rates based on max day demand over the past 3 years.

MNWD has an emergency interconnection agreement with IRWD to supply treated Phase 1 water at 10.6 million gallons per day (MGD) with a maximum flow rate of 15.6 cfs for 30 days. The maximum incident volume IRWD will supply is 1,768 AF. The agreement also provides emergency water to the City of San Clemente, Laguna Beach County Water District, SMWD, and South Coast Water District. Under the agreement, IRWD and the participating agencies jointly constructed various projects to transfer water to the Aufdenkamp Transmission Main and Joint Transmission Main. MNWD has capacity rights of 55 percent and is responsible for the same percentage of project costs and ongoing operations and maintenance. Water delivered through the interconnection is MWDSC water or locally produced water exchanged for MWDSC water. The option is not designed to address droughts, but only to be used during emergency conditions when MWDSC facilities are disrupted due to seismic events or unplanned outages. The capacity right decreases over time, ultimately reaching zero in 2030 per the agreement.

Section 5.2 Imported Water Quality

MWDSC's planning efforts for groundwater storage, recycled water, and other water management strategies require meeting specific water quality targets for imported water. Metropolitan has two major sources of water: the Colorado River and the State Water Project (SWP). Groundwater inflows are also received into the SWP through groundwater banking programs in the Central Valley. Each source has specific quality issues, which are summarized in this section. To date, MWDSC has not identified any water quality risks that cannot be mitigated. As described in this section, the only potential effect of

water quality on the level of water supplies based on current knowledge might be increases in the salinity of water resources. Under California's current drought conditions, decreased flows have altered Delta flow patterns and, while the effects of the drought have not been fully studied, there have been some observable changes in water quality such as increased salinity due to increased seawater intrusion. However, even under drought conditions, SWP salinity is significantly lower than Colorado River water salinity, and MWDSC relies on blending imported water sources to mitigate for the higher salinity Colorado River water. During recent periods of drought, MWDSC's SWP allocation has been reduced, including to a historical low of zero percent in January 2014, which affected blending operations. MWDSC increased its reliance on Colorado River water in 2014 and 2015, and subsequently, salinity in treatment plant deliveries increased overall from the higher Colorado River salinity levels. MWDSC anticipates no significant reductions in water supply availability from imported sources due to water quality concerns, such as salinity, over the next five years.

Section 5.2.1 Colorado River Water Quality

High salinity levels remain a significant issue associated with Colorado River supplies. In addition, MWDSC has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate, and chromium-6, which are discussed later in this section. MWDSC has also been active in efforts to protect these supplies from potential increases in nutrient loading due to agriculture and urbanization, as well as tracking the occurrence of constituents of emerging concern, such as N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). MMWDSC fully expects its source water protection efforts to be successful, so the only foreseeable water quality constraint to the use of Colorado River water will be the need to blend (mix) it with SWP supplies to meet MWDSC's Board-adopted salinity standards.

Section 5.2.2 State Water Project Water Quality

The key water quality issues for the SWP are disinfection byproduct precursors, in particular, total organic carbon and bromide. MWDSC is working to protect the water quality of this source, but it has needed to upgrade its water treatment plants to deal adequately with disinfection byproducts. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant, and they may place some near-term restrictions on MWDSC's ability to use SWP water. MWDSC is overcoming these treatment restrictions through the use of ozone disinfection at its treatment plants. Ozone facilities have been completed at four of MWDSC's treatment plants, and construction is underway for ozone facilities at the Weymouth water treatment plant. Arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP system than within the Colorado River, leading to the potential for algal related concerns that can affect water management strategies. MWDSC is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants.

Section 5.3 Groundwater

MNWD is a member of the San Juan Basin Authority, a joint powers authority created in 1971 for the purpose of carrying out water resources development of the San Juan Basin. The members of the SJBA

are SMWD, MNWD, SCWD, and the City of San Juan Capistrano. MNWD has not received any groundwater from the San Juan Basin.

Section 5.3.1 San Juan Groundwater Basin Characteristics

The San Juan Basin is located in southern Orange County within the San Juan Creek Watershed. The San Juan Basin is comprised of four sub-basins: Upper San Juan, Middle San Juan, Lower San Juan, and Lower Trabuco and is bound on the west by the Pacific Ocean and by tertiary semi-permeable marine deposits. The Basin is recharged through flow from San Juan Creek, Oso Creek, and Arroyo Trabuco, precipitation to the valley floor, and Hot Spring Canyon spring flows.

The San Juan Basin Authority updated the Groundwater Management and Facilities Plan in 2013 to review the groundwater management strategies of the San Juan Basin. The review of the basin characteristics estimated the total storage capacity to be approximately 26,500 acre-feet. This is a reduction of approximately 14,000 acre-feet of storage capacity since the last update in 1994. Several water rights permits exist to allocate the water within the San Juan Basin. The San Juan Basin Authority has 8,026 acre feet of water rights with other local agencies and entities holding rights to 5,494 acre feet of water within the basin. Many of these water rights permits have provisions that limit the yield of water based on storage within the San Juan Basin and water quality to protect against seawater intrusion. The production goals identified in the groundwater management plan by the existing groundwater producers is approximately 11,200 acre-feet per year. However, the average available yield from the basin is approximately 9,600 acre-feet per year with a range of 7.400 acre-feet per year to 11,200 acre-feet per year. As a result of these limits to the basin yield, the SJBA has implemented an adaptive management strategy with an active monitoring program to ensure the production from the San Juan Basin does not degrade the water quality of the San Juan Basin while complying with the water rights permit. Figure 5-2 depicts the San Juan Basin.

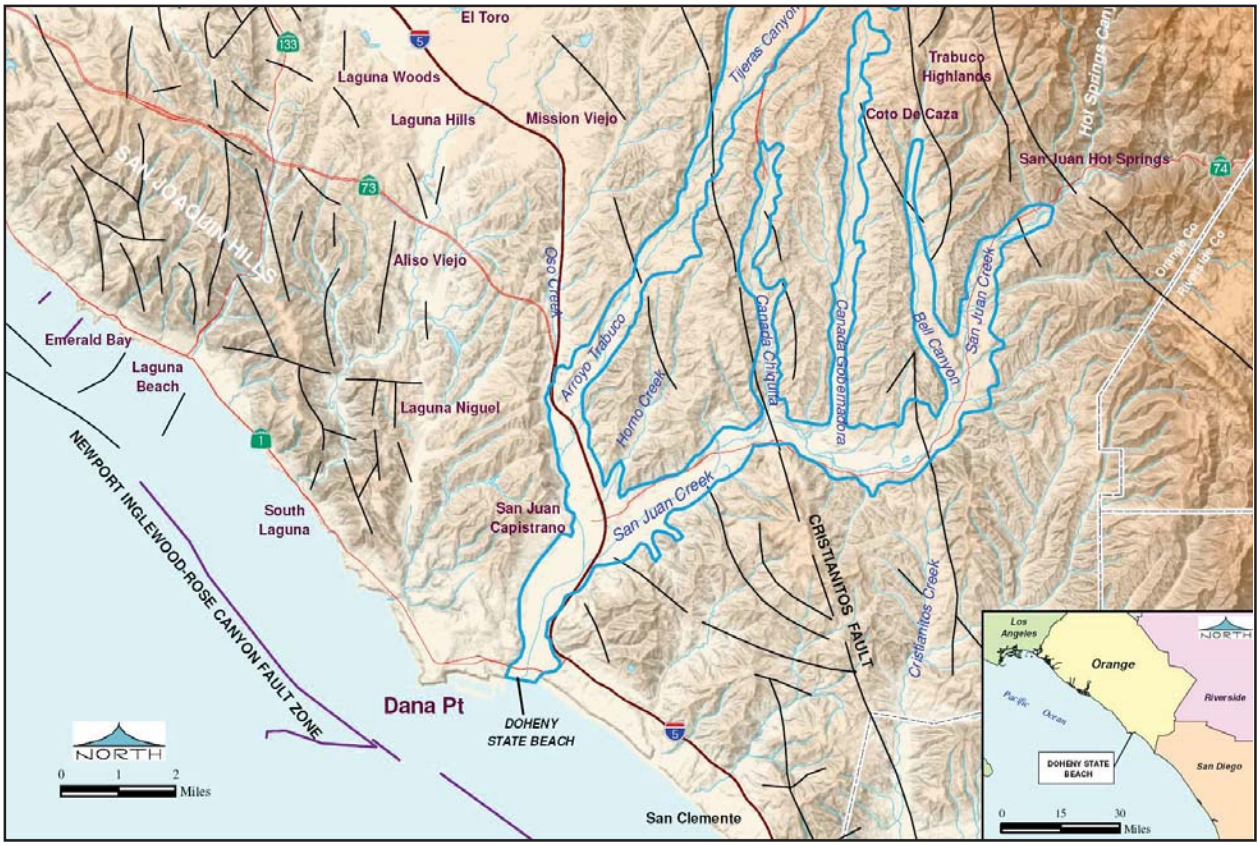

Figure 5-2: San Juan Groundwater Basin

Section 5.3.2 Groundwater Production Optimization

The San Juan Basin Authority agencies are currently investigating alternatives for increasing the yield and maximizing the available storage within the San Juan Basin. The groundwater management plan identified that in-stream recharge is the only viable large-scale recharge method to increase the potential yield due to a lack of off-stream sites. Options for enhancing the yield of the San Juan Basin include: increasing groundwater recharge using storm water capture, and introduction of recycled water for groundwater recharge. Surface water recharge involves utilizing rubber dams and/or incidental recycled water recharge to increase the potential yield of the basin from 2,000 acre-feet per year to 8,200 acre-feet per year through a phased progression of these recharge project opportunities. Further analysis of the potential recharge enhancement projects is necessary to understand the regulatory, technical, and institutional challenges to implementation of the projects. The District will continue to work with the interested San Juan Basin Authority agencies to investigate the enhancement opportunities and the impact on the District's potential to receive groundwater from the San Juan Basin.

Section 5.4 Surface Water

For purposes of this 2015 UWMP, the District does not have any local surface water supplies available. As explained above, it is possible that local surface runoff captured in Irvine Lake could be treated at the Baker Water Treatment Plant and made available to project participants in the future. However, the

quantity of potential local supply from Irvine Lake has not been determined at this time, and thus from a conservative standpoint local surface water is not included as part of the District's projected water supply portfolio.

Section 5.5 Storm Water

For purposes of this 2015 UWMP, the District does not have any storm water projects or storm water supplies available. As part of a conceptual groundwater optimization project in the San Juan Groundwater Basin, the use of storm water is being evaluated as a potential source of supply in the future. However, the quantity of potential storm water supplies from the Basin has not been determined at this time, and thus from a conservative standpoint storm water is not included as part of the District's projected water supply portfolio.

Section 5.6 Wastewater and Recycled Water

Section 5.6.1 Agency Coordination

There are a number of water agencies in south Orange County that provide potable water service as well as wastewater collection and treatment. These agencies depend on imported water supplies for the majority of their potable water supplies due to the misfortune of geography in that very little groundwater supplies are available. These agencies have been in the forefront of recycled water development to diversify water supplies. Over the years, money agencies have given up individual wastewater treatment facilities and joined the South Orange County Wastewater Authority (SOCWA). In the summer of 2015, Santa Margarita Water District took over operation of the Plant 3A Wastewater Treatment Plant from SOCWA. Both SMWD and MNWD own capacity rights in Plant 3A. Plant 3A has historically utilized less than one-third of its wastewater treatment capacity; the regional partnership was centered on potentially expanding the recycled water production capacity of the plant through regional optimization of wastewater flows.

Section 5.6.2 Wastewater Description and Disposal

MNWD collects wastewater via a network of gravity lines, lift stations, and force mains throughout the service area. Wastewater is primarily residential in nature. There is very little contribution from commercial and industrial activities as MNWD is primarily residential. Approximately 22 percent of total wastewater collected is from commercial customers with the remaining portion from residential customers.

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

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

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

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

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

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

Costs for the operation and maintenance of treatment facilities by SOCWA are proportioned to each member agency primarily based on volume deliveries and/or capacity ownership of the plants. The current total average daily flow tributary to the SOCWA J.B. Latham Treatment Plant is 8 MGD. The plant has a design capacity of 13 MGD. The SOCWA Joint Regional Treatment Plant has a capacity of 12 MGD and is currently processing slightly over 8 MGD. Plant 3A has a secondary treatment capacity of 6 MGD and is currently processing slightly under 2 MGD. Over the past five years, through active and passive

conservation measures, wastewater flows in the District service area have decreased over 30 percent. The District's Recycled Water Master Plan is evaluating the impact of continued wastewater decreases on flows and opportunities to optimize flows both within and opportunities regionally to use all wastewater for beneficial use. MNWD owns 22.7 MGD of secondary treatment capacity in the wastewater treatment plants. Table 5-1 shows the 2015 share of flows to the wastewater treatment plants that the District owns capacity in.

Table 5-1: DWR Table 6-2: Wastewater Collected Within Service Area in 2015

DWR Table 6-2 Retail: Wastewater Collected Within Service Area in 2015

☐	There is no wastewater collection system. The supplier will not complete the table below.
100%	Percentage of 2015 service area covered by wastewater collection system *(optional)*
100%	Percentage of 2015 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected in 2015	Name of Wastewater Treatment Agency Receiving Collected	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
MNWD	*Metered*	8,974 AFY	*SOCWA*	**Joint Regional Treatment Plant**	*Yes*	*Yes*
MNWD	*Estimated*	2,108 AFY	*SMWD*	**3A Treatment Plant**	*Yes*	*Yes*
MNWD	*Estimated*	1,149 AFY	*SOCWA*	**JB Latham Treatment Plant**	*No*	*Yes*
MNWD	*Estimated*	0,000 AFY	*SOCWA*	**Coastal Treatment Plant**	*Yes*	*Yes*
Total Wastewater Collected from Service Area in 2015:		**12,231**				

NOTES: The reported volumes are the amount of contributed wastewater from the District. In Fiscal Year 2016, SMWD began operating the 3A wastewater treatment plant on behalf of the District.

The wastewater treatment plants use a conventional activated sludge process that treats wastewater to secondary treatment standards. The SOCWA plant effluent is disposed by means of ocean outfalls that discharge off the coasts of Dana Point and Laguna Beach.

Table 5-2 summarizes wastewater treatment and discharge within the service area in 2015.

Table 5-2: DWR Table 6-3: Wastewater Treatment and Discharge within Service Area in 2015

DWR Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015

☐ **No wastewater is treated or disposed of within the UWMP service area.**
The supplier will not complete the table below

Wastewater Treatment Plant name	Discharge Location	Discharge Location Description	Wastewater Discharge ID Number	Method of Disposal	Does this Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	2015 volumes			
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside Service Area
Joint Regional Treatment Plant	Aliso Creek Ocean Outfall			Ocean Outfall	No	Tertiary	8,974	1,771	7,203	-
3A Treatment Plant	San Juan Creek Ocean Outfall			Ocean outfall	Yes	Tertiary	2,108	1,255	854	-
JB Latham Treatment Plant	San Juan Creek Ocean Outfall			Ocean outfall	Yes	Secondary, Undisinfected	1,149	1,149	-	-
Coastal Treatment Plant	Aliso Creek Ocean Outfall			Ocean outfall	Yes	Tertiary	-	-	-	-
						Total	**12,231**	**4,175**	**8,057**	**0**

NOTES: The District has storage in Upper Oso Reservoir leading to the differences between this table and Table 5-4 in total recycled water delivered versus treated. The quoted numbers are for the amount of wastewater contributed from the District.

Section 5.6.3 Current Recycled Water Uses

In 1984, MNWD constructed a 0.6 MGD Advanced Wastewater Treatment Plant (AWT) at the AWMA plant in Laguna Niguel, currently known as SOCWA Joint Regional Wastewater Treatment Plant (JRTP). This tertiary treatment facility produced water for irrigating the El Niguel Country Club in Laguna Niguel and produced approximately 350 acre-feet of water per year for the Country Club. In 1989, the AWT facility was expanded from 0.6 to 2.4 MGD of tertiary treatment capacity to expand service from the El Niguel Country Club to Crown Valley Community Park, Laguna Niguel Regional Park, and several greenbelt areas within the City of Laguna Niguel. In 1996, MNWD constructed a second AWT at the JRTP with a capacity of 9 MGD along with an underground reclaimed water storage tank. The original 2.4 MGD plant has been abandoned.

In 1991, MNWD constructed a 2.4 MGD AWT facility at Plant 3A to provide recycled water for irrigation use. MNWD has expanded its reclaimed water supply capacity to provide maximum-month demands for its reclaimed water distribution system. This system serves two separate hydrologic areas (HA): Laguna HA 1.1 (including the Laguna Niguel, Aliso Viejo, and Dana Point hydrologic sub-areas), and Mission Viejo HA 1.2. The system serves reclaimed water from three water reclamation treatment plants: (1) MNWD Plant 3A AWT, (2) SOCWA JRTP AWT, and (3) South Coast Water District Water Recycling Plant (WRP) located at the Coastal Wastewater site, which is interconnected to the MNWD distribution system. MNWD currently has 11.4 MGD of tertiary treatment capacity in compliance with Title 22 Recycled Water requirements. MNWD also has 1,000 AF of seasonal storage for its recycled water distribution system in the Upper Oso Reservoir. MNWD has 2.4 MGD capacity in Plant 3A; 9.0 MGD capacity in the SOCWA Joint Regional Treatment Plant; and 1.4 MGD of capacity in the SOCWA Coastal Treatment Plant. Table 5-3 presents a comparison of the projected 2015 recycled water demands from the 2010 UWMP with actual demands.

Table 5-3: DWR Table 6-5: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual

DWR Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual			
☐	Recycled water was not used in 2010 nor projected for use in 2015. The supplier will not complete the table below.		
Use Type		2010 Projection for 2015	2015 actual use
Landscape irrigation (excludes golf courses)		8,500	6,377
Golf course irrigation			1,061
Other	*Losses*	Water Loss in the recycled water distribution system	550
	Total	**8,500**	**7,988**
NOTES: Recycled water for golf course irrigation was not reported separately in the 2010 UWMP, neither was water loss. As explained above, losses includes both apparent and real losses; the District has not yet done an audit of the water losses of the recycled system.			

Table 5-4 illustrates the current, and projected uses for recycled water in MNWD. The usage is limited to landscape irrigation with tertiary treated water meeting Title XXII standards.

Section 5.6.4 Potential Recycled Water Uses

MNWD's demands for recycled water continue to increase as new services are connected to the recycled water system. Recycled water represents approximately 23% of MNWD's supply. With the potential expansion of MNWD's recycled water distribution system, recycled water will increase to about 28% of the supply by 2040. As will be expanded in Chapter 9, the District's recycled water customers will all be on Advanced Metering Infrastructure (AMI) by the end of 2016. In combination with the turf removal program, recycled water customers are expected to be more efficient over the next twenty-five years, similarly to the efficiency gains in the potable water system. Table 5-4 presents projected recycled water use within MNWD's service area through 2040.

Table 5-4: DWR Table 6-4: Current and Projected Recycled Water Direct Beneficial Uses within Service Area

DWR Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area*									
☐	**Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.**								
Name of Agency Producing (Treating) the Recycled Water:			**South Orange County Wastewater Authority**						
Name of Agency Operating the Recycled Water Distribution System:			**Moulton Niguel Water District**						
Supplemental Water Added in 2015			187						
Source of 2015 Supplemental Water			Municipal Water District of Orange County						
Beneficial Use Type		General Description of 2015 Uses	Level of Treatment	2015	2020	2025	2030	2035	2040 (opt)
Landscape irrigation (exc golf courses)		**Slopes, medians for HOAs and**	Tertiary	6,377	6,762	8,562	8,562	8,562	8,562
Golf course irrigation			Tertiary	1,061	877	877	877	877	877
Other	**Losses**	**Water Loss in the recycled water**	Tertiary	550	472	571	559	547	536
			Total:	**7,988**	**8,111**	**10,010**	**9,998**	**9,986**	**9,975**
IPR - Indirect Potable Reuse									
** This may include use outside the UWMP area that is NOT included in another UWMP area. It is to be noted in the general description cell.*									
NOTES: The District golf courses have undergone large turf removal projects. The projections in 2020 and beyond are based on the expected water savings from turf removal projects finished after June 2015 and expected future projects totaling 1.5 million square feet at an assumed 40 gallons of water saved per square foot of turf removed.									

Currently, the District is undergoing an extensive Recycled Water Master-Planning effort to look at the cost benefit of extending recycled water service to the remaining 1,260 potable irrigation customers.

These customers currently use on average approximately 4,000 acre feet per year of water. A preliminary output of the study is that through a Phase V extension of the recycled water system, approximately 2,000 of additional average year demand can be converted from potable to recycled water use. A discussion on financial incentives to aid in customers' conversion is provided in Section 9.1.8. However, the District is closely monitoring regulations on both direct and indirect potable reuse of water. If in the future, the cost of developing potable water sources from recycled water is cheaper than direct recycled water use, the District would consider shifting strategies. As noted in Section 2.3.1, the District's service area is largely residential with commercial office spaces. There are not projected to be any opportunities for recycled water use for agricultural irrigation, wildlife habitat enhancement, wetlands, or industrial reuse. Additionally, opportunities for dual plumbing for indoor recycled water use is prohibitively expensive within the District's service area currently.

Section 5.7 Desalinated Water Opportunities

As part of the District's 2015 Long Range Water Reliability Plan, the District evaluated new desalination projects amongst a variety of stages of planning. A conceptual desalination project was evaluated and assumed to be developed at either the Huntington Beach and/or Dana Point facility, would provide MNWD with up to 14,000 AFY. The supply from this option would be delivered directly or in-lieu into MNWD's service area, providing both supply and system reliability benefits. This option would be eligible for MWDSC's Local Resources Program credit, and it was assumed that this credit would offset project costs by $340/AF.

Table 5-5: Summary of Desalinated Water Opportunities

Represents Base Loaded Supply (Take or Pay) **Annual Supply Yield = 14,000 AFY** **Peak Capacity for Local Emergencies = 19 cfs for 30-60 days** **Delivery and Benefit:** Desalinated water would be delivered to MNWD's service area via one of several locations. • Provides supply reliability benefits under droughts and Delta levee failure • Provides system reliability benefits under Diemer WTP outage	**Today's Unit Cost ($/AF): $1,710-$2,210** Costs include either purchased water agreement costs or shared costs for treatment plant, intake and brine disposal, and conveyance costs. Unit cost inclusive of MWDSC LRP. 40% of costs are fixed and do not escalate. **Issues:** • Agreements between partners for water supply • Environmental impacts of intake and brine disposal are significant • Regulatory approvals are needed • Operational challenges to MNWD for such a high quantity of base loaded supply to service area

Section 5.8 Exchanges or Transfers

The District does not currently have any exchange or transfer agreements in place. However, the District is always evaluating opportunities for local and regional exchanges to provide greater system and long term reliability.

Section 5.9 Future Water Supply Options

Section 5.9.1 San Juan Basin Groundwater Expansion

This option would involve recharge of storm flows, urban run-off and tertiary-treated wastewater storage and recovery of tertiary-treated wastewater and stormwater into the San Juan groundwater basin to enhance current safe yield and provide new local water supply. Because of the geology of the basin, the tertiary-treated wastewater and stormwater would have to be stored through direct injection. The extracted groundwater would then be treated at an expanded groundwater recovery (desalination) treatment facility before being delivered for potable water use. One major implementation issue would be to obtain permitting approval for recharge direct injection of tertiary-treated wastewater. This option

would be eligible for MWD's Local Resources Program credit, and it was assumed that this credit would offset project costs by $340/AF.

Table 5-6: San Juan Basin Indirect Potable Reuse Concept Summary

Represents Base Loaded (Take or Pay) Supply **Annual Supply Yield = 3,000 AFY** **Peak Capacity for Local Emergencies = 4 cfs for 30-60 days** **Delivery and Benefit:** In partnership with SJB Authority and partners, water would be delivered to southern part of MNWD's service area. • Provides supply reliability benefits under droughts and Delta Levee failure • Provides system reliability benefits under Diemer WTP outage	**Today's Unit Cost ($/AF): $1,100-$2,500** Costs would likely include new injection and production wells, conveyance pipeline and pump stations, and expanded brackish desalination. Unit cost inclusive of MWDSC LRP. 50% of the cost is fixed and does not escalate. **Issues:** • Agreement with SJB Authority and partners for cost-sharing • Regulatory approval for using tertiary-treated wastewater for GW recharge • Environmental impacts of additional brine disposal

Section 5.9.2 Non-Potable Water Reuse

Expansion of MWNDs existing recycled water system for non-potable reuse can reduce the need for treated imported water and improve reliability. Expansion of MNWD's recycling system is based on the assumption of increasing existing distribution by 2,000 AFY, based on projected irrigation demands for 2040. Table 5-7 presents these preliminary projections.

Table 5-7: DWR Table 6-6: Methods to Expand Future Recycled Water Use

DWR Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
Phase V RW Extension	Output of 2016 Recycled Water Master Plan	2017-2025	2,000
		Total	**2,000**
NOTES:			

Currently, MNWD has capacity for tertiary treatment higher than the current average year demands of approximately 8,000 AFY and expansion could potentially be increased if demands increase in the interim. For this option, facilities required to increase the existing recycled water system by 2,000 AFY are conveyance pipeline extensions, pump stations and seasonal storage. Expansion of the existing recycled water system may qualify for a subsidy from MWD's Local Resource Program up to $340/AF. Cost estimates can be developed utilizing representative costs from similar projects in Southern California in combination with data regarding the distance of additional recycled water users from existing pipelines and treatment plant capacity expansion requirements.

Section 5.10 Summary of Existing and Planned Sources of Water

Currently MNWD's potable water supply is entirely imported water purchased from MWDOC. MNWD is planning to identify more local water supplies as a part of its future water supply portfolio. In the near future, MNWD will receive a portion of its potable demand from the future Baker Water Treatment Plant improving treated imported water reliability and also generating system reliability in cases of catastrophic failure from earthquakes, flooding, and other disasters. In addition to this, the District is waiting on the SWRCB report to the California State Legislature findings on the regulatory framework for Indirect Potable Reuse and Direct Potable Reuse. In the winter months, there is excess wastewater that is discharged to the ocean. This available resource could be treated and either put through a natural barrier and used in the potable distribution system or directly treated to potable water. Due to the high cost of providing the remaining recycled water to customers, this strategy could prove more cost effective to use as a base-loaded water resource and will help the district to be more self-reliant with its local water supply sources.

Table 5-8: DWR Table 6-7: Expected Future Water Supply Projects or Programs

DWR Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Section 5.1.5	Page location of narrative					
Name of Future Projects or Programs	Joint Project with other agencies?	Agencies Collaborating with:	Description (if needed)	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Agency
Recycled Water	No		Recycled water system extensions that will offset existing potable water supply	2017-2025	Average Year	2,000
BAKER WTP	Yes	IRWD, ETWD, SMWD, TCWD	Untreated water from Colorado and SWP treated and provides system reliability in the event of a Deimer outage	2016	Average Year	9,400
NOTES: The other existing and planned sources of supply are discussed in Section 5.10						

Table 5-8 presents the expected future water supply projects that are far enough along in development to be able to quantify. These recycled water projects and the development of the Baker Water Treatment Plant, increase supply availability and reliability for the District.

Table 5-9: DWR Table 6-8: Water Supplies – Actual

DWR Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume	Water Quality	Total Right or Safe Yield *(optional)*
Purchased or Imported Water		26,824	Drinking Water	
Recycled Water		7,988	Recycled Water	
	Total	**34,812**		**0**
NOTES:				

Table 5-9 presents the amount of water currently available to the District. The amount used in 2015 is provided along with each supply's water quality and the amount available from each source.

Chapter 6 Water Supply Reliability Assessment

The District relies on imported supplies provided by MWDSC through MWDOC and local recycled water supplies. Historically, most of the imported supply has come from the Colorado River Aqueduct (CRA). Improvements made to MWDSC's system now allow greater flexibility in conveying northern California supplies from the SWP to Lake Mathews and in incorporating transfers, exchanges, and storage programs into MWD's supply portfolio.

Section 6.1 Constraints on Water Sources

The District's recycled water supply is a highly reliable supply, however, various factors have the potential to affect the availability and reliability of the District's imported supply from MWDSC. In its 2015 Integrated Resources Plan Update, MWDSC identified risks and uncertainties that could potentially influence the reliability of supplies, associated with the following factors (MWDSC Draft UWMP, 2015).

- Water quality
- Climate change
- Regulatory and operational changes
- Project construction and implementation issues
- Infrastructure reliability and maintenance
- Demographic and growth uncertainty

For example, SWP operations are subject to legal, environmental, and water quality factors resulting in export reductions from the Sacramento River-San Joaquin River Delta (Delta), releases of additional water from storage, other operational changes associated with endangered species, or water quality requirements in the Delta. MWDSC relied on DWR's 2015 SWP Delivery Capability Report which presents current estimates of water availability and reliability, incorporating biological opinion restrictions. In response to these constraints on water sources, MWDSC has increased supplies by developing a flexible Central Valley/SWP storage and transfer program (MWDSC Draft UWMP, 2015).

Colorado River supplies are also subject to various regulatory and environmental concerns. For example, controlling the spread and impacts of quagga mussels within the Colorado River Aqueduct requires extensive maintenance and results in reduced operational flexibility. In addition, MWDSC has been active in responding to potential water quality concerns by protecting source water quality and developing water management programs that maintain and enhance water quality in the Colorado River system. Efforts have been focused on managing total organic carbon, bromide concentrations, pathogenic microbes, and TDS. Contaminants that cannot be sufficiently controlled through protection of source waters are handled through changed water treatment protocols or blending.

Furthermore, climate change is expected to shift precipitation patterns and affect water supply, which will make water supply planning even more challenging. The areas of primary concern for the imported supply include the reduction in Sierra Nevada and Colorado River Basin snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of levee failure in the Delta.

The following discussion of water supply and water quality challenges is excerpted from the MWDSC 2015 UWMP for purposes of addressing potential impacts to the District's imported supply (MWDSC, Draft 2015 UWMP).

- The region and Colorado River Basin have been experiencing drought conditions for multiple years. In the past 16 years (2000 to 2015), there have been only three years when the Colorado River flow has been above average. The last above average year was 2011, when the unregulated water year inflow to Lake Powell was 139 percent of average.
- Endangered species protection and conveyance needs in the Delta have resulted in operational constraints that are particularly important because pumping restrictions impact many water resource programs: SWP supplies and additional voluntary transfers, Central Valley storage and transfers, in-region groundwater storage, and in-region surface water storage.
- Changing climate patterns are predicted to shift precipitation patterns and affect water supply. While uncertainties remain regarding the exact timing, magnitude, and regional impacts of climate change related temperature and precipitation changes, researchers have identified several areas of potential concern:
    - Reduction in Sierra Nevada snowpack
    - Reduction in Colorado River Basin snowpack
    - Increased intensity and frequency of extreme weather events
    - Rising sea levels resulting in:
        - Impacts to coastal groundwater basins and the Delta due to seawater intrusion,
        - Increased risk of damage from storms, high-tide events, and the erosion of levees; and
        - Potential pumping cutbacks on the SWP and Central Valley Project.
- Water quality regulations and issues like quagga mussels within the CRA are of concern. Controlling the spread and impacts of the quagga mussels requires extensive maintenance and reduced operational flexibility.

However, the primary constraint to the District on the availability of imported supplies during times of supply shortages is the cost, particularly when MWDSC's Water Supply Allocation Plan is in effect, as further discussed below. In terms of quantity and reliability, MWDSC has an extensive supply augmentation program to assure its member agencies that their current and projected demands for imported supplies can be reliably met through 2040 during average/normal, single-dry, and multiple-dry year conditions.

MWDSC's ability to ensure water supply availability and reliability to its member agencies is based in part on its Water Surplus and Drought Management Plan (WSDM). MWDSC developed and adopted the WSDM Plan to provide policy guidance and manage regional water supply actions under both surplus and drought conditions to achieve the overall goal of ensuring water supply reliability to its member agencies as set forth in MWDSC's Regional UWMP and IRP. The WSDM Plan outlines various water supply conditions and corresponding actions MWDSC may undertake in response to moderate, serious and extreme water shortages. Under Condition 1, MWDSC issues a Water Supply Watch and encourages local agencies to implement voluntary dry-year conservation measures and utilize regional

storage reserves. Under Condition 2, MWDSC issues a Water Supply Alert and calls for cities, counties, its member agencies and all other retail water providers to implement extraordinary conservation through drought ordinances and other measures to minimize the use of storage reserves. Under Condition 3, MWDSC may implement its Water Supply Allocation Plan (WSAP), which allocates available water supplies among its member agencies based on factors such as impacts to retail customers, population and projected growth of particular member agencies, the availability of recycled water and other local supplies, conservation efforts, and other factors. At times when the WSAP is implemented, MWDSC member agencies do not lose their ability to receive any particular amount of imported water supplies, but instead MWDSC places limits on the amount of water its member agencies can purchase without facing a surcharge. In turn, MWDOC has also developed a WSAP to allocate imported supplies at the retail level in Orange County. Under these WSAPs, the availability of imported water supplies is based primarily on the need for imported supplies relative to the total need for those supplies within the MWDSC and MWDOC service areas.

In response to prolonged drought conditions, in April 2015 MWDSC declared a Condition 3 shortage and decided to implement its WSAP with the goal of achieving a 15 percent reduction in regional deliveries to its member agencies starting on July 1, 2015. Importantly, MWDSC has confirmed that implementation of its WSAP merely involves the potential application of a surcharge to those member agencies whose deliveries of water from MWDSC exceed their allocations, but it does not otherwise prohibit or restrict such deliveries. (MWDSC WSAP Staff Report, pp. 3-6.)

To improve long term supply availability and reliability for the region, MWDSC has developed an adaptive management strategy as a part of its 2015 Integrated Resources Plan Update. Reliability targets were established for imported and local water supplies and water conservation to, if successful, provide a future without water shortages and mandatory restrictions under planned conditions. For imported supplies, MWDSC looks to make investments in additional partnerships and initiatives to maximize Colorado River Aqueduct deliveries in dry years. For the SWP, MWDSC is looking to make ecologically-sound infrastructure investments so that the water system can capture sufficient supplies to help meet average year demands and to refill MWDSC's storage network in above-average and wet years. Lowering regional residential demand by 20 percent by the year 2020 (compared to a baseline established in 2009 state legislation), reducing water use from outdoor landscapes, and advancing additional local supplies are among the planned actions to keep supplies and demands in balance (MWDSC Draft IRP, 2016).

Section 6.2 Reliability by Type of Year

During the twentieth century, California experienced four periods of severe drought: 1928-34, 1976-77, 1987-92, and 2012-present. The year 1977 is considered to be the driest year of record in the Four Rivers Basin by DWR. These rivers flow into the Delta and are the source waters for the SWP, thus MWDSC's selection as the single driest base year. Southern California and, in particular Orange County, sustained few adverse impacts from the 1976 to 1977 drought, due in large part to the availability of

Colorado River water and groundwater stored in local groundwater basins and utilized by various Orange County agencies during drought conditions.

Table 6-1 presents three year types: average, single dry year, and multiple dry years. To analyze the variability of imported supply reliability due to climate, hydrologic conditions that define these year types were determined. The years selected to reflect these year types are those used by MWDSC since MWDSC's imported supplies are the predominant District water supply. The District's recycled water supply is 100 percent reliable during all year types, subject only to temporary interruptions due to potential infrastructure or operational issues.

Because the District has relied on imported water supplies (in addition to recycled water) to meet its demands, the reliability levels during all hydrologic year types presented in Table 6-1 reflects MWDSC's determination of its ability to reliably meet the demands of its member agencies. Notably, the MWDSC 2015 UWMP determines that MWDSC is able to meet the current and projected full service demands of its member agencies under all three hydrologic conditions through 2040 by developing and implementing water resources programs and activities through its IRP preferred resource mix. This mix includes conservation; local resources such as recycled water and groundwater recovery; Colorado River supplies and transfers; SWP supplies and transfers; in-region surface reservoir storage; in-region groundwater storage; and out-of-region banking, treatment, conveyance, and infrastructure improvements.

Although MWDSC's reliability assumptions were used in this analysis, MWDOC's assumptions are equally important to the District. As presented in its 2015 RUWMP, MWDOC has determined that it is able to meet "bumped" water demands (demands that were increased to reflect dry year conditions before conservation efforts reduced demands) during all hydrologic year types through 2040. Similar to MWDSC, the reliability levels from MWDOC are due to its diversified supplies, comprehensive management, and conservation efforts (MWDOC, 2016).

Table 6-1: DWR Table 7-1 Retail: Basis of Water Year Use

DWR Table 7-1 Retail: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☑	Quantification of available supplies is not compatible with this table and is provided in Tables 7-2 through 7-4.
		☐	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available	**% of Average Supply**
Average Year	Average of 1922 to 2004		100%
Single-Dry Year	1977		100%
Multiple-Dry Years 1st Year	1990		100%
Multiple-Dry Years 2nd Year	1991		100%
Multiple-Dry Years 3rd Year	1992		100%
NOTES: MWD assumption of reliability based on MWDSC 2015 RUWMP. District's recycled water is 100% reliable in all year types.			

Average/Normal Water Year: The normal year most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields. MWD used 1922 through 2004 to establish this normal year.

Single Dry Water Year: This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield. MWD identified 1977 as the single driest year since 1922. MWDOC used 2006/07 as its single driest year.

Multiple Dry Water Years: This is defined as three consecutive years with the lowest average water supply availability to the District for consecutive multiple years. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and groundwater basins. For modeling purposes, MWDSC identified 1990 to 1993 as the driest multiple years since 1922 when the least amount of imported water was available. MWDOC used 2005/06 through 2007/08 as its driest multiple year scenario.

Section 6.3 Supply and Demand Assessment

An assessment of District supply reliability under normal, single dry, and multiple dry years is presented here. Responses to an actual drought or continuation of the current drought follow the water use efficiency mandates of MWD's Water Surplus and Drought Management Plan (WSDM Plan), along with

implementation of the appropriate stage of the District's water shortage ordinance discussed in Chapter 7.

Section 6.3.1 Normal Year Reliability Comparison

The District has entitlements to receive imported water from MWD and has the capacity in existing transmission facilities to convey enough supply to meet its projected demands. Table 6-2 presents a comparison between projected District water demands and the availability of future supplies to meet these demands under normal or average years through 2040. Supply totals reflect imported water and recycled water. As described in Chapter 5, the projected imported supply is based on projected average year water purchases from MWDOC. This is added to the approximately 8,000 afy of recycled water availability. Notably, both MWDSC and MWDOC have documented that they can reliably meet the full demands of their respective member agencies over the next 20 years and beyond during average/normal year periods.

Table 6-2: DWR Table 7-2 Retail: Normal Year Supply and Demand Comparison

DWR Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 (Opt)
Supply totals *(autofill from Table 6-9)*	40,929	44,178	44,938	45,391	45,391
Demand totals *(autofill from Table 4-3)*	35,915	35,701	35,158	35,154	35,225
Difference	5,014	8,477	9,781	10,237	10,166
NOTES:					

Section 6.3.2 Single Dry Year Reliability Comparison

District supplies and demands were analyzed to determine impacts associated with a single dry year. The projected single dry year supply is based on the availability of water for the two sources as presented in Table 6-3.

Section 6.3.3 MWDOC "Bump" in Demands

For reliability planning, MWDOC estimated an increase in member agency demands associated with a single dry year. The 9 percent "bump" for MNWD was based on the highest per capita usage over the ten year period of 2005/06 to 2014/15 compared with the annual average usage over the same period. This single dry year of 2006/07 was near the beginning of a decade that included many dry years and a recession, thus reducing the average demands significantly. The second single dry year not following a dry year during this decade was 2011/12. If this year were used to calculate the bump, demands were actually 10 percent lower for this single dry year than the 10-year average. However, to also plan conservatively, the 9 percent bump in the Demand Totals from Table 6-2 was added to reflect an

increase in demands associated with a future first year of drier weather, before additional conservation outreach is implemented.

Table 6-3: DWR Table 7-3 Retail: Single Dry Year Supply and Demand Comparison

DWR Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 (Opt)
Supply totals	39,147	38,914	38,322	38,318	38,396
Demand totals	39,147	38,914	38,322	38,318	38,396
Difference	0	0	0	0	0
NOTES:					

Table 6-3 presents a comparison of projected single dry year water supply availability to the bumped single dry year water demands projected for the next 20 years. This table indicates that, based on the reliability of MWD supply, the region can provide reliable water supplies under the single driest year hydrology to meet the bumped increase in demands. MWD and MWDOC have documented that their service areas are projected to be 100 percent reliable in single dry years, including MWDOC's projected bumped increase in demands.

Section 6.3.4 Multiple Dry Year Reliability Comparison

As conducted with the single dry year demands, total projected water demands from Table 6-2 were increased to reflect a MWDOC-developed bump of 9 percent in demands for multiple dry years.

MWDOC is planning conservatively for its RUWMP analysis: it applied the multiple dry year increase in demands to all three years of the multiple dry year scenario demands. Because the District has instituted budget based rates and aggressive water use efficiency outreach, only the first two years of increased demands at 9 percent are included in Table 6-4. With MNWD's strong conservation programs, water demands will typically decrease over time as water use efficiency outreach efforts take effect. The third dry year will range from an increase to a decrease over the second year depending on these efforts.

Table 6-4 presents a comparison of projected multiple dry year water supply availability to the bumped multiple dry year water demands. Based on the reliability of MWD supply, the region can provide reliable water supplies under the multiple dry year hydrology to meet the increase in demands. MWD and MWDOC have documented that their service areas are projected to be 100 percent reliable in multiple dry years, including MWDOC's projected bumped increase in demands.

Table 6-4: DWR Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison

DWR Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	39,147	38,914	38,322	38,318	38,396
	Demand totals	39,147	38,914	38,322	38,318	38,396
	Difference	0	0	0	0	0
Second year	Supply totals	39,147	38,914	38,322	38,318	38,396
	Demand totals	39,147	38,914	38,322	38,318	38,396
	Difference	0	0	0	0	0
Third year	Supply totals	35,915	35,701	35,158	35,154	35,225
	Demand totals	35,915	35,701	35,158	35,154	35,225
	Difference	0	0	0	0	0
NOTES:						

Section 6.4 Regional Supply Reliability

MWDOC has undertaken the "OC Water Reliability Study" to identify regional supply reliability levels, address supply and system gaps with investments, and provide input to MWD's Integrated Resources Plan process. Interim results provided an assessment of 2040 demands and the potential gap in supplies. Preliminary results indicate that, except for the groundwater recovery expansion program, with no new projects by MET, MWDOC, and member agencies, and without the California WaterFix, there may be supply shortages of 13 percent by 2040. However, the UWMPs for both MWD and MWDOC highlight the numerous projects currently in the planning stages to increase supplies to prevent shortages.

Phase 2 of the study, starting in 2016, will result in a quantification of reliability improvements and costs from project portfolios to allow for stakeholders to determine the most appropriate projects. This reliability study is not taking the place of current supply projects underway. The MWDOC reliability study offers participants the opportunity to further enhance reliability levels.

In accordance with the information and analyses provided herein, and in the 2015 UWMPs prepared by MWDSC and MWDOC, MNWD is capable of meeting its customers' demands in all hydrologic year types through 2040, even with a potential bump in dry year demands. The highly reliable supplies reflect not only regional projects and comprehensive water supply planning by MWDSC and MWDOC, but also the forward thinking planning and efforts the District has undertaken to develop its recycled water supplies

and extraordinary conservation programs, thus greatly reducing reliance on imported supplies. As set forth throughout this UWMP, MNWD will continue to expand its recycled water program and aggressive conservation programs to further reduce reliance on imported water supplies. In addition, as discussed in Section 5.3 , the District will continue to explore participation in the San Juan Basin development project, one or both of the regional Orange County desalination projects, and opportunities for local and/or regional groundwater banking programs, all of which are local water resource programs that can add to supply reliability and further reduce demands on imported supplies.

Chapter 7 Water Shortage Contingency Planning

In February 2015, the Moulton Niguel Water District Board of Directors adopted Ordinance 15-01 laying the foundation for actions during times of water shortage or emergency. Pursuant to State law, the District is required to adopt a water shortage contingency plan to address specific "stages" of action to be undertaken in response to water supply shortages. A plan generally will include within each stage specified levels of reduction in the use of water that are appropriate for a water agency's service area. Recognizing that water is its most vital resource, the District updated its Water Shortage Contingency Plan in February 2015, with five water shortage stages (each a "Stage") and mandates to enable the District to respond to potential shortages, including up to a 50 percent reduction in water supply. During each Stage, specific practices can be implemented to reduce water use to preserve the District's water supplies and protect public health and safety.

The previous Water Shortage Contingency Plan (Plan) is contained within the District's Rules and Regulations and was last updated in 2008 as a mechanism to reduce demand under the 2009 to 2010 drought conditions. The Plan has been revised to utilize the District's Water Budget Based Rate Structure to implement varying stages of restrictions using pricing signals to encourage water use efficiency and conservation. The Water Shortage Contingency Plan is a mechanism by which the Board of Directors may implement varying stages of restrictions on customer water usage resulting from conditions under which normal water usage levels cannot not be met. This is proposed to be achieved by adjusting water allocation parameters to respond to varying levels of water supply conditions.

The revised Plan is presented in the form of an ordinance, which gives the District the ability to issue penalties, as outlined in the revised Plan, if a customer is in violation of an implemented water shortage stage. A summary of the revised Plan and corresponding penalties were distributed to MNWD customers through incorporation into the 2015 published Notice of Public Hearing, as part of the Proposition 218 process.

Section 7.1 Stages of Action: Stages 1 to 5

MNWD's Plan includes five drought stages; excerpts from the ordinance are provided here. The implementation of any given stage of the plan is dependent on Board action, which will consider the following in making a determination:

> (1) The District's wholesale water supplier has determined that a drought, water shortage, or water shortage emergency exists or has implemented or taken other actions requiring a reduction in water demand;
>
> (2) Metropolitan Water District of Southern California ("MWD") Water Supply Allocation Plan implementation or other actions requiring a reduction in water demand;
>
> (3) Regional or statewide importation or local distribution systems or facility(ies) have failed or have been shut down (e.g., a main break, reservoir, pipeline, canal, or other distribution or conveyance system failure);
>
> (4) Alternative water supplies are limited or unavailable;

(5) The State has determined that a drought, water shortage or water shortage emergency exists;

(6) The State has implemented restrictions on the use of water or reduced or restricted the delivery of wholesale water to the District; and

(7) Any other natural disaster that impacts the availability of water to the District.

Each stage is associated with the following water conservation targets.

- Stage 1: Voluntary (5% reduction)
- Stage 2: 10% reduction
- Stage 3: 20% reduction
- Stage 4: 30% reduction
- Stage 5: Health & Safety (50% reduction)

During each subsequent drought stage, the proposed drought rate policies would incrementally reduce the allocation of water in the "upper" tiers. This approach results in customers more quickly incurring higher tier rates if they do not reduce their consumption in accordance with the drought stage. Any customer who uses water in excess of his or her calculated water budget shall be in violation of the rules and regulations established by the District's Plan and shall pay an administrative penalty for water used in excess of a customer's water budget. A summary of the tier allocation changes in each stage and for each customer class is summarized in Table 7-1.

Table 7-1: Drought Rate Policy by Stage

Stage	Water Use Reduction Target	All Residential	Commercial	Irrigation	Recycled Water
Stage 1	5% voluntary reduction	No change	No change	No change	No change
Stage 2	10% overall reduction	Eliminate Tiers 3 and 4	Eliminate Tiers 2 and 3	Eliminate Tiers 2 and 3	Eliminate Tiers 2 and 3
Stage 3	20% overall reduction	Reduce Tier 2 allocation by 40% No Tiers 3 or 4	No Tiers 2 or3	Reduce Tier 1 by 40% No Tiers 2 or 3	Reduce Tier 1 by 10% No Tier 2 or 3
Stage 4	30% overall reduction	Reduce Tier 2 allocation by 70% No Tiers 3 or 4	No Tiers 2 or 3	Reduce Tier 1 by 70% No Tiers 2 or 3	Reduce Tier 1 by 20% No Tier 2 or 3
Stage 5	50% overall reduction	Reduce Tier 1 allocation by 33%. No Tiers 2, 3, or 4	No Tiers 2 or 3	No Tiers 1, 2, or 3.	Reduce Tier 1 by 30% No Tier 2 or 3

Section 7.2 Prohibitions on End Users

Mandatory prohibitions during Stage 1 are summarized here from the District's Rules and Regulations and are provided in Table 7-2. Information referenced here is provided in Appendix 4 Ordinance 15-01 Prohibited Water Waste Activities.

(A) **Conservation through Best Management Practices (BMP's).** Recognizing that water is our most vital resource, water conservation BMPs have been established to conserve water, prevent the waste or unreasonable use or unreasonable method of use of water, and preserve the District's water supplies. The BMPs shall be in effect at all times. Except as otherwise provided in this Section 5.N.4. of the Ordinance, the BMPs shall not apply to the use of recycled water.

(B) **Installation of Water Conservation Devices.** No water shall be provided by the District for internal or external use to any residential, commercial, industrial, agricultural, recreational, governmental, or public building or structure of any kind which is constructed or altered and in which either internal or external irrigation or domestic water piping or water fixtures are to be installed, extended, or altered in any way, including, but not limited to, any plumbing, water piping, or water fixtures for which a construction permit is required to be obtained from the County of Orange or its successor, or for which District approval of plans and service applications are required, unless the new, extended, or altered plumbing, water piping, or other water using facilities conform to the requirements and standards of this Section 5.N.4.(C) of the Rules and Regulations.

(C) **Standards for Water Conservation Devices.** The required water conservation devices and standards of the District are those set forth in Exhibit "F" to the District's Rules and Regulations. Nothing provided shall be deemed to relieve any person from compliance with the plumbing code of the County of Orange or any other state or local plumbing or building requirements.

(D) **Limits on Watering Hours.** Watering or irrigating any lawn, landscape or other vegetated area with potable water should be avoided between the hours of 9:00 a.m. and 5:00 p.m. on any day, except by use of a hand-held bucket or similar container, a hand-held hose equipped with an automatic shut-off nozzle or device, or for very short periods of time for the express purpose of adjusting or repairing an irrigation system.

(E) **Limits on Water Duration.** Watering or irrigating any lawn, landscape or other vegetated area with potable water using a landscape irrigation system or watering device that is not continuously attended should be limited to no more than eight minutes of watering per station every other day during the summer and less than six minutes during the spring, fall and winter. This subsection does not apply to landscape irrigation systems that exclusively use very low-flow irrigation systems where no emitter produces more than two gallons of water per hour.

(F) **No Watering During Rain.** Watering or irrigating any lawn, landscape or other vegetated area with potable water should be avoided when it is raining.

(G) **Plant Low-Water Demand Plants and Trees.** When installing new landscaping, plant only low-water demand trees and plants. New turf should only be installed for functional purposes. Functional turf is defined as turf used for athletic or high traffic areas.

(H) **No Excessive Water Flow or Runoff.** Watering or irrigating any lawn, landscape or other vegetated area in a manner that causes or allows for excessive flow or runoff of potable or recycled water onto an adjoining sidewalk, driveway, street, alley, gutter or ditch should be avoided.

(I) **No Washing Down Hard or Paved Surfaces.** Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, tennis courts, patios or alleys, should be avoided except when necessary to alleviate safety or sanitary hazards, and then only by use of a hand-held bucket or similar container, a hand-held hose equipped with an automatic shut-off device or a low-volume, high-pressure cleaning machine equipped to recycle any water used.

(J) **Obligation to Fix Leaks, Breaks or Malfunctions.** Excessive use, loss or escape of potable or recycled water through breaks, leaks or other malfunctions in the water user's plumbing or distribution system should be avoided for any period of time after such escape of water should have reasonably been discovered and corrected. It is unlawful for any person to permit for the foregoing for more than five days after receiving notice from the District of any such break, leak, or other malfunction.

(K) **Re-circulating Water Required for Water Fountains and Decorative Water Features.** Operating a water fountain or other decorative water feature that does not use re-circulated water is prohibited.

(L) **Limits on Washing Vehicles.** Using potable water to wash or clean a vehicle, including but not limited to any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not, should be avoided, except by use of a hand-held bucket or similar container, a hand-held hose equipped with an automatic water shut-off nozzle or a low volume power washer with an automatic water shut-off nozzle. This paragraph does not apply to commercial car washes or the washing of vehicles regulations where the health, safety, and welfare of the public is contingent upon frequent vehicle cleaning, such as garbage trucks and vehicles used to transport food and perishables.

(M) **Drinking Water Served Upon Request Only.** Eating or drinking establishments, including but not limited to a restaurant, hotel, café, cafeteria, bar, club or other public place where food or drinks are sold, served, or offered for sale, should only provide drinking water to persons when expressly requested.

(N) **Commercial Lodging Establishments Must Provide Option to Not Launder Linens Daily.** Hotels, motels, and other commercial lodging establishments should provide customers the option of not having towels and linens laundered daily. Commercial lodging establishments should prominently display notice of this option in each bathroom using clear and easily understood language.

(O) **Installation of Single Pass Cooling Systems.** Single pass cooling systems shall not be installed in buildings requesting new potable water service.

(P) **Ceased Installation of Non-re-circulating Water Systems in Commercial Car Washes and Laundry Systems.** Non-recirculating water systems in commercial car washes and laundry systems shall not be installed.

(Q) **Restaurants Required to Use Water Conserving Dish Wash Spray Valves.** Food preparation establishments, such as restaurants or cafés, shall not use non-water conserving dish wash spray valves.

(R) **Swimming Pools and Spa Covers.** Property owners who have a swimming pool or a spa are encouraged to cover the facilities to minimize water loss due to evaporation.

(S) **Water Waste and Unreasonable Water Use Prohibited**. The waste or unreasonable use or unreasonable method of use of water by any person shall be prohibited at all times.

Section 7.3 Penalties, Charges, Other Enforcement of Prohibitions

During Stages 2 through 5, any customer who uses water in excess of his or her calculated water budget shall be in violation of the Plan's rules and regulations and shall pay an administrative penalty ("Conservation Penalty") for each hundred cubic feet (HCF), or portion thereof, of water used in excess of a customer's water budget. The Conservation Penalty shall be in addition to the Volumetric Charge the District collects for the potable water or recycled water delivered. The water demand reductions for each of the Stages, the water budget adjustments, and the Conservation Penalties effective April 1, 2015, that may be imposed are described below and in Table 7-2. The implementation of any stage of the Plan is dependent on Board action, contemplating the District's water supply conditions and demand expectations.

- **Stage 1** – Efforts in Stage 1 are focused on a voluntary reduction. No restrictions on water use will be implemented and no adjustments will be made to customers' assigned water budgets.
- **Stage 2** – During Stage 2, all water customers, both potable and recycled, using water in excess of their assigned water budgets shall be in violation of the Plan rules and regulations. Any water used in excess of their water budgets will be subject to the Conservation Penalty of $7.43 per HCF for potable water customers and $7.04 per HCF for recycled water customers.
- **Stage 3** – During Stage 3, residential, multi-family and irrigation customers using potable water will have their outdoor water budgets reduced to 60% of their calculated outdoor water budget to meet reduced water supplies. All recycled water customers will have their outdoor water

budgets reduced to 90% of their calculated water budget due to reduced recycled water supplies from indoor water use reductions. Customers using water in excess of their recalculated water budgets shall be in violation of the Plan's rules and regulations. Any water used in excess of their recalculated water budgets will be subject to a Conservation Penalty of $7.43 per HCF for potable water customers and $7.04 per HCF for recycled water customers.

- **Stage 4** – During Stage 4, residential, multi-family and irrigation customers using potable water will have their outdoor water budgets reduced to 30% of their calculated outdoor water budget to meet reduced water supplies. All recycled water customers will have their outdoor water budgets reduced to 80% of their calculated water budget due to reduced recycled water supplies from indoor water use reductions. Customers using water in excess of their recalculated water budgets shall be in violation of the Plan rules and regulations. Any water used in excess of their recalculated water budgets will be subject to a Conservation Penalty of $7.43 per HCF for potable water customers and $7.04 per HCF for recycled water customers.
- **Stage 5** – During Stage 5, all residential and multi-family customers will have their indoor water budgets reduced from 60 gallons per capita per day to 40 gallons per capita per day. All commercial customers using potable water in excess of their calculated water budgets, all residential and multi-family customers using potable water in excess of their recalculated indoor water budgets, and all irrigation customers using potable water shall be in violation of the Plan. There shall be no use of potable water for outdoor irrigation within the District's service area. All recycled water customers will have their outdoor water budget reduced to 70% of their calculated water budget due to reduced recycled water supplies from indoor water use reductions. All recycled water customers using recycled water in excess of their recalculated recycled water budget shall be in violation of the rules and regulations. Any customer who uses water in excess of his or her recalculated or assigned water budget will be subject to the following Conservation Penalty: $7.63 per HCF for residential and multi-family customers; $7.43 per HCF for commercial customers; $9.04 per HCF for irrigation customers using potable water; and $7.04 per HCF for recycled water customers.

Table 7-2: DWR Table 8-2: Restrictions and Prohibitions on End Users

Table 8-2 Retail Only: Restrictions and Prohibitions on End Users			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
1	Landscape - Other landscape restriction or prohibition	Must use recycled water if readily available.	Yes
1	Other water feature or swimming pool restriction	No water budget bill adjustments allowed for pool fills.	Yes
2	Other	No bill adjustments allowed for going over a customer's water budget. Further description in Chapter 9.	Yes

Table 8-2 Retail Only: Restrictions and Prohibitions on End Users			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
3	Other	No bill adjustments allowed for going over a customer's water budget. Further description in Chapter 9.	Yes
4	Other	No bill adjustments allowed for going over a customer's water budget. Further description in Chapter 9.	Yes
5	Other	No bill adjustments allowed for going over a customer's water budget. Further description in Chapter 9.	Yes
0	CII - Restaurants may only serve water upon request	See Section N.4.M of Rules and Regulations	No
0	Landscape - Restrict or prohibit runoff from landscape irrigation	See Section N.4.H of Rules and Regulations	No
0	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	See Section N.4.J of Rules and Regulations	No
0	Landscape - Limit landscape irrigation to specific times	See Section N.4.D of Rules and Regulations	No
0	Other - Prohibit use of potable water for washing hard surfaces	See Section N.4.I of Rules and Regulations	No
0	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	See Section N.4.L of Rules and Regulations	No
0	Other water feature or swimming pool restriction	See Section N.4.R of Rules and Regulations	No
0	Water Features - Restrict water use for decorative water features, such as fountains	See Section N.4.K of Rules and Regulations	No
0	CII - Lodging establishment must offer opt out of linen service	See Section N.4.N of Rules and Regulations	No
0	Other	No single pass cooling systems. See Section N.4.O of Rules and Regulations	No
0	CII - Commercial kitchens required to use pre-rinse spray valves	See Section N.4.Q of Rules and Regulations	No
0	CII - Other CII restriction or prohibition	Prohibition of non-recirculating system for commercial laundry. See Section N.4.P of Rules and Regulations	No
0	Other	Prohibition of Waste and Unreasonable Use- See Section N.4.S of Rules and Regulations	No
0	Other	Conservation Devices Required- See section N.4.C of Rules and Regulations	No

Table 8-2 Retail Only: Restrictions and Prohibitions on End Users			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
0	Landscape - Other landscape restriction or prohibition	Limits on watering duration- See section N.4.E of Rules and Regulations	No
0	Landscape - Other landscape restriction or prohibition	No watering during rain- See section N.4.F of Rules and Regulations	No
0	Landscape - Other landscape restriction or prohibition	Plant low water demand plants- See section N.4.G of Rules and Regulations	No
0	Pools and Spas - Require covers for pools and spas	See Section N.4.R of Rules and Regulations	No
NOTES: Section N of the District's Rules and Regulations is the District's Water Shortage Contingency Plan which is provided in Appendix 4. Stage 0 indicates that the specified end use restriction is always in place.			

Section 7.4 Consumption Reduction Methods by Agencies

Consumption reduction methods to be used to reduce water use in the most restrictive stage of Stage 5 are related to pricing, as presented in Table 7-3. This table is to reflect the most restrictive stage that can achieve a water use reduction consistent with up to a 50% reduction in supply. It is anticipated that total demands will be reduced by more than 50 percent during Stage 5 restrictions in order to meet potential supply reductions of 50 percent as per the Water Code.

Table 7-3: DWR Table 8-3: Stages of WSCP - Consumption Reduction Methods

Table 8-3 Retail Only: Stages of WSCP - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier	Additional Explanation or Reference *(optional)*
1	Expand Public Information Campaign	Implemented to meet up to a 5% supply shortfall.
2	Implement or Modify Drought Rate Structure or Surcharge	Implemented to meet up to a 10% supply shortfall.
3	Implement or Modify Drought Rate Structure or Surcharge	Implemented to meet up to a 20% supply shortfall.
4	Implement or Modify Drought Rate Structure or Surcharge	Implemented to meet up to a 29% supply shortfall.
5	Implement or Modify Drought Rate Structure or Surcharge	Implemented to meet up to a 52% supply shortfall.
NOTES:		

Section 7.5 Determining Water Shortage Reductions

Water use in the MNWD service area is 100 percent metered. Billing categories, or customer classes, include single family residential, multi-family residential, commercial, and irrigation accounts. The billing categories reflect the service area land uses and allow MNWD to track water usage.

Chapter 8 Revenue and Expenditure Impacts

Section 8.1 Methodology

There are three major financial impacts that will occur as a result of each drought stage. During each subsequent stage:

- District operating costs will increase as it spends more on outreach efforts, water efficiency rebate programs, enforcement of State-mandated restrictions on customers, and additional reporting to the State;
- District revenues will decrease as water conservation is realized; and
- Expenses from imported water purchases will decrease as water conservation is realized.

The financial impacts of each stage will depend on the actual reductions in water and recycled water consumption, the subsequent decreases in water purchase costs, and the increases to the Water Use Efficiency program operating costs. All of these elements were estimated based on best available data and reasonable forecasting assumptions, as described below.

The drought rate policies were designed to maintain the District's financial health by recovering the necessary revenues associated with each stage. This includes assumptions that not all customers will reduce their consumption, with the additional penalty revenue closing what would otherwise be a revenue gap.

Section 8.1.1 Assumptions in setting drought stages

Each stage assumes a reduction in water usage for each customer class, although there is considerable uncertainty in predicting the actual water reductions that will actually occur during each drought stage. It was assumed that the amount of reduction would vary by customer class since a customer's ability and willingness to reduce water usage depends on the purpose of the water and the policies being applied to that customer class. The analysis assumed that not all of the water usage targeted by the drought rate policies was actually eliminated; rather that some of the targeted water usage would shift to the next higher tier. For example, when Tiers 3 & 4 are eliminated in Stage 2 for residential customers, the values below assume that 70% of the water in Tiers 3 & 4 will be conserved while the remaining 30% would incur administrative penalties. As the stages progress, it is assumed that compliance with the targets will increase as public awareness is augmented and enforcement is increased. As such, Stage 3 was assumed to be 85% effective and Stages 4 and 5 were assumed to be 100% effective.

Table 8-1: Change in Potable Water Consumption by Stage and Customer Class

	Single Family Residential	Multi-Family Residential	Commercial	Irrigation	Purchased Water Change
Stage 1	-5.0%	-5.0%	-5.0%	-5.0%	-5.0%
Stage 2	-11.3%	-8.4%	-10.9%	-12.1%	-11.1%
Stage 3	-19.1%	-8.9%	-10.9%	-35.2%	-19.6%
Stage 4	-27.5%	-9.5%	-10.9%	-59.9%	-28.6%
Stage 5	-53.1%	-36.2%	-10.9%	-85.4%	-51.8%

Section 8.1.2 Changes in Operating Budget

The following describes the assumed changes in operating budget with each drought stage.

Imported Water Costs - MNWD purchases all of its potable water from the wholesaler MWDOC. This study assumed that MNWD's imported water costs would decrease by the amount of water conserved multiplied by $928 per AF. The total water purchases from 2013 were used for purposes of forecasting future water purchase costs. The avoided costs of purchased water for each stage are summarized in Table 8-3, based on the predicted water conservation percentages shown in Table 8-1. During drought events, MWDOC may charge drought surcharges if MNWD does not achieve target reductions for the given drought phase. In the event that MWDOC imposes such drought surcharge rates, this analysis assumes that those costs will be passed through directly to MNWD customers. Given the uncertainty of those costs (how much they would be and whether they would even be incurred), their impact was not modeled as part of this study. The cost of recycled water supply remains largely the same to MNWD, regardless of whether customers purchase the water. As such, changes in Recycled Water consumption were assumed to have a negligible impact on the District's operating expenses.

Water Use Efficiency (WUE) Program Costs - As MNWD moves into higher drought stages, the WUE Program operating costs are expected to increase as a result of increased labor and direct costs for outreach and increases in rebate incentives. The District has a comprehensive water efficiency rebate program which is funded by conservation charges from the allocation-based rate structure. The rebate program provides monetary incentives for the installation of water-saving devices such as weather-based irrigation controllers, high-efficiency toilets, turf removal, synthetic turf, and more.

Table 8-2 summarizes the changes in WUE Program costs by drought stage.

Table 8-2: Forecasted Increases in WUE Operating Costs by Drought Stage

Stage	Additional FTEs	Direct Costs	Rebate Costs	Total Costs
Stage 1 – Voluntary	1	$105,300	$500,000	$605,300
Stage 2 - 10% reduction	3	$313,700	$1,500,000	$1,813,700
Stage 3 - 20% reduction	4	$427,100	$2,000,000	$2,427,100
Stage 4 - 30% reduction	5	$528,600	$3,000,000	$3,528,600
Stage 5 - Health and Safety	6	$632,000	$4,000,000	$4,632,000

Section 8.1.3 Summary of Financial Impacts

The financial impact of each drought stage was assessed to ensure that the drought stage policies would result in neither dramatic increases nor dramatic decreases in the District's net revenue. To project the change in rate revenues, the tier definitions and assumed levels of conservation for each drought stage were applied to customer water use patterns from 2013. In other words, the calculated change in rate revenues considered the reduction in total water usage as well as the shift in water usage towards higher tiers. The analysis used recommended Domestic and Recycled Water rates for FY 2015.

These reductions in rate revenues were coupled with the changes in MNWD operating costs. As summarized in Table 8-3, the projected net financial impact may be positive or negative, depending on the drought stage.

Table 8-3: Predicted Change in Revenue

Stage	Change in Revenue (Positive implies decrease)	Change in Water Purchase Costs	Change in WUE Operating Costs	Change in Net Revenue
Stage 1 – Voluntary	$1,248,234	($1,188,947)	$605,300	($664,587)
Stage 2 - 10% reduction	$1,382,398	($2,636,160)	$1,813,700	($559,938)
Stage 3 - 20% reduction	$1,331,348	($4,650,163)	$2,427,100	$891,716
Stage 4 - 30% reduction	$3,297,464	($6,808,024)	$3,528,600	($18,040)
Stage 5 - Health and Safety	$7,483,518	($12,309,825)	$4,632,000	$194,307

As previously mentioned, the actual financial impact of each drought stage will depend on variables that MNWD has little or no control over. Preliminary sensitivity analysis indicates that variations in the amount of water conservation by customers may result in significant swings in net revenue.

Generally speaking, if customers do not conserve as much as planned, there will be an increase in net revenues relative to the results shown in Table 8-3, and vice versa. This dynamic is driven by the fact that customers will largely be paying top-tier rates for any water that they do not otherwise conserve. That top-tier water is more expensive than MNWD's marginal cost of purchased water; therefore, the net revenue would increase. If customers conserve less than forecasted, net revenue will increase and the WUE Fund reserves will increase. In this circumstance, the District's first course of action would be to increase WUE program expenditures in order to achieve more water use reductions. Because such an adjustment would be a decrease in rates, no Proposition 218 process would be necessary.

The rate design is such that decreases in water usage above the individual budget only impact the District's Water Efficiency Fund. The marginal cost of water is used as a point to delineate revenue that goes to the Water Efficiency Fund versus that used to pay for imported water through the District's General Fund. If customers use less water in the higher tiers, less money is needed for conservation and water reliability projects. Hence, the clear nexus in design provides a mechanism to mitigate risk from changes in water use. Reduced water usage within the individually calculated water budget increases net revenues due to the price to the customer being lower than the cost of imported water. The District allocated property tax revenue it receives to provide incentive for increasingly efficient water usage.

MNWD's drought rate policy complies with the District's approved "Plan for Alternative Demand Reductions" and the State of California's drought emergency water conservation regulations. These drought rate policies have been structured to minimize the financial impact of the drought stages to both customers and the District, while also achieving the water conservation goals set by the District's Water Shortage Contingency Plan. In the event that actual water conservation falls short of the target reductions for a given stage, the District intends to use the increase in net revenues to increase conservation efforts such as outreach and rebate funding, or otherwise offset future rate increases. Conversely, if actual water conservation exceeds the target reductions, MNWD has established reserves that will enable the District to temporarily withstand the revenue shortfall which would only be in the Water Efficiency Fund and would not be needed with customers meeting efficiency goals. These proposed drought rate policies will help MNWD to maintain financial stability and promote necessary water conservation during a drought emergency, while also complying with the requirements of Section 864 in the State of California's drought emergency water conservation regulations.

Section 8.2 Resolution or Ordinance

Attached as Appendix 4 and adopted via Ordinance 15-01.

Section 8.3 Catastrophic Supply Interruption

In the event of a catastrophic supply emergency, the District has included language as part of its Water Shortage Contingency Plan to provide a mechanism to preserve water supplies for essential needs. The implementation of the penalties described previously will not have time to take effect to reduce water demands in the event of a catastrophic water supply emergency. Below is the language in the adopted ordinance specifying the powers of the District's General Manager to respond to an immediate emergency:

Determination of Immediate Emergency. In case of an immediate emergency if the Board of Directors cannot meet in time to act to protect the public interest pursuant to the Section 5.N., the General Manager has the authority to implement such provisions of this Section 5.N. The provisions shall be implemented upon the General Manager's written determination that the District cannot supply adequate water to meet the ordinary demands of water consumers and that such implementation is necessary to protect the public health and safety.

(1) The implementation of any such provisions shall take effect immediately upon making a public announcement of the immediate emergency and publication of such immediate emergency on the District's website.

(2) Such written determination shall be delivered to the Board of Directors and considered at a general or special meeting for review, revocation, or ratification. Such meeting shall be held upon the earliest date that a quorum of the Board of Directors is available.

(3) At the Board of Directors meeting, the General Manager shall update the Board of Directors on the severity and length of the immediate emergency.

(4) During an immediate emergency, the District may specify temporary restrictions on the use of potable and recycled water. Any person who willfully fails to comply with those temporary restrictions may be subject to an administrative penalty of $500 per offense and have his or her water meter locked by the District.

The District has invested in a number of regional projects to support system reliability in the event of an earthquake or power outage including the Baker Water Treatment Plant and Upper Chiquita Reservoir. Prior to these investments, the District was at less than 7 days of system reliability in the event of a Deimer Water Treatment Plant outage. Building these infrastructure improvements for system reliability more than doubled the average number of days of system reliability to over 14. With active demand management programs and the system reliability improvements, the District is at over 24 days of average day system reliability as of March 2016 based on the previous 12 months of water demand.

Section 8.3.1 Water Emergency Response Organization of Orange County (WEROC)

In 1983, the Orange County water community identified a need to develop a plan on how agencies would respond effectively to disasters impacting the regional water distribution system. The collective efforts of these agencies resulted in the formation of the Water Emergency Response Organization of Orange County (WEROC) to coordinate emergency response on behalf of all Orange County water and wastewater agencies, develop an emergency plan to respond to disasters, and conduct disaster training exercises for the Orange County water community. WEROC was established with the creation of an indemnification agreement between its member agencies to protect each other against civil liabilities and to facilitate the exchange of resources. WEROC is unique in its ability to provide a single point of contact for representation of all water and wastewater utilities in Orange County during a disaster. This representation is to the county, state, and federal disaster coordination agencies. Within the Orange County Operational Area, WEROC is the recognized contact for emergency disaster response for the water community.

Each local water and wastewater utility is responsible for developing its own disaster preparedness and response plan to meet emergencies within their service area. The District maintains an Emergency Response Plan (ERP) last updated in 2014. The ERP provides a reference for employees and contractors and for Municipal Emergency Response organizations, such as the local Fire and Law Enforcement Agencies. WEROC performs coordination of information and mutual-aid requests among water and wastewater agencies, and with MWDSC. WEROC provides assistance to utilities developing their plans and facilitates working groups when new best practices need to be examined or regulations come into effect. Additionally, WEROC supports the utilities efforts with training, exercise coordination, and representation to other emergency response agencies. In the event of a major emergency or regional disaster WEROC would perform the following functions:

- Collect damage assessment reports from Orange County water and wastewater utilities;
- Assess the overall condition of the Orange County water supply system; including treatment, storage and distribution; and assess the overall condition of the Orange County wastewater system;
- Identify the information and resource needs of the impacted water and wastewater utilities;
- Quantify available resources;
- Determine optimal use of those resources and coordinate the exchange of those resources as mutual aid;
- Determine water supply needs and establish repair priorities;
- Recommend water emergency allocations and coordinate water distribution as needed;
- Liaison with water utilities, MWDSC, the Orange County Operational Area and the California Emergency Management Agency; and
- Document remedial actions taken during the disaster operation and assist impacted agencies with the Federal Public Assistance process.

Two dedicated WEROC Emergency Operations Centers (EOCs) are located within Orange County. Both sites are maintained in a state of readiness in the event that they will be activated following a major emergency disaster. WEROC EOCs are staffed by trained volunteer personnel from the water community. WEROC's Emergency Radio Communication System consists of two mountain-top radio repeaters and several control stations. WEROC is a flexible and dynamic program that continues to make improvements to its emergency preparedness plan, emergency response facilities, and its training program to address new issues as they surface.

During a disaster, WEROC will work cooperatively with MWDSC through their Member Agency Response System to facilitate the flow of information and requests for mutual-aid within MWDSC's 5,100 square mile service area. WEROC also provides updated information to MWDSC's EOC at Eagle Rock.

Day-to-day management of WEROC is provided by MWDOC. Although MWDOC is a majority contributor to the WEROC budget, the program is also supported by the Orange County Water District, Orange County Sanitation District, South Orange County Wastewater Authority and the three Cities of Anaheim, Fullerton and Santa Ana. Additionally, El Toro Water District and MWDSC provide facility and maintenance support to the WEROC EOCs on a regular basis. Program oversight is conducted by the

WEROC Executive Committee. The Executive Committee includes representatives from MWDOC and OCWD. A WEROC Steering Committee serves as an advisory group providing general guidance to the program, and includes representatives from member agencies, MWDSC, the Division of Drinking Water (DDW), and the County Operational Area.

Additional emergency services mutual aid plans in the State of California include the Master Mutual Aid Agreement, and the California Water and Wastewater Agencies Response Network (WARN), and Plan Bulldozer. The Master Mutual Aid Agreement includes all public agencies that have signed the agreement incorporating the Standardized Emergency Management System (SEMS), and is coordinated out by the California Office of Emergency Services Management Agency. WARN includes all public and private water and wastewater utilities that have signed the WARN agreement, and provides the opportunity for mutual aid assistance. WARN is managed by a State Steering Committee and can be activated by any signatory to the agreement. Plan Bulldozer provides mutual aid for construction equipment to any public agency for the initial time of disaster when danger to life and property exists.

The Municipal Water District of Orange County and 19 other participating water and wastewater utilities including MNWD completed an update to the 2012 Orange County Regional Water and Wastewater Multi-Hazard Mitigation Plan which can be found at http://www.mwdoc.com/weroc/Hazard-Mitigation.

Hazard mitigation plans form the foundation for a community's long-term strategy to identify vulnerability to natural and man-made hazards. The plans also aim to reduce disaster losses by breaking the cycle of disaster damage, reconstruction, and repetitive damage. According to the federal Disaster Mitigation Act of 2000, State and local governments are required to develop hazard mitigation plans and update them every five years as a condition for receiving certain types of non-emergency disaster assistance.

Section 8.4 Minimum Supply Next Three Years

As a matter of practice, MWDSC does not provide annual estimates of the minimum supplies available to its member agencies. As such, MWDSC member agencies must develop their own estimates for the purposes of meeting the requirements of the Act.

Section 135 of the MWDSC Act declares that a member agency has the right to invoke its “preferential right” to water, which grants each member agency a preferential right to purchase a percentage of MWDSC’s available supplies based on specified, cumulative financial contributions to MWDSC. Each year, MWDSC calculates and distributes each member agency’s percentage of preferential rights. However, since MWDSC’s creation in 1927, no member agency has ever invoked these rights as a means of acquiring limited supplies from MWDSC.

MWDOC has adopted a shortage allocation plan (WSAP) and accompanying allocation model that estimates firm demands on MWDOC. Assuming MWDOC would not be imposing mandatory restrictions if MWDSC is not, the estimate of firm demands in MWDOC’s latest allocation model has been used to estimate the minimum imported supplies available to each of MWDOC’s retail agencies for 2015-2018.

Thus, the estimate of the minimum imported supplies available to MWDOC is 164,613 AF (MWDOC, Water Shortage Allocation Model, November 2015).

As provided in its 2015 UWMP and 2016 IRP Update, MWDSC has concluded that the water supply and demand management actions it is undertaking will increase its reliability throughout the 25-year period addressed in its planning documents. Thus for purposes of this estimate, it is assumed that MWDSC and MWDOC will be able to maintain the identified supply amounts throughout the three-year period.

Table 8-4 presents the minimum water supply availability during each of the next three water years based on the driest three-year historical sequence for the District's water supplies. The available supply includes 7,988 AF of recycled water and 27,017 AF of an assumed highly reliable supply of potable water, as discussed in Chapter 4 and Chapter 5 of this UWMP.

Table 8-4: DWR Table 8-4: Minimum Supply Next Three Years

DWR Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	35,005	35,005	35,005
NOTES: The above is Moulton Niguel Water District's share based on MWDOC's allocation of the MWD Water Shortage Allocation Plan Stage 3 for the next 3 years.			

Chapter 9 Demand Management Measures

Section 9.1 Demand Management Measures for Retail Agencies

Since 2010, Moulton Niguel Water District (MNWD or District) has dramatically expanded demand management programs as a core function of its efforts to reduce demand on its imported water supply. Although the District is well below its SBX7-7 compliance target of 173 GPCD (as fully discussed in Chapter 4 above), achieving 140 GPCD through the 2015 reporting period, conservation and supply reliability will remain high priorities. Demand management program expansion began with a transformation of the District's relatively flat, five-tiered rate structure to a water budget-based rate structure (WBBRS) which featured a strong conservation price signal. In addition to incentivizing efficient water use, the revenue generated by the higher price for out of budget water use provides funding for a robust rebate and marketing program. Chapter 9 provides a detailed overview of the policies in place and the history of the development of demand management programs.

Section 9.1.1 Water conservation and waste prevention ordinances

As discussed above, the District updated its water conservation and waste ordinance in February 2015 to expand water conservation best management practices, and to adopt its updated Water Shortage Contingency Plan which can be enacted in times of drought, water shortages, and water shortage emergencies. Ordinance 15-01 prescribes water conservation rules and regulations. The ordinance establishes 19 water conservation best management practices which shall be in effect at all times. These practices are described in Chapter 7 of this UWMP and the ordinance is provided as Appendix 4.

Section 9.1.2 Metering

All service connections within the District's 36.5 square mile service area are metered. Meter accuracy is a top priority of the District. As such, the District maintains a robust meter replacement plan, by which an average of 3,000 of the District's 55,000 meters are replaced each year.

The District has a comprehensive meter maintenance and testing regime in order to ensure accurate metering of water usage. Testing frequency and criteria differ between customer classes, as meter size and type requirements vary widely depending on the nature of a customer's water usage.

- **Residential Water Meters:** Residential water meters range in size from 5/8 inch to 1 inch, and occasionally up to 2 inches. The residential meters have an estimated operating life of 12-15 years, and can last even longer depending on operating conditions of the water system and flow volume. Meters with low or high consumption are tested for accuracy. Each residential tract is spot checked every ten years for consideration of a complete water meter change out. The District considers the age of the meters, the average size of the lots, the consumption history, the pressure zone, and maintenance records in determining whether or not to replace a meter.
- **Commercial Water Meters:** Commercial meters in the District range in size from ¾ inch to 10 inches. Meter readings with zero, high, or low consumption are checked for accuracy as they are billed. Meters must test within AWWA specifications. Those that fall outside the accuracy range will either be repaired or replaced. Large water meters between 3 and 10 inches are tested annually.

- **Recycled Water Meters:** Recycled water meters range in size from 1-1/2 inches to 10 inches. All recycled meters are tested on a bi-annual schedule. Actual physical testing and calibration of water meters differs depending on the type of meter. Small meters (5/8 inch to 1 inch) are connected to a calibrated meter or to a test bench. The meter is tested at low, medium and high flows to determine accuracy.
- **Turbine Meters:** Turbine meters are typically only used for irrigation systems as they only detect higher flow rates above ten gallons per minute. They are tested using a low-flow rate and a high-flow rate.
- **Compound Meters:** Compound meters require more maintenance, but are very accurate over a wide range of flows. Four tests are performed on compound meters and include: a very low-flow test, a medium-flow test, a cross-over test, and a high-flow test. Caution is taken when conducting a high-flow test to ensure public safety.

Both Automatic Meter Reading (AMR) and Advanced Meter Infrastructure (AMI) are in place within the service area on a limited basis. Grant funding was awarded to convert the District's 1,300 recycled irrigation meters to AMI, as well as the District's 1,370 potable water irrigation meters and existing 1,850 older AMI meters for a total of 4,420 new AMI meters. This project is underway and will be fully implemented by December 2017. More information on the AMI Implementation Project can be found in Section 9.3.2.

Section 9.1.3 Conservation Pricing

The District first implemented a WBBRS in July of 2011. Water budget based rates encourage conservation by providing each customer with a calculated water budget designed to meet efficient indoor and outdoor watering needs. Efficient water use is billed at the lowest price and usage that exceeds the budget is billed at progressively higher rates. Figure 9-1 shows how the price per unit consumed increases dramatically as water use increases. By emphasizing efficient use, the rate structure motivates customers to partner with the District in its effort to meet SBx7-7 targets and maintain a reliable source of water.

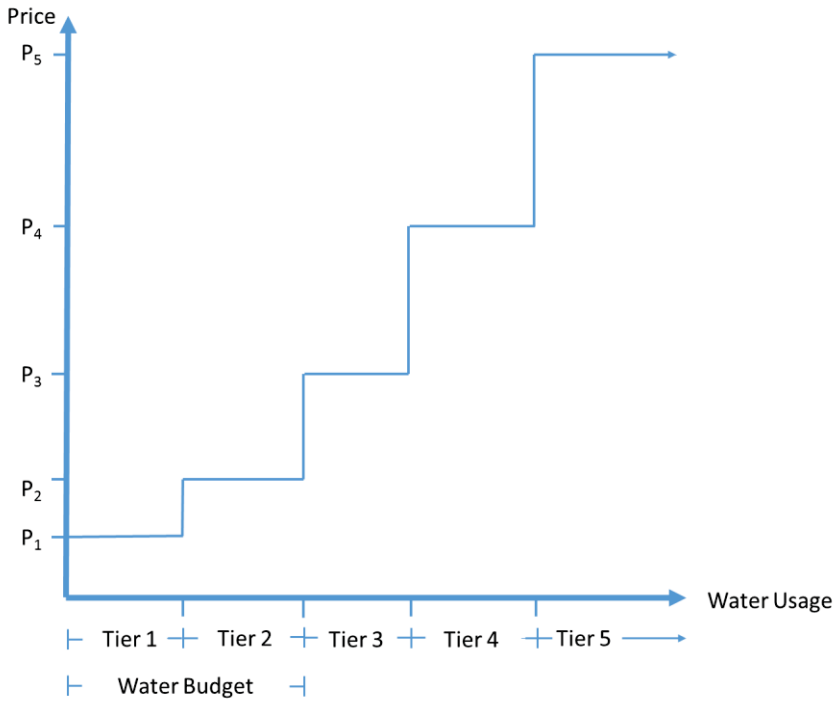

Figure 9-1: Example of Inclining Block Rates

Note: The price per unit of water increases as the customer moves to the right bumping up into higher tiers. Each customer would have Tier 1 and Tier 2 individually determined by their indoor and outdoor water budgets. Tier widths for tiers 3, 4 and 5 are then based on the total water budget.

Historically, the District has billed single family residential and recycled accounts monthly, and multi-family, commercial, and irrigation accounts bi-monthly. In December 2015, all bi-monthly customers were converted to monthly billing as part of a drought response strategy to increase timely communication with customers about their water use. Water charges consist of both a fixed service charge based on meter size, and a commodity charge. Monthly water budgets are determined for each of the District's customers. Residential water budgets (both single and multi-family) are comprised of two parts: an indoor allocation (determined by the number of persons in the household), and an outdoor allocation (determined by the size of irrigable area, and localized daily weather data). Water budgets for Irrigation customers consist of on an outdoor allocation based on the same irrigable area and evapotranspiration calculations used for Residential customers. Each commercial account receives a water budget based on a three-year historical rolling average of the customer's water usage for that month. Most commercial customers have two metered connections, an irrigation meter and a commercial meter.

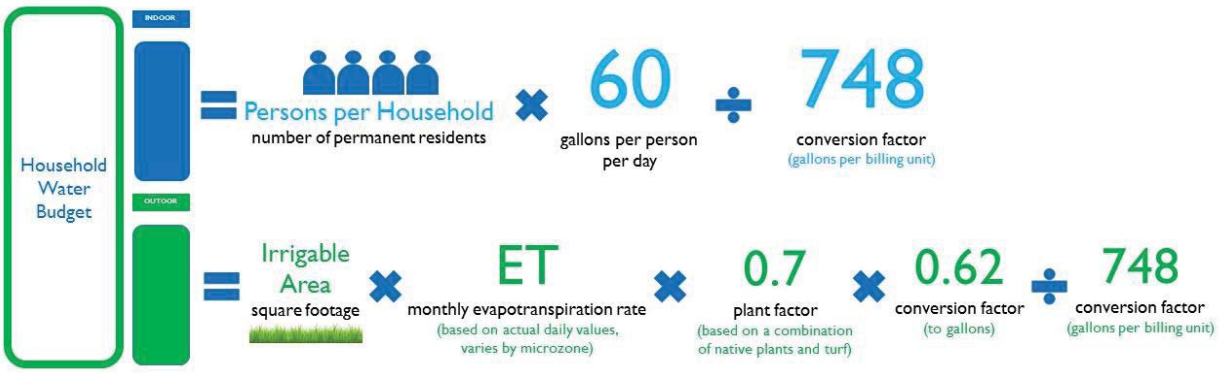

Figure 9-2: Water Budget Calculation

The above infographic boils down to the following two equations to calculate the indoor and outdoor water budget:

$$Indoor\ Budget = \frac{Number\ of\ People\ in\ Household\ \times 60\ gal\ \times Days\ in\ Billing\ Period}{748}$$

$$Outdoor\ Budget = \frac{Square\ Feet\ of\ Irrigable\ Area\ \times Evapotranspiration\ \times 0.62}{748}$$

In February of 2015, after the completion of a cost-of-service study and rate study, recommendations were made to adjust rates to reflect the District's cost of providing service to specific classes of customers and to encourage further conservation to reliably meet water demand, and to adjust budgets to promote additional water conservation. The recommended modifications to the Water and Recycled Water rate structure were as follows:

1. Reduce the indoor "gallons per capita day" allocation from 65 gallons to 60 gallons.
2. Reduce the outdoor water budget plant factor from 0.80 to 0.70 (except for recycled water and high public-use areas).
3. Create a 4-tier rate structure for Commercial, Irrigation, and Recycled water customers.
4. Make budget allocations for the (new) Tier 2 and Tier 3 for Commercial and Irrigation customers each equal to 25% of their budget.
5. Assign each Water customer class its own respective fixed Service Charge schedule.
6. Retain the same unit price for volumetric Water rates for all customer classes (excluding Recycled water).
7. All Water rate revenue in excess of $2.27 per hcf, which is the District's marginal cost of water, will be designated for the WUE Fund.
8. In addition to the above mentioned adjustments, a new rate schedule was developed to comply with the cost-of-service results and recover the revenue requirement for each customer class so that each class pays its proportionate share in relation to the amount of demand placed on the system. The 2015 rate schedule for Water and Recycled Water is summarized in Table 9-1 and Table 9-2 below.

Table 9-1: Rates for Volumetric Charges

RATES FOR VOLUMETRIC CHARGES EFFECTIVE APRIL 1, 2015 ($/HCF)			
Tier	Residential, Multi-Family	Commercial, Irrigation	Recycled
Tier 1	$1.41	$1.61	$1.17
Tier 2	$1.61	$2.49	$1.66
Tier 3	$2.49	$4.25	$3.42
Tier 4	$4.25	$9.04	$8.21
Tier 5	$9.04	-	-

Table 9-2: Rates for Monthly Service Charges

RATES FOR MONTHLY SERVICE CHARGES EFFECTIVE APRIL 1, 2015 ($/METER SIZE)						
Meter Size	Residential	Multi-Family	Commercial	Irrigation	Recycled	Fire Protection
5/8"	$10.79	$6.64	$5.93	$16.88	$16.88	$3.58
3/4"	$10.79	$6.64	$5.93	$16.88	$16.88	$3.58
1"	$10.79	$6.64	$5.93	$16.88	$16.88	$3.58
1 1/2"	$35.97	$22.13	$19.77	$56.27	$56.27	$11.94
2"	$57.55	$35.41	$31.63	$90.03	$90.03	$19.11
2 1/2"	-	-	-	-	-	$30.45
3"	$125.89	$77.47	$69.19	$196.94	$196.94	$41.80
4"	$215.80	$132.80	$118.60	$337.60	$337.60	$71.65
6"	$449.94	$276.89	$247.28	$703.90	$703.90	$149.27
8"	$647.40	$398.40	$355.80	$1,012.80	$1,012.80	$214.95
10"	$1,043.39	$642.09	$573.43	$1,632.30	$1,632.30	$346.31

These rates enable the District to comply with the requirements of the State's Section 865 Mandatory Actions by Water Suppliers and allow the District to achieve a level of conservation that has been recognized by the State Water Resource Control Board (SWRCB) as superior to mandatory limitations of two day per week watering restrictions. This rate structure also provides a level of revenue stability during periods of drought or economic downturn. These adjustments were implemented on April 1,

2015, in compliance with the Proposition 218 process with the approval of the Board of Directors. Simultaneously to the rate approval process, the District's Board of Directors approved through the Ordinance process, a new Water Shortage Contingency Plan which includes triggers for increased penalties on customers for using water above their individually calculated budget under water shortage scenarios. The District's Water Shortage Contingency Plan and penalties implemented during droughts or other emergencies were discussed in more detail in Chapter 7.

The District's integrated drought response strategy has received accolades from the SWRCB as a best practice in the industry in rate design and as is included as a case study by the California Department of Water Resources (DWR) in the appendices of the 2015 Urban Water Management Plan Guidebook. The core elements of the rate structure's success is to recover fixed costs on the meter and from property tax and to recover variable costs on the general fund portion of the volumetric rate schedule. If customers use water wastefully, they generate funding for conservation and reliability projects to offset their increase in water usage. Property tax and unrestricted revenues offset the in-budget volumetric rates below the marginal cost of water to provide incentive to remain efficient. Additionally, if customers conserve, there is less of a need to fund new demand offsets resulting in a nexus between where revenue is generated and the use of the funds. As part of the 2014/2015 rate study, the District's Board of Directors adopted a new reserve policy in August of 2014 to manage funds in the face of financial risk to the District. If usage increases in the in-budget rates, creating a net revenue loss, Rate Stabilization reserve funds could be used in the short term to meet financial obligations. Given that the rate structure is designed to increase efficiency, the expectation is that any increase in consumption is temporary.

Section 9.1.4 Public education and outreach

A key component of the District's Demand Management Measures is public education and outreach. With the 2012 to 2016 (and currently ongoing) drought in California, Governor Brown's declared state of emergency, and SWRCB mandatory reductions in water use, MNWD developed a comprehensive public education and outreach strategy to affect reductions in water use. A multi-pronged approach was used to reach as many customers as possible using a variety of messaging platforms and targeting methods. The education and outreach efforts can be broadly classified by the type of interaction between the District and customers: direct communication with customers, reference point for customer inquiries, community presence, and regional messaging.

Direct Communication with Customers

In order to get the message about conservation out to its customers, the District first looked to methods of communication that were already in use. For many customers, the only interaction they have with the District is related to their bill or an interruption in their service. While the District has since been actively developing new avenues of communication with customers, the District capitalized on these bill and service related interactions to communicate with customers directly. Initially, all customers were targeted alike with messages to save water and preserve our most precious resource, and as customers began to respond, subsequent messages were targeted to smaller subsets of customers based on water usage and irrigable area. In Figure 9-3, the District's direct communication efforts are plotted alongside a comparison of CY 2014 to CY 2015 total water production. The figure illustrates the relationship

between rates, outreach, and customer understanding to overall water demand reduction. It is important to note that direct conclusions should not be drawn from the results shown in Figure 9-3; instead, the figure illustrates that there is a correlation between customers choosing to use water efficiently and when rate structure changes were paired with outreach and education. The area between the red CY 2014 fit line and blue CY 2015 fit line, represents the reduction in peak water production attributable to active conservation and efficient water usage decisions from the District's customers.

Communicating Water Use via Water Bills (and bill inserts): The District's Water Budget Based Rate Structure calls for additional information to be communicated on the customer bills. Prominently displayed on each bill are the factors that are used to calculate the residential or irrigation customer's budget, which includes the number of residents in the household, amount of irrigated area, and the evapotranspiration for the billing period. The water use is segmented into different tiers with increasing rates if the customer exceeds their individually calculated water budget. The bill format is easy to understand and includes a bar chart that compares the current usage to the usage for the same month of the prior year. We included a conservation message on the bill itself and developed bill inserts that are drought specific. The District has also communicated its message through "drought snipes" (drought or conservation information printed on the outside of billing envelopes) to highlight timely conservation actions customers could take to reduce their usage. The shaded areas in Figure 9-3 represent the date range each drought snipe was used and the respective message can be found in Table 9-3. In December of 2015, the District switched its commercial, multi-family, and irrigation customers from bi-monthly billing to monthly billing. Presenting these customers with monthly bills enable them to better track their water usage and make leak repairs or irrigation timer adjustments on a timelier basis, thus preventing waste and inefficiency.

Door Hangers: The District utilized several different door hangers to communicate with customers about ways to save water. One door hanger was used to alert the customer that we received a water waste complaint and that it was important for them to locate the source of water waste and remedy the situation as soon as possible. A second door hanger served as a notification to inform a customer that movement was observed on their water meter which would indicate a leak at the property. The hanger provided the customer with suggestions to help them locate the leak by listing some of the most common ones such as leaking irrigation valves, leaky toilet float valves, leaky faucets, or a leak in the service line from the meter to the house. A third door hanger was left when a customer asked for a reread of their water meter. Using the door hanger, the District informed them of the current read and whether or not any movement was observed on the meter. Door hangers provided a simple form of communication the District utilized when the customer was not at the property at the time of the visit. A combined average of 625 door hangers are placed per year.

Postcards: Beginning in the spring of 2015, the District began a weekly to bi-weekly postcard campaign. New postcards were regularly developed with a different message for our customers. Some weeks, the postcards would be sent to all of the District's customers, and other weeks a more targeted approach was implemented. For example, one week a postcard was mailed to all customers with irrigable area over 1,000 square feet with a plea for them to adjust their irrigation timers to water less frequently and

for shorter durations. Another postcard was mailed specifically to our highest water wasters. Blanketing our customers with weekly postcards contributed toward significant water savings during the summer of 2015. The colored dots along the CY 2015 production line in Figure 9-3 represent the date each postcard was mailed and the respective message can be found in Table 9-3.

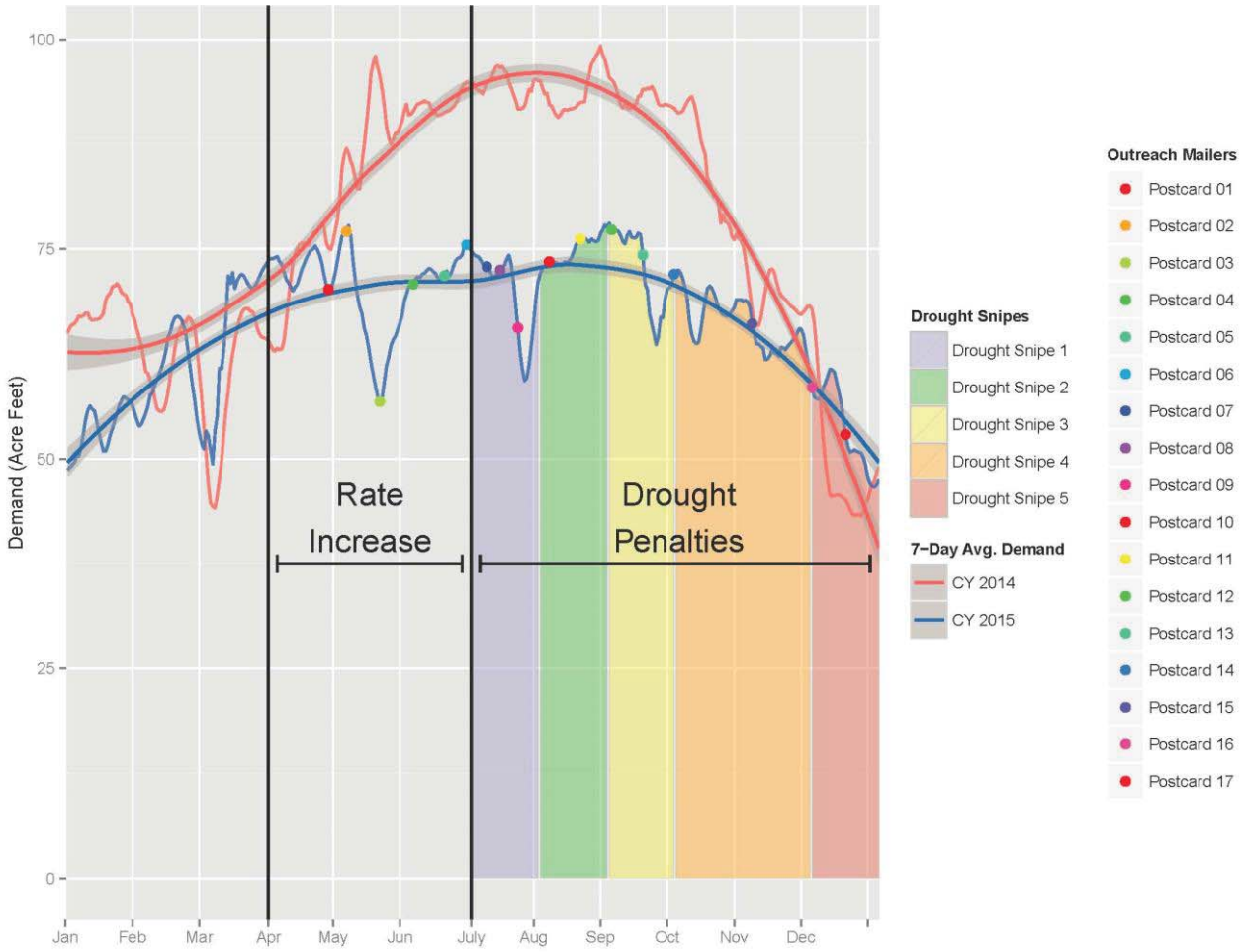

Figure 9-3: Comparison of calendar year 2014 to 2015 total water production

Table 9-3: Drought Snipes and Postcards

Date Range	Effort Type	Message
7/1/2015 - 8/1/2015	Drought Snipe 1	Live Within Your Budget; The summer is important. Save water now.
8/1/2015 - 9/1/2015	Drought Snipe 2	Live Within Your Budget; Use water wisely. Every drop matters. Save water now.

Date Range	Effort Type	Message
9/1/2015 - 10/1/2015	Drought Snipe 3	Live Within Your Budget; Use water efficient devices. Every drop matters. Save water now.
10/1/2015 - 11/1/2015	Drought Snipe 4	Live Within Your Budget; Fall is here. Adjust your sprinkler timers. Save water now.
12/2/2015-1/1/2016	Drought Snipe 5	We need your help. Save water outdoors.
4/28/2015	Postcard 01	Know your water budget; What does this mean for me?
5/6/2015	Postcard 02	Managing Water Supplies through the drought
5/21/2015	Postcard 03	WSCP Stages 1 and 2
6/5/2015	Postcard 04	Monthly Water Budget
6/19/2015	Postcard 05	WSCP Stage 2
6/29/2015	Postcard 06	CCR: It's better on tap
7/8/2015	Postcard 07	Outdoor watering; sprinkler timers: Don't forget about me
7/14/2015	Postcard 08	Leaks: Pay attention to me
7/22/2015	Postcard 09	Check me out
8/5/2015	Postcard 10	Let's get friendly
8/19/2015	Postcard 11	Be a turnoff; indoor and outdoor
9/2/2015	Postcard 12	Keep me in check
9/16/2015	Postcard 13	Make the right choice. Pick wisely.
9/30/2015	Postcard 14	Let's Take a Break. I need some time off….
11/4/2015	Postcard 15	It's not just me.
12/1/2015	Postcard 16	I can live with less.
12/16/2015	Postcard 17	We need your help.

Reference for Customer Inquiries

As messaging about the drought increased on both a local and statewide level, customers naturally became more interested in conservation and how they were using water. The District knew it was imperative that it serve as a reference for customer inquiries, not only to maintain its commitment to

customer service, but also to develop a partnership in long-term reliability with its customers. Digital marketing was used to provide customers with useful conservation information at times when they would naturally be looking for it. Highlights from the digital marketing campaign are shown in Table 9-4.

Table 9-4: Digital Marketing

Date Range	Effort Type	Message
10/23/2015	Email Blast	Fall is here: Be sure to adjust your sprinkler timer!
12/10/2015	Email Blast	Turn off your sprinklers, and let nature do its thing!
10/5/2015-11/12/2015	Facebook Ads	OLAA: MNWD Pay-Per-Click Campaign
10/26/2015-2/29/2016	Facebook Page Promotion 1	Landscape Workshops
11/5/2015-1/31/2016	Facebook Page Promotion 2	Reduce Outdoor Watering
10/16/2015-10/30/2015	Facebook Post 1	Fall is here. Adjust your sprinkler timer now.
10/27/2015-11/17/2015	Facebook Post 2	It's not just me.
11/4/2015-11/11/2015	Facebook Post 3	Check out our new video on how to look for leaks!
11/23/2015-12/31/2015	Facebook Post 4	I can live with less. Shorter days. Shorter watering times.
12/11/2015-12/18/2015	Facebook Post 5	When it rains, turn your sprinklers off.
12/17/2015-12/24/2015	Facebook Post 6	Rain is in the forecast, and we need your help.
12/22/2015-1/4/2016	Facebook Post 7	It rained, and more is on the way! Turn off outdoor irrigation until spring!
1/4/2016-1/8/2016	Facebook Post 8	Help save millions of gallons of water by turning off outdoor irrigation until spring.
8/10/2015	Landing Page	Landing page

Marketing of Rebates: Moulton Niguel Water District included rebate information on outreach materials advising customers of available funding for the installation of new water efficient devices and the removal of turf and replacement with California friendly landscapes. A new website landing page

was developed for our rebates, and the rebates were advertised in local newspapers, social media sites, at community events, and at our California Friendly Landscape workshops.

Informative website, online tools (water budget calculator, new landing pages), and social media: The District consistently updates its website, adding timely information for our customers. New landing pages were created for conservation rebates and water savings tips. A water budget calculator was developed for customers to obtain a better understanding of the factors that are used to determine a budget and how they are affected by the weather or the number of days in the relevant billing period. The District is expanding its presence on social media sites such as LinkedIn, Facebook, Twitter, YouTube, and Instagram. As part of the drought outreach, the District utilized targeting tools to place digital ads promoting rebates and water conservation on Facebook, GoogleAds, and LinkedIn.

Informational Videos: MNWD has developed two short informational videos which are posted on our website to give our customers additional tools to help conserve water. They show how to look for leaks within the home by checking the water meter for movement, which could indicate a leak at the property, and making sure toilets are working properly. A second video focuses on irrigation systems and the importance of adjusting the sprinkler timer on a regular basis to prevent overwatering. Future video topics will focus on instructional videos for our customers while strengthening our customer service relationship.

Community Presence

As mentioned above, customer interaction with the District had previously been limited to billing and service related inquires. In order to develop a general awareness about efficient water use and get residents interested in the water system, the District has dramatically increased its presence in the communities it serves.

Newspaper articles: In the fall of 2015, the District provided full page advertorials in the Orange County Register for ten weeks. These articles focused on the drought and conservation tips. They also provided a “How to Guide” to tearing out a lawn and replacing it with a beautiful native landscape.

Newsletters**:** Quarterly newsletters were created with timely information about the drought and tips for water conservation. These newsletters were used as bill inserts and included in every bill. The newsletters were distributed to all local city halls, libraries, and community centers, and they were also available at the District’s booth during local community events.

Press Releases: The District issued press releases on District news, community events, educational workshops, as well as information on the drought and conservation tips.

Partnering with Cities: (light pole banners, city e-news and websites, displays at local libraries and city halls, portable changeable message boards): Moulton Niguel Water District serves the cities of Laguna Niguel, Aliso Viejo, Mission Viejo, Laguna Hills, San Juan Capistrano, and Dana Point. The District partnered with these cities to place information on their websites and in their e-news blasts to residents. Light pole banners with messages to reduce outdoor irrigation were installed throughout Mission Viejo, Aliso Viejo, Laguna Hills, and Laguna Niguel. Drought displays were set up at two of the local libraries and the city halls. Community centers received informational materials on a regular basis

to hand out to visitors. The District purchased two portable changeable message boards that are placed in high traffic areas to promote water conservation.

Information booths at fairs and public events: The District is an active participant in the local community events in the cities that it serves. At these events, the District typically has a booth where employees provide informational items about the District and its water sources, as well as the drought and water saving tips. These booths often contain demonstrations of water saving devices. The District staffs an average of 20 information booths per year, reaching hundreds of customers annually at public events.

Live Smart Community Event: In May of 2015, the District coordinated a family-friendly community event called *Live Smart*, where we partnered with local cities, businesses, utilities, and garden centers to promote water and energy conservation, rebates, and California Native gardening. Over 600 adults and children participated in a fun and informative day focused on maximizing water and energy efficiency while saving money and "Living Smart!"

Speakers Bureau: The District coordinated a Speakers Bureau program and gave presentations to homeowners associations, city councils, local realtor associations, and other groups upon request. Topics included where the District's water comes from, the District's water budget-based rate structure, rebates, and other conservation related issues. The District spearheaded its first of many educational workshops for homeowner association board members and property managers with a common goal of sharing conservation efforts and water saving tips while building partnerships within the community.

Table 9-5: Community Presence Efforts

Date Range	Effort Type	Message
10/10/2015	Light Pole Banners - AV	Reduce Outdoor Watering
10/3/2015	Light Pole Banners - LN, LH	Reduce Outdoor Watering
5/16/2015	Live Smart Community Event	
9/27/2015	OC Register Custom Content 1	Watching Water Use is More Critical Than Ever
10/4/2015	OC Register Custom Content 2	How to Go Native with Less Stress
10/11/2015	OC Register Custom Content 3	Plan Before You Plant
10/18/2015	OC Register Custom Content 4	Return to Nature with a California Native Garden
10/25/2015	OC Register Custom Content 5	A Change in the Weather
11/1/2015	OC Register Custom Content 6	Losing Your Lawn & Gaining a Garden
11/8/2015	OC Register Custom Content 7	Caring for California Natives

Date Range	Effort Type	Message
11/15/2015	OC Register Custom Content 8	Rain, Runoff & Recycling
11/22/2015	OC Register Custom Content 9	Summer is Over, but the Drought is Still Here
11/29/2015	OC Register Custom Content 10	Giving Back by Saving Water
5/14/2015	OC Register Local Paper Ad	Live Smart
7/30/2015	OC Register Local Paper Ad	June 2015 Saved 200 Million Gallons
8/13/2015	OC Register Local Paper Ad	Be a Turnoff; July 2015 Saved 265 MG
8/27/2015	OC Register Local Paper Ad	Don't smother me.
9/10/2015	OC Register Local Paper Ad	Let's get friendly
6/26/2015	Over-allocation Letters	Residential
8/1/2015 - 9/1/2015	Summer Newsletter	

Regional Messaging

With the deluge of conservation messaging customers have received from all levels of government and media, it is critical that a consistent and accurate message be developed. Even more critical than consistency and accuracy, is the regional and seasonal applicability of the conservation messaging going out to customers. The District has coordinated its outreach efforts with those of neighboring water districts in order to put forward a consistent drought response message across Orange County. It is also important that the District serve as a regional voice, not only for communicating to its customers, but also communicating for its customers through active involvement with state policymakers.

Coordinating Outreach Efforts with Neighboring Water Districts: The District partnered with neighboring water agencies in the creation of banners and flyers promoting California native and drought tolerant landscaping and rebates. These colorful banners were installed at the point of sale at home improvement centers such as Lowes, Home Depot and other local nurseries and garden stores. Over 20,000 flyers containing rebate information were provided to these stores as part of this effort, as well.

Letters to the State Legislature: Moulton Niguel Water District has coordinated efforts to submit letters to the SWRCB expressing suggestions or concerns for their consideration on important issues that impact water usage and towards effecting long term efficiency statewide.

School education programs: The District recognizes the value in teaching children about the importance of water and the need for everyone to use it wisely. The District utilizes MWDOC's highly successful water education school program which features the famous mascot, "Ricki the Rambunctious Raindrop." The program reaches an average of 4,500 elementary school students in the District's service area every year, teaching them the water cycle, the importance and value of water, and the personal responsibility we all have as environmental stewards.

The School Program features assembly-style presentations that are grade-specific and performed on-site at the schools. The program curriculum is aligned with the science content standards established by the State of California. Since its inception in 1973, nearly three million Orange County students have been educated through the School Program.

In 2004, MWDOC formed an exciting partnership with Discovery Science Center that has allowed both organizations to reach more Orange County students each year and provide them with even greater educational experiences in the areas of water and science. Discovery Science Center currently serves as the School Program administrator, handling all of the program marketing, bookings, and program implementation. During the 2010-11 school year, more than 70,000 students will be educated through the program.

Poster Contest: Each year, MWDOC holds a Water Education Poster and Slogan Contest to increase water awareness. To participate, children in grades K-6 develop posters and slogans that reflect a water awareness message. The goal is to get children thinking about how they can use water wisely and to facilitate discussion about water between children and their friend, parents, and teachers. Each year, more than 1,500 poster and slogan entries are received through the contest.

During a special judging event, approximately 16 posters and 10 slogans are selected as the winners. All of our winners – and their parents, teachers, and principals – are invited to attend a special awards ceremony with Ricki the Raindrop at Discovery Science Center. At the awards ceremony, the winners are presented with their framed artwork as well as a custom t-shirt featuring their poster or slogan, a trophy, a certificate, and other fun water-saving prizes.

Children's Water Education Festival: The largest water education festival of its kind is the annual Children's Water Education Festival (Festival). The Festival is presented by OCWD, the National Water Research Institute, Disneyland Resort, and MWDOC. Each year, more than 5,000 students participate in the Festival over the course of this two-day event. The Festival is currently held at the University of California, Irvine.

The Festival presents a unique opportunity to educate students in grades four through six about local water issues and help them understand how they can protect our water resources and the environment. Students attend the Festival with their teacher and classmates, visiting a variety of booths focused on different water-related topics throughout the day. Participating organizations (presenters) engage the students through interactive educational presentations that are aligned with the science content standards established by the State of California. Since its inception, more than 80,000 children from schools throughout Orange County have experienced the Festival and all it has to offer.

Section 9.1.5 Programs to assess and manage distribution system real loss

The District tracks system water loss on a monthly basis through the use of work orders and reported leaks, which are then compiled into annual reports in accordance with the AWWA and EPA recommendations. In 2015, the District enlisted Water Systems Optimization, Inc. (WSO) to assist in assessing and managing its distribution system real water losses. A thorough and complete audit was conducted on the billing and tracking of water use and loss for fiscal year 2014. The District underwent a complete billing system data validation and integrity analysis. A review of the meter testing procedures

for meters used for importing and exporting water in the District was performed, as well as a random representative test of small meters. WSO developed a customized water loss tool kit for the District and provided staff training. After addressing several issues identified in the study, the District reduced Real Water Losses from 7.7% in FY 2014 to 6.3% in FY 2015. The Water Audit for FY 2014 yielded an Infrastructure Leakage Index (ILI) of 1.74 which indicates appropriate loss control. The District has instituted the following improvements to our annual water audits:

1. Adjusted the volume of Water Imported for changes in storage,
2. Streamlined and organized the leak/break repair data,
3. Added a timestamp to work orders to document the containment/shutoff time of leaks/breaks,
4. Rebuilt the 20-inch source meter to ensure accuracy,
5. Investigated customer accounts that experienced three or more consecutive zero-reads,
6. Performed comprehensive small customer meter testing and thorough analysis,
7. Performed a thorough evaluation of the large customer meter testing equipment,
8. Tested large customer meters using a consumption-based approach,
9. Maintained a database of large customer meter testing performance, and
10. Currently conducting pressure studies on two separate closed systems to evaluate opportunities for pressure management.

The District began a pilot water loss control program to institute the other recommendations provided by WSO:

11. Ensure the accuracy of the three additional source meters through the testing and calibration by MWDSC twice per year, and
12. Perform proactive leak detection to remove the backlog of hidden leakage in the system.

In accordance with the California Urban Water Conservation Council (CUWCC) BMP 1.2 and SB 555, the District has completed the water audit and balance using the AWWA software for FY14 and FY15. Staff has completed training in the AWWA Water Audit Method and the Component Analysis Process. Repairs of all reported leaks and breaks are made to the extent they are cost effective. Recordkeeping of reported leaks include: the date and time the leak was reported, the leak running time from report to repair, the estimated leak volume, the type of leaking pipe or fitting, and the leak location with GPS coordinates. The goal is to map all leaks using the GIS system to provide further analysis and refinement of the infrastructure rehabilitation program. The District will continue to improve its water loss performance in a manner consistent with the AWWA methodology. In conformance with recommendation 12 above, the District has initiated a water loss control pilot program in order to test implementation of a full-scale District-wide water loss control program. Chapter 4 details the District's distribution system losses.

Section 9.1.6 Water conservation program coordination and staffing support

The role of water conservation programs has expanded significantly as the District has grown and the needs of its customers have evolved. The District has employed a full-time conservation coordinator

since 2001. Due to the growing demand for water use efficiency programs, a conservation department was created in 2010. The Conservation Department was comprised of the Water Conservation Coordinator and two Water Use Efficiency Practitioners. The new Conservation Department would oversee the day-to-day management of the District's water use efficiency programs, and were augmented by existing staff from other departments and/or temporary help when specific programs were implemented which required a temporary increase in staffing hours. For example, additional customer service employees were utilized to implement the Water Budget Based Rate Structure in 2011, and temporary help was hired to perform landscape surveys and assist with the increased call volume. In November 2011, the District developed its own rebate program using the revenue generated from customer water use above the new individually calculated water budgets. This resulted in an increase in the workload for the conservation staff. Staffing was increased in 2015 to meet the demand from customers for turf removal rebates in response to the drought and to provide customers with information on conservation strategies through water audits. Currently, the Conservation Department consists of the Conservation Supervisor, two Water Use Efficiency Practitioners, a Conservation Representative, and a temporary employee.

The Conservation Department is responsible for a variety of tasks related to conservation and community outreach, including: responding to calls about high bills and increased consumption, customer interaction at our headquarters and throughout the District by field personnel, education of how water budgets work, variance processing for additional household members or square footage of irrigated area or other special circumstances, home and commercial water surveys, irrigation timer settings, rebate processing and site inspections, promoting and staffing landscape workshops, attending community and HOA events, distributing conservation supplies to hotels and restaurants, participating in regional water use efficiency meetings at MWDOC and MWDSC, and tracking data on our water use efficiency fund and rebate program.

Section 9.1.7 CUWCC Best Management Practices

The California Urban Water Conservation Council (CUWCC) is a membership organization promoting urban water conservation throughout California with over 400 members from water agencies and public advocacy organizations. The CUWCC supports water use efficiency by directing public policies; forming collaborative partnerships; advancing research, training, and public education; and integrating innovative technologies and practices. The District was one of the original urban water suppliers to sign the Memorandum of Understanding (MOU) in 1991, pledging to develop and implement urban water conservation practices to reduce the demand on urban water supplies. The CUWCC instituted Best Management Practices (BMP's) for water agencies, and member water agencies are required to submit a Best Management Practices Retail Water Agency Report to them biannually. The BMP's establish standard conservation practices for water suppliers to implement that are intended to reduce long-term urban demands, while protecting the environment. The intent of the MOU is that signatory water suppliers will: develop comprehensive conservation BMP programs using sound economic criteria, and consider water conservation on an equal basis with other water management options.

A Best Management Practice (BMP) is defined as a policy, program, practice, rule, regulation or ordinance or the use of devices, equipment or facilities which meet one of the following criteria:

1. An established and generally accepted practice among water suppliers that results in more efficient use or conservation of water,
2. A practice for which sufficient data are available from existing water conservation projects to indicate that significant conservation or conservation related benefits can be achieved; that the practice is technically and economically reasonable and not environmentally or socially unacceptable; and that the practice is not otherwise unreasonable for most water suppliers to carry out.

The District has a long history of enacting water conservation programs. The District implements all of the retail water agency BMP requirements according to the MOU and is in full compliance, as shown in the following chart.

Table 9-6: CUWCC BMP's and Coverage Status

CUWCC BMP's and Coverage Status			
Category	**Sub-Category**	**Practices**	**Status**
BMP 1 Utility Operations	1.1 Operations Practices	Maintain a Conservation Coordinator position	On Track
		Water Waste Prevention Ordinance	On Track
	1.2 Water Loss Control	Complete an AWWA Water Audit and Balance	On Track
		Measure performance with an Audit Validity Score	On Track
		Complete Training in AWWWA Water Audit Method	On Track
		Complete Training in Component Analysis Process	On Track
		Complete/Update the Component Analysis	On Track
		Repair reported leaks and breaks to the extent cost effective	On Track
		Located and repaired Unreported leaks to the extent cost effective	On Track
		Maintain in-house records of the completed AWWA worksheet	On Track
		Maintain records of each Component Analysis performed	On Track
	1.3 Metering with Commodity Rates	All service connections are metered	On Track
		All service connections are billed volumetrically	On Track
		Maintain a Meter Repair and Replacement Plan	On Track
		Implementation of Water Rate Structure to conserve water	On Track

CUWCC BMP's and Coverage Status			
Category	**Sub-Category**	**Practices**	**Status**
	1.4 Conservation Pricing	Implementation of Water Waste(Sewer) Rate Structure	On Track
BMP 2 Education	Public Information Programs	Minimum of one media contact per quarter	On Track
		Agency website updated at least once per quarter with conservation messages	On Track
	School Education Programs	Maintain active program to educate students about water conservation and efficient water use	On Track
BMP 3 Residential		Using GPCD reporting option to meet programmatic requirements.	On Track
BMP 4 Commercial/ Industrial/ Institutional		Using GPCD reporting option to meet programmatic requirements.	On Track
BMP 5 Landscape		Using GPCD reporting option to meet programmatic requirements.	On Track

Section 9.1.8 Other Demand Management Measures

District staff works closely with MWDOC, the regional wholesaler, to develop and implement District and regional water use efficiency programs. The District offers a wide variety of rebates to its customers designed to promote water conservation. As stated in Section 9.1.6, the District developed its own internal rebate program in November 2011, which was funded entirely by the revenue collected from charges for out of budget water usage. The development and administration of the program was handled completely in-house until August 2014, when the District joined the MWDOC Water Use Efficiency Choice program, whereby the District's rebates were processed by MWDOC and combined with funding from grants and MWDSC funds. The District provided supplemental funding for various devices and District staff performed the pre and post-inspections for turf removal rebates.

MWDOC administers all rebates for the District currently, with the exception of artificial turf installation, when installed separately and not in conjunction with turf removal. The District made artificial turf installation rebates available to those customers who did not desire or qualify for a turf removal rebate, but installed artificial turf.

Residential Rebates – Indoor

High Efficiency Clothes Washers: Almost 15 percent of water used inside the home is for laundry. New high efficiency clothes washers (HECW) use up to 55% less water than older models. Switching to a high efficiency clothes washer may provide a water savings of 4,800 gallons per year. The District offered a rebate of $200 per washer installed that has a high efficiency symbol and is listed on the Consortium for Energy Efficiency (CEE) qualifying product list. From November 2011 to June 2014, the District rebated $503,723.06 for 2,519 HECWs. Customers could also apply for an $85 rebate per qualifying device from MWDOC. A combined total of 11,578 high efficiency clothes washers have been rebated to the District's customers from both programs.

High Efficiency Toilets: Replacing a 3.5 gallon per flush toilet with a 1.28 gallon per flush toilet may save an average of 10,000 gallons per year per household. The District offered a rebate of $150 per toilet for a maximum of five toilets totaling $750. From November 2011 to June 2014, Moulton Niguel Water District rebated 6,648 new toilets totaling $955,963. Customers were also able to apply for additional rebates through MWDOC through a separate application process. In August of 2014, the District merged its rebate program with MWDOC, easing the application process for our customers. Combining our rebate amount of $150 per toilet with MWDOC's rebate amount of $100 enabled our customers to obtain $250 rebate per qualifying toilet, with a maximum number of devices remaining at five. From August 2014 through June 2015, the District and MWDOC rebated 2,897 toilets, bring the total number of toilets rebated from FY11-FY15 to 9,545. As of November 11, 2015, rebate incentives for HET's with 1.28 gallons per flush (gpf) were no longer available and instead, rebates for Premium High Efficiency Toilets using 4-liters (1.06 gpf) or less were offered at $40 per toilet. Premium high efficiency toilets use almost 20% less water than the WaterSense standard and flush the same amount of waste just as effectively.

Residential Rebates – Outdoor

Weather Based Irrigation Controllers: Weather based irrigation controllers (WBICs) allow for a more accurate, customized irrigation setting by automatically adjusting the schedule and amount of water in response to changing weather conditions. Not only does this save water by reducing unnecessary watering, it also allows for personalization of irrigation schedules to meet the landscape's specific plant and climate needs. Rebates of $25 per station up to a maximum of 24 stations or a total of $600 were available per account. The District paid $118,138 for 212 controllers between November 2011 and June 2014. MWDOC's Smart Timer Program began in 2004, providing rebates on weather-based irrigation controllers to both residential and commercial customers. A total of 1,314 WBIC's have been rebated through the District's and MWDOC's programs within the District's service area. The District through MWDOC currently provides a rebate of up to $195 to the customer for a weather based irrigation timer.

Rotating Spray Nozzles for Pop-up Spray Heads: Rotating nozzles provide directed, uniform water distribution to plants, eliminating wasteful runoff. They use a lower flow rate than traditional spray nozzles and are 20% more efficient, thus saving up to 1,000 gallons every year. The District's rebate amount was $4 per nozzle with a maximum rebate of $200 for 50 nozzles for residential customers and a maximum of $400 for 100 nozzles for commercial customers. From November 2011 to June 2014, the District rebated 2,272 rotating spray nozzles equaling $9,008 for residential and commercial customers. MWDOC started a rotating nozzle rebate program in 2007 for both residential and commercial customers. To date, MNWD and MWDOC have given out rebates for 8,239 residential rotating nozzles and 14,543 small commercial rotating spray nozzles.

Drip Irrigation: A drip irrigation system allows water to drip slowly to the roots of plants, either onto the soil surface or directly into the root zone through a network of valves, pipes, tubing, and emitters. Traditional overhead sprinklers have a water efficiency of 50%, while drip irrigation is almost 100% efficient. Original rebates of $0.20 per square foot were available, up to a maximum of $300 per customer. The District rebated residential customers $6,401.12 for 36,881 square feet during the time period from November 2011 through June 2014. After merging the District's rebate program with

MWDOC in August of 2014, the drip irrigation rebate amounts changed to $175 per component kit. Each kit is able to provide coverage for between 250 and 500 square feet of spray irrigation that is retrofitted. Each residential site was eligible for up to three kits and the installed drip irrigation equipment must be listed on the Eligible Products List. A post-inspection is required for all drip conversion projects and a minimum of 250 square feet of irrigated area must be converted to drip irrigation in order to qualify.

Turf Removal: Turf grass is one of the most water-intensive plants in a customer's landscape. By removing 500 sq. ft. of turf, an estimated 9,000 gallons of water is saved per year. To qualify for a rebate, a pre-inspection is required to determine the amount of turf being removed, as well as confirm the grass is alive and irrigated. A post-inspection is also a requirement to verify the total square feet of turf removed in order to calculate the rebate amount. Through the merger of the District's rebates with those of MWDOC, customers were able to apply for $3.50 per square foot of turf removal. This dollar amount brought a dramatic spike in the number of program participants. After MWD's funding was exhausted, the District continued to offer turf removal rebates at $2.00 per square foot. Total turf removed in the District's service area from FY 2012 through FY 2015 through MWDOC was 2,460,071 square feet with a cumulative 702 acre feet of water savings.

Synthetic Turf: Synthetic turf must be manufactured in the USA due to lead content contained in foreign manufactured turf products. Also, the synthetic turf must be permeable to allow water to percolate into soil and minimize runoff to the street. A pre and post-inspection are required. The rebate amount is $1.50 per square foot with a maximum of $4,500 and 3,000 square feet per residential customer.

Rain Barrels: Rain barrels allow for the capture of rainwater that fall onto the roof for reuse on the customer's landscape. Plants and microbes prefer rainwater because it is naturally "soft" and free of chlorine, fluoride, and other chemicals. Rain barrels help reduce ocean water pollution by preventing rain from carrying fertilizers, pet waste, and other harmful debris into the ocean. To qualify for a $75 rebate, the rain barrel must hold at least 50 gallons and be designed specifically to capture rain. The barrel must have a cover to prevent mosquitoes from entering the water. A customer may receive a maximum rebate for four rain barrels of $300.

Soil Moisture Sensors: Soil moisture sensor controllers are placed below ground in the root zones of lawns and landscapes to determine if and how long to water. They are available as stand-alone controllers or add-on devices to existing controllers. They have been shown to reduce outdoor water use by as much as 70% without sacrificing the quality or health of landscape. The residential rebate amount is up to $195 per controller for properties less than one acre, or $35 per station for properties one acre or larger.

Table 9-7: Residential Rebates

Residential Rebates through June 30, 2015		
Program	**Current Rebate Level**	**Units Rebated**
High Efficiency Clothes Washers	Up to $285 per washer	6,733
High Efficiency Toilets	Up to $40 per toilet	10,399
Sprinkler Nozzles	Up to $6 per nozzle	6,442
Drip Irrigation	Up to $175 per kit	45,394
Smart Irrigation Timers	Up to $195 per controller	452
Soil Moisture Sensors	Up to $155 per sensor	3
Rain Barrels	Up to $75 per barrel	75
Turf Removal	Up to $2 per sq.ft.	168,415
Synthetic Turf w/Turf Removal	Up to $3.50 per sq.ft.	502,397
Note: The units rebated refer to the units referred to in the current rebate level column.		

Residential Water Saving Programs

Landscape Training Classes: The District conducts six to eight California Friendly Landscape Training classes per year, in partnership with MWDOC, and sponsored by MWDSC. These three hour workshops help homeowners design and maintain water efficient landscapes. The program consists of in-person classes that focus on landscape and irrigation design, plant and fertilizer selection, plant care and maintenance, and irrigation. Average attendance per landscape class is 20 people, resulting in approximately 160 participants per year.

Home Saving Surveys: The District conducted personal Home Saving Surveys for a variety of reasons. Customers who experienced high water usage were visited upon request to check their meter for movement which would indicate a leak. The Conservation Specialist also checked their irrigation timer to verify they had a battery backup in case of a power outage and confirmed the settings on the timer so as to prevent overwatering. Home Surveys were also conducted to verify the amount of irrigated area at a property since this amount determined the outdoor water budget. The District also performed Home Saving Surveys as an educational tool for customers who wanted to learn how to adjust their irrigation timer or who wanted to learn how to be more efficient with their water use. The District conducted 3,414 Home Saving Surveys from 2011 to 2015.

Home Certifications: District customers can participate in MWDOC's Orange County Water Smart Home Program which offers them the opportunity to have their house certified as a Water Smart Home. The program includes a free outdoor (and indoor, if desired) home water survey that will score their home's water efficiency and highlight areas for potential water savings. Recommendations will include rebates and no-cost activities that lead to increased water conservation. Customers who implement the recommended improvements and submit proof of the improvements will receive the Water Smart Home certification.

Commercial Rebates - Indoor

Zero & Ultra Low Water Urinals: Ultra low water urinals provide effective, low-maintenance flushing in public restrooms while reducing water consumption by as much as 88%. Zero water urinals are an improvement over traditional urinals in both maintenance and hygiene. 1.25 gallon per flush urinals will save an average of 680 gallons per year per employee if replacing pre-1994, 1.5 gallons per flush urinals. Rebates of $150 per urinal were available up to a maximum of 5 urinals and $750. During the period between November 2011 and June 2014, the District rebated 3 urinals for $429. The current rebate amount is $200 per eligible urinal.

Commercial Clothes Washers: Commercial sports team type 20 pound and larger clothes washer must have computer controlled water level adjustments. Other commercial clothes washer must have a water factor of 4.5 or less and be the front loading type. Rebates are available for $400 per washer with a maximum of ten washers and $4,000. The District rebated 10 washers for $4,000 from November 2011 through June 2014.

Cooling Tower Conductivity Controller: Automated monitoring and control are the keys to maintaining cooling system efficiency. By accurately transmitting information to the valves that control the amount of blow down (water drained from the cooling tower reservoir) and subsequent makeup water, a conductivity controller can dramatically reduce operating expenses. Annual water savings with a new cooling tower conductivity controller can be as much as 800,000 gallons. Rebates of $1,000 per controller were available, with a maximum of $2,000 for two controllers. The District rebated one controller for $600 between November 2011 and June 2014. The current rebate levels are up to $1,225 for cooling tower conductivity controllers and $2,750 for ph-cooling tower controllers.

High Efficiency Toilets (HET): Replacing a 3.5 gallon per flush toilet with a 1.28 gpf toilet may save an average of 10,000 gallons per year per business. In addition to HET's, dual flush high efficiency toilets with 1.6/1.28 gallons per flush efficiency rating were also eligible to receive a rebate. As of November 11, 2015, rebate incentives for HET's with 1.28 gpf were no longer available and instead, rebates for Premium High Efficiency Toilets using 4-liters (1.06 gpf) or less were offered at $40 per toilet. Premium high efficiency toilets use almost 20% less water than the WaterSense standard and flush the same amount of waste just as effectively.

Air Cooled Ice Machines: New air cooled ice machines use less energy and water to make ice quickly and efficiently. To qualify for an MNWD rebate, air cooled ice machines must be replacing older existing water cooled ice machines. Older water cooled ice machines typically use 90 gallons of water to produce 100 pounds of ice, with an additional 180 gallons of water per 100 pounds of ice to cool the machine. Air cooled ice machines use 15-25 gallons of water per 100 pounds of ice and do not use water to cool the machine, thereby achieving significant water savings. By installing an air cooled ice machine, water savings could be as much as 219,000 gallons per year. Rebates are available for up to $1,750 per machine.

Connectionless Food Steamers: Restaurants often use food steamers to maintain or warm food. New water-efficient connectionless (pressure-less) food steamers, which have no water line or sewer discharge line, have been developed. This type of food steamer is intended for small to medium-size

restaurants. Based on a study by the Food Service Technology Center, connectionless food steamers save an average of 81,500 gallons per year with an estimated 10-year life span. Rebates are available for up to $985 per compartment.

Dry Vacuum Pumps: Vacuum pumps are used in many businesses, including dental and medical practices, petrochemical and pharmaceutical manufacturing, as well as food and medical applications for drying, distilling, evaporating, degasifying, freezing, suction, and laboratory analysis. Liquid ring vacuum pumps are use large amounts of water as a liquid seal to create the vacuum. Converting to dry vacuum pumps will reduce water and sewer expenses. Dry vacuum pumps are capable of creating an airtight seal without the use of water by utilizing parts machined within extremely close tolerances. Rebates are available for up to $125 per 0.5 HP pump.

Laminar Flow Restrictors: Laminar flow restrictors placed on faucets do not draw air into the water stream and produce a non-aerated clear stream of water which inhibits bacterial growth and transmission. Reduced flow rates can reduce water and energy costs. Retrofitting an existing faucet with a laminar flow restrictor can save up to 7,500 gallons per device. Laminar flow restrictors eligible for the SoCal WaterSmart rebate are to be installed in hospitals, urgent care, and other health care related facilities. Devices should meet California Office of Statewide Health Planning and Development standards. Rebates are available for up to $10 per restrictor.

Commercial Rebates – Outdoor

Turf Removal: Turf grass is one of the most water-intensive plants in a customer's landscape. By removing 500 sq. ft. of turf, an estimated 9,000 gallons of water is saved per year. To qualify for a rebate, a pre-inspection is required to determine the amount of turf being removed, as well as confirm the grass is alive and irrigated. A post-inspection is also a requirement to verify the total square feet of turf removed in order to calculate the rebate amount. Through the merger of the District's rebates with those of MWDOC, customers were able to apply for $3.50 per square foot of turf removal. This dollar amount brought a dramatic spike in the number of program participants. After MET's funding was exhausted, the District continued to offer turf removal rebates at $2.00 per sq. ft.

Synthetic Turf: Synthetic turf must be manufactured in the USA due to lead content contained in foreign manufactured turf products. Also, the synthetic turf must be permeable to allow water to percolate into soil and minimize runoff to the street. A pre and post-inspection is required. The rebate amount is $1.50 per square foot of synthetic turf installed.

Large Rotating Spray Nozzles: High efficiency nozzle retrofits for large rotary sprinklers replace standard plastic nozzles with durable metal nozzles. These replacement nozzles are resistant to wear and provide a high uniformity of water distribution. They are mostly used on golf courses and other open landscapes for long range and close-in watering. High efficiency nozzle retrofits provide healthier, greener turf and improved distribution and uniformity with lower water and energy costs. Lower maintenance costs are also achieved. Rebates are offered per set (8 set minimum – no maximum). The current rebate amount $28 per set, with $13 coming from MET's incentive, and $15 from MNWD.

Drip Irrigation: Drip irrigation is a system that allows water to drip slowly to the roots of plants, either onto the soil surface or directly into the root zone through a network of valves, pipes, tubing, and emitters. Traditional overhead sprinklers have a water efficiency of 50%, while drip irrigation is 100% efficient. Commercial sites may be eligible to receive $0.40 per square foot of converted area. The installed drip irrigation equipment must be listed on the Eligible Products List and a minimum of 250 square feet of irrigated area must be converted.

Sprinkler Nozzles: Rotating spray nozzles for pop-up spray heads use lower flow rates than traditional spray type heads and applies water more evenly, reducing runoff and misting. Rotating spray nozzles generally are 20% more efficient that traditional spray nozzles and each nozzle can save up to 1,100 gallons per year. The current rebate is up to $6 per nozzle.

Smart Irrigation Timers: Weather based irrigation controllers allow for a more accurate, customized irrigation setting by automatically adjusting the schedule and amount of water in response to changing weather conditions. Smart timers use information about your plants, soil, and weather conditions to give your landscape the right amount of water year-round. Not only should this save water by reducing unnecessary watering, it also allows for personalization of irrigation schedules to meet the landscape's specific plant and climate needs. The estimated water savings per year for 2,000 sq. ft. of irrigated area is approximately 17,204 gallons. Commercial rebates are offered at up to $75 per station for all properties.

Soil Moisture Sensors: The District began offering rebates for soil moisture sensors in October of 2015. Soil moisture sensor controllers are placed below ground in the root zones of lawns and landscapes to determine if and how long to water. They are available as stand-alone controllers or add-on devices to existing controllers. They have been shown to reduce outdoor water use by as much as 70% without sacrificing the quality or health of landscape. The commercial rebate amount is up to $75 per station for all properties.

In-Stem Flow Regulators: In-stem flow regulators control water flow in irrigation systems at the sprinkler head. They are recommended for parks, schools, office complexes, golf courses, nurseries, and other commercial irrigation applications. Retrofitting existing pop-up spray heads with in-stem flow regulators can save up to 1,000 gallons per device. The rebate amount is up to $1 per regulator.

Recycled Retrofits: The average irrigated acre requires two acre-feet (or 652,000 gallons) of potable water per year. Changing the irrigation water source to recycled water allows the customer to purchase recycled water at a lower rate than the potable water rate. The District offers a rebate of $1,250 per irrigated acre or 50% of the project cost, whichever is less for work performed past the current potable water meter, with a maximum rebate amount of $5,000. Metropolitan Water District of Southern California's (MWDSC) On-site Retrofit Pilot Program provides additional financial incentives to public or private property owners to convert potable water irrigation or industrial water systems to recycled water service. Incentives of up to $195 per acre-foot for five years of estimated water use are available, with a cap at the actual retrofit costs. Items eligible for incentives include: project design, permitting, construction costs associated with the retrofit of potable to recycled water systems, connection fees, and required recycled water signage. MWDSC's program is on a first come, first served basis until the

closing date of June 30, 2016, or until funding for this program is exhausted. Since July 2010, there have been 111 recycled retrofits in the District's service area. Seven of the sited that performed retrofits received rebates.

Commercial Water Saving Programs – Including MWDOC/MWDSC programs

Commercial Surveys: Moulton Niguel Water District conducted commercial surveys on all of the potable and recycled irrigation accounts in the service area to physically measure the amount of irrigated area that each meter served. This verification was necessary to confidently assign an outdoor water budget for each irrigation account. The District also offered water surveys to commercial customers who exceeded their water budget. Conservation staff contacted the business to enquire if there had been a change in their operations, an increase in the number of employees, or a known leak at the property. An appointment was scheduled, when possible, to meet the commercial customer at their place of business to do an on-site inspection of their facility to determine their water use efficiency. Conservation staff held meetings with landscapers of irrigation accounts to discuss the importance of weekly meter reading and irrigation timer and system inspections. Customer outreach promoted the District's desire to assist customers in their ability to operate within their personalized water budget. Through face-to-face meetings, partnerships were formed with customers. From 2011 to 2015, the District performed 3,099 commercial surveys.

Water Smart Landscape Program: MWDOC's Water Smart Landscape Program (formerly called the Landscape Performance Certification Program) is a free water management tool for homeowner associations, landscapers and property managers. Participants in the program use the internes to track their irrigation meter's monthly water use and compare it to a custom water budget. This enables property managers and landscapers to easily identify areas that are over/under watered and enhances their accountability to homeowner association boards. A recent study shows that irrigation meters participating in this program save an average of 765 gallons of water per day compared to those meters not in the program. Program participants receive monthly Irrigation Performance Reports directed to the property owner, property manager, and the landscaper to: easily track irrigation water use, help reduce water bills, improve the health, appearance and value of landscapes, protect the environment by decreasing urban runoff, and maintain compliance with NPDES requirements. Funding for the Water Smart Landscape Program is provided by the District, MWDOC, and MWDSC.

Water Smart Industrial Program: The Water Smart Industrial Program was developed to help industrial facilities become more efficient with their water use. It is a free program providing customers the opportunity to reduce their facility's water use and utility expenses by implementing water-saving processes. Participants receive a free industrial process water use survey and a customized facility report with water saving recommendations. Cash incentives are available for facilities that employ select process improvements and equipment installation.

Public Spaces Program: MWDOC's Public Spaces Water Smart Landscape Program provides incentives for water efficient landscape improvement projects at public sites in Orange County. The program specifically targets the implementation of comprehensive landscape improvements for publicly owned and highly visible landscape properties throughout Orange County. The public site must be highly visible

and remove more than half of the non-functional turf. Older irrigation timers should be upgraded to weather-based and/or soil moisture self-adjusting irrigation timers. Also, the conversion from high-precipitation rate fixed spray irrigation to low-precipitation rate rotating nozzles and/or drip irrigation is encouraged. These improvements will reduce dry-weather runoff, pollution prevention, lower maintenance costs, and significant water savings. As part of the landscape renovation effort, MWDOC will develop signage to be placed at each project site to inform the public of the purpose, promote the landscape renovation benefits, and describe how renovations of this type can be accomplished at other properties throughout Orange County.

Fitness Center Program: SoCal WaterSmart developed a new program for fitness centers to receive enhanced incentives when replacing older toilets and urinals with new qualifying devices. Fitness centers have a high potential for increased water savings by installing new toilets and urinals due to the high volume usage at these facilities. Premium High-Efficiency Toilets (PHET) operate at 1.gpf or less, using up to 20 percent less water than the current WaterSense standard. These toilets are available in gravity-fed, pressure assist, and dual-flush models. Rebates are only available for toilets on the Qualified Models List.

Table 9-8: Commercial Rebates

Commercial Rebates through June 30, 2015		
Program	**Current Rebate Level**	**Units Rebated**
High Efficiency Toilets	Up to $40 per toilet	46
Ultra Low & Zero Water Urinals	Up to $200 per urinal	129
Air-Cooled Ice Machines	Up to $1750 per machine	-
Connectionless Food Steamers	Up to $985 per compartment	-
Cooling Tower Controllers	Up to $2750 per controller	1
Dry Vacuum Pumps	Up to $125 per 0.5 HP	-
Laminar Flow Restrictors	Up to $10 per restrictor	-
Large Rotary Spray Nozzles	Up to $28 per set	
Drip Irrigation	Up to $0.40 per sq.ft.	97,441
Sprinkler Nozzles	Up to $6 per nozzle	6,966
Smart Irrigation Timers	Up to $75 per station	425
Soil Moisture Sensors	Up to $75 per station	-
In-Stem Flow Regulators	Up to $1 per regulator	-
Turf Removal	Up to $2 per sq.ft.	1,745,402
Synthetic Turf w/Turf Removal	Up to $3.50 per sq.ft.	233,623

Commercial Rebates through June 30, 2015		
Program	Current Rebate Level	Units Rebated
Recycled Retrofits	Up to $1250 per acre	7

Section 9.2 Implementation over the Past Five Years (Nature and Extent)

The following measures, described in the previous section, were implemented within the last five years.

Section 9.2.1 Water waste prevention ordinances

The District updated its water waste prevention ordinance in 2015, to clarify and expand the conservation measures that are in place at all times emphasizing the new norms in water use efficiency. The expanded ordinance has 19 conservation best management practices, as well as the Water Shortage Contingency Plan. Chapter 7 and Section 8.2 provide details of the ordinance.

Section 9.2.2 Metering

All 55,000 service connections (residential, multi-family, commercial, irrigation, recycled, and construction hydrants) are metered and billed based on commodity rates. As of December 2015, all customers are billed on a monthly basis. A meter maintenance and replacement program ensures accurate meter reading and customer billing. Currently, there are 1850 AMI meters located in specific residential areas and 15,025 AMR meters installed at all commercial and recycled locations, plus some residential areas. Grant funding will allow for all potable irrigation and recycled irrigation meters to be replaced with AMI meters, along with the supporting infrastructure. Additional information on our metering and AMI Pilot Program is located in Section 9.1.2 and Section 9.3.2, respectively.

Section 9.2.3 Conservation Pricing

Conservation pricing is a key demand management measure for the District and is incorporated in the Water Budget Based Rate Structure (WBBRS) that was implemented on July 1, 2011. All 55,000 customers receive a personalized water budget every month. Customers receive details of their water budgets on their bill and additional pricing information is shared in a variety of ways, including a web-based budget calculator and extensive community outreach. More information on conservation pricing is found in Section 9.1.3.

Section 9.2.4 Public education and outreach

The District's communication with customers through public education and outreach is demonstrated through a comprehensive approach using a variety of platforms. Section 9.1.4 details the direct communication with customers, the reference point for customer inquiries, community presence and regional messaging. The District has printed and mailed over 630,000 postcards between April 2015 and March 2016. Additionally, over 25,000 rebate flyers were distributed throughout the District's service area in 2015.

Section 9.2.5 Programs to assess and manage distribution system real loss

The District updated its program to assess and manage water loss in 2014 through additional training in the AWWA reporting software and component analysis. Reformed processes to track leaks provided valuable data for better reporting. Included in the review of water loss tracking was an evaluation of our

meter reading and billing processes. Industry experts report water loss using new performance indicators such as the Apparent Losses per service connection per day, Real Losses per service connection per day, and the Infrastructure Leakage Index (ILI). The District's Apparent Losses per connection per day improved from 3.27gallons in FY14 to 3.05 gallons in FY15. The Real Losses per service connection per day improved from 37.05 gallons in FY14 to 28.31 in FY15. The ILI also improved from 1.74 in FY14 to 1.33 in FY15. In addition, the District is on track with the CUWCC's BMP 1.2. Continued improvements are expected through the implementation of focused resources and improved processes. Section 3.3 and Section 9.1.5 provide more information on water loss programs.

Section 9.2.6 Water conservation program coordination and staffing support

Over the past five years, conservation staffing support and coordination have been extremely important components of the WBBRS implementation. After the creation of an efficiency fund for over-allocation monies that were collected, a rebate program was developed and administered in-house as a means of providing customers with water efficient devices and a turf removal program to help them stay within their assigned budgets. Conservation activities were managed by the Conservation Supervisor and carried out by the Supervisor and two Water Use Efficiency Practitioners. Temporary help was utilized to meet specific program demands. Also, an outside contractor provided support in the form of rebate inspections. A comprehensive description of the conservation activities can be found in Section 9.1.6 and also Other Demand Management Measures in Section 9.1.8.

Section 9.2.7 Other Demand Management Measures

The District partnered with its wholesaler, MWDOC, to implement numerous water use efficiency programs. A complete list of available rebates and water savings programs is found in Section 9.1.8, as well as MWDSC funded and MWDOC-administered programs that include: home certifications, the Water Smart Landscape Program, the Water Smart Industrial Program, the Public Spaces Program, and the Fitness Center Program.

Section 9.3 Planned Implementation to Achieve Water Use Targets

Even with its many accomplishments in the area of demand management, the District is committed to achieving even greater water savings throughout its service area. As noted in earlier chapters, the District is currently almost 20 percent below its SBX7-7 2020 compliance target. The following measures are currently underway or may be implemented to ensure that the District achieves its water use target for 2020, most of which are discussed in greater detail above.

Section 9.3.1 Water waste prevention ordinances

Moulton Niguel Water District updated and expanded its water conservation and waste prevention ordinance in 2015. The District will monitor the effectiveness of the ordinance provisions and propose changes as needed.

Section 9.3.2 Metering

The District received a grant to install AMI meters in the service area for dedicated potable and recycled water irrigation customers. The purpose of the AMI Implementation Project is to showcase and test advanced meter infrastructure with supporting software, education, and public outreach with a subset of customers with some of the highest water consumption rates in the District's service area, these

being primarily potable and recycled irrigation customers. The ultimate goal is to increase water use efficiency and conservation through the availability of near real-time data on water usage and daily water needs. Implementing AMI will assist the District in proactively identifying leaks, assist operations through demand-side time-of-use management, and reduce real system losses. AMI will benefit the customers by providing tools for monitoring water usage and promoting behavioral changes to optimize their operations in terms of water use efficiency. The AMI Implementation Project will serve as a pilot which could potentially lead to an expansion of the AMI program to include all potable and recycled accounts in the District totaling over 55,000 meters system-wide.

Section 9.3.3 Conservation Pricing

The District's WBBRS encourages efficient water use and provides customers the ability to manage their own water use. While the District continually strives for cost reductions and to better utilize the assets it manages on behalf of the public, it is necessary to align rates with the increasing costs of delivering services, which include the cost of purchasing water and complying with regulations governing the treatment of water and wastewater, the costs of operating and maintaining the water systems, and construction of capital infrastructure improvements to repair, replace, and update the District's aging water system. The District's most recent 218 Notice of Public Hearing proposed three years of gradually increased rates. Tightening of water budgets through the reduction in the gallons per person per day and the lowering of the plant factor to promote the use of California Native landscaping are under consideration for the future.

Section 9.3.4 Public education and outreach

The District participates in MWDOC's School Education Choice Program. To supplement MWDOC's program, the District plans to expand its outreach to the local schools by developing additional water use efficiency programs geared toward school aged children. Instilling a conservation mindset at an early age leads to better stewardship of natural resources for generations.

Section 9.3.5 Programs to assess and manage distribution system real loss

The District plans to integrate water use efficiency planning into all aspects of its operations including water loss control program implementation, which is expected to result in an estimated net savings of over 201.5 AF per year in 2020 and up to 307 AF per year in 2040. Another planned implementation that will affect the District's amount of water loss is the tracking of leaks and line breaks using GPS coordinates, creating the ability to map and further analyze the leak data for frequency patterns, thus providing the ability to target common leak sources such as meter type, pipe material, age of infrastructure, or pressure zone.

Section 9.3.6 Water conservation program coordination and staffing support

The turf removal rebate program has been very popular with the District's customers. In order to process the large volume of rebate applications in a timely manner, the District has contracted with an outside firm to assist with the pre and post-inspections of turf removal projects. Also, the District plans to continue conducting workshops for property managers and landscape professionals to educate them on managing water within their individually calculated water budget to promote irrigation efficiency. The Conservation staff works closely with other departments within the District such as the Billing Department for variance adjustments and customer education, the Engineering Department and field

personnel for water loss tracking, the Accounting Department for rebate processing, and the Policy and Outreach staff for community events. Partnerships with the neighboring districts was and will remain a common practice in our shared efforts to meet collective goals and individual water reduction targets. New programs will be developed to reach our highest water wasters by providing assistance and education on conservation.

Section 9.3.7 University Partnerships

The District entered into partnerships with several universities in the summer of 2015 with the purpose of conducting studies on water conservation factors and marketing research.

The District has partnered with Professors Kurt Schwabe and Ken Baerenklau from the University of California, Riverside in an exciting research project into conservation drivers. The objectives of this project are to identify agency, household, environmental and community-level drivers that influence water conservation decisions and outcomes among residential single-family households in the District service area. Developing effective water conservation strategies requires information on past, current, and anticipated future household-level decisions regarding water conservation. It also requires an understanding of how agency programs and customer actions interact with one another, with current and future potential pricing and rebate policies, and with characteristics of residential households and their surrounding social, demographic, and physical environment. The study will provide an analysis of the drivers of residential single-family household participation in water conservation programs offered by MNWD, an evaluation of program characteristics to increase participation rates in particular programs, estimates of the overall impacts of such programs and customer actions on residential water use and water bills, and an evaluation of individual program costs and benefits of individual programs to the agency. The main programs that will be evaluated include turf removal, synthetic turf installation, high efficiency/front load clothes washers, and smart irrigation timers. The project is expected to be finalized in the second quarter of 2017 with interim results that will be put in place via program design to refine and better meet customer needs for conservation programs.

While the District has achieved significant water savings that align with increased communications, it is important that MNWD understands which messages and which modes of marketing are most cost effective to subsets of the customer base.

In July of 2015, the District partnered with Stanford University to help answer some of these questions. The Marketing Research effort involves a scientific process to answer two primary questions:

1. How much water savings is due to ads, as opposed to other media?
2. Are the effects of ads on water conservation long- or short-term?

The study is based on cutting edge statistical methods to better inform targeted marketing strategies using the following strategies:

- Run an “actionable” campaign
- Randomly withhold new digital communication from some customers to form control group
- Media
- Focus on digital ads

- Track clicks to agency website or survey after exposure
- Measurement
- Observe whether households changed behavior (relative to control)
- Which ad content best leads to long-run change
- Cost-Benefit of Action Alternatives
- Decompose ad expenses, content and savings
- Help determine marketing budget allocation

The District will evaluate its current communications program with this actionable data to further increase its effectiveness and water conservation. The results of the study are expected in 2017 and will be incorporated into new digital marketing strategies to more cost effectively inform increasingly efficient water use.

Section 9.3.8 Updating MNWD logo and tagline

The District engaged a consultant to act as a strategic partner to evaluate the District's existing logo to develop a powerful brand identity for MNWD. A simplified, modernized logo was designed that pops with boldness while retaining the traditional form that customers and staff value. The evolved logo mark symbolizes the evolution and innovation of the District. Final approval of the new brand by the Board of Directors was approved in the first quarter of 2016.

Section 9.3.9 Developing new website

The District plans to create a new website that utilizes the new brand identity presenting a modern, fresh look that communicates its strengths in superior customer service, reliability, innovation and collaboration. A request for proposal has been issued for both a customer portal and a utility portal. The customer portal will serve as a tool to provide customers with valuable information about their water usage. The portal will:

1. Demonstrate water usage and water budget graphs and charts,
2. Allow customers to set alerts and budgets with their own parameters,
3. Provide customer email alerts and push alerts with bill amounts to date, projected bill amounts based on current usage trends, and comparisons to past usage,
4. Provide rebate information,
5. Bill pay with single sign-on,
6. Water budget information, such as number of residents and irrigable area,
7. Conservation tips,
8. Leak alerts,
9. Customer acknowledgement of leak alert to keep on file with time/date stamp,
10. Current meter read information,
11. Historic ET and current daily ET,
12. Variance/Bill adjustment requests with verification,
13. Access to how-to videos, and much more.

The new website is scheduled for launch in the third quarter of 2016, giving customers the tools they need to proactively manage their water budgets and conserve the State's limited water supply.

Section 9.3.10 California Data Collaborative

The District is a pilot member of the California Data Collaborative. The California Data Collaborative brings together water utilities throughout California to accelerate development of "smart" water use statewide by collectively leveraging usage data from the 3.7 million people they serve. This initiative is the first ever public agency led effort to centralize comprehensive customer level usage data to improve efficiencies, refine demand management strategies and promote long-term sustainable solutions across California's natural resources. This initiative aims to utilize "Big Data," an approach that has proven successful in the private and other public sectors, to answer the call for improvements in California's water data infrastructure from leading water and technology experts. The first phase of this pilot project focuses on integrating customer-level water usage data across participating utilities to develop more robust measurements of water usage behavior across California and illustrate how this effort can scale statewide. The California Data Collaborative will address four primary needs:

1. The critical role of customer-level usage data – California currently collects a variety of reported utility level water usage metrics through the SWRCB conservation program (monthly averages since 2013), DWR's UWMP program (annual averages last updated in 2010), and the Clean Drinking Water program. Ultimately, however, water usage decisions are made at the customer level, and such granular data is necessary to effectively manage water demand across California. Customer level usage data enables analysts to dig deeper into water usage trends by customer class, geographic area, hydrologic features and other unique local characteristics. In addition, customer level usage data across utilities supports more comprehensive research into what conservation actions work in what contexts to effectively manage demand.

2. The need for inter-utility collaboration in understanding water usage behavior – A study evaluating the impact of turf rebates in Moulton Niguel Water District was recently published. This study supplements the existing literature by examining water usage behavior as a function of demographic characteristics and water usage brackets, and by investigating conservation program participation behavior. But with data from only one utility, the District is unable to answer: what would have happened if MNWD had implemented the turf rebates differently during that time? Yet in South Orange County, other districts have historically offered different rebate amounts, creating a reference point that analysts can use to understand the drivers of turf rebate program participation and scope next steps to achieve turf market transformation. Other subsets of California's 411 other major urban water retailers offer different conservation programs, pricing structures, and marketing approaches to a variety of customer populations. Putting all of California's customer level usage data together with key contextual information in a centralized, secure cloud platform can accelerate the understanding of the unique characteristics of communities throughout California and lead to an effective, customized approach to local demand management that have statewide impacts.

3. Integrating the entire lifecycle of CA's water usage data – California water retailers employ a wide variety of data management and customer classification practices, but every urban

metered water connection in California collects three key data points: a) the amount of water used, b) the address where that water was used, and c) the time period over which that water was used. Those geographic and time identifiers enable the integration of contextual demographic, weather, evapotranspiration and other data sources such as irrigable area derived from aerial or satellite imagery. That data can be integrated with utility operational data (e.g. SCADA, GIS asset maps) to support system efficiencies like leak detection and improving operations through demand forecasting. Centralizing that data in cloud infrastructure enables the water community to better leverage modern data science tools regularly employed by private technology companies and increasingly in other industries such as energy, agriculture, retail, healthcare, and financial services.

4. Pioneering new data infrastructure so California can adapt to whatever the future holds – Using computer programming scripts to integrate water usage data with important contextual information provides two key advantages over current manual approaches: better information and less time/cost to the agency. Computers can repeatedly run routine tasks and regularly update the data over secure web connections allowing for more current analysis that can aid in water management decisions. Water managers need timely, comprehensive measurements to accelerate how we achieve water efficiency and adapt to California's challenging water supply realities.

Over the last five years, the District has implemented a comprehensive array of demand management measures through a concentrated effort aimed at increasing water use efficiency. While the District has accomplished much, it will continue to work toward greater water savings and improved efficiency. The planned programs and actions mentioned in this chapter illustrate the District's focus on the future.

Partnerships with customers and other agencies have been an integral part of the District's overall demand management plan. The District will continue to reach out to cities, customers, and surrounding agencies to explore additional opportunities for recycled water use. Study results derived from university partnerships and the data collaborative will assist the District in developing effective water conservation strategies and improve its targeted marketing campaigns. Results of the UCR study will enable the District to better target its conservation incentives to effect landscape market transformation. The installation of AMI meters and an updated website with a customer portal will provide near real-time data on water usage and assist in proactively identifying leaks to reduce water loss for customers. The District's allocation based rate structure provides the ultimate conservation tool and will be monitored for possible refinement. It is more important than ever to utilize cutting edge methods for demand management to meet both near and long-term reliability needs.

Chapter 10 Urban Water Management Plan Adoption Process

This section provides the information required by the UWMP Act related to adoption of the UWMP and external coordination and outreach activities carried out by MNWD as required by the California Water Code.

Section 10.1 Inclusion of all 2015 Data

Data provided in this plan reflects fiscal years beginning July 1. Data utilized is current through the end of the last full fiscal year – June 30, 2015.

Section 10.2 Notice to Cities and Counties and Coordination with Other Agencies

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, MNWD worked closely with many other entities to develop and update this planning document, including but not limited to other water suppliers that share a common source, water management agencies, and other relevant public agencies to the extent practicable. MNWD also encouraged public involvement by holding a public hearing for residents to learn and ask questions about their water supply and all related aspects of the 2015 UWMP, as further discussed below.

MNWD notified all cities and the County within its service area at least 60 days prior to the public hearing. As shown in Table 10-1, MNWD sent a Letter of Notification to the County of Orange and all cities within the District's service area prior to April 16, 2016 to state that it was in the process of preparing an updated UWMP (Appendix 5). These agencies were also notified 30 days prior (by May 16, 2016) of the date, time, and location of the public hearing. Furthermore, prior to the hearing on and adoption of the UWMP, a copy of the UWMP was made available for public inspection. As discussed below, MNWD also ensured that notice of the time and place of the hearing was published within its service area in accordance with the requirements of Section 6066 of the Government Code.

Table 10-1: DWR Table 10-1 Retail: Notification to Cities and Counties

DWR Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
City of Laguna Niguel	☑	☑
City of Laguna Hills	☑	☑
City of San Juan Capistrano	☑	☑
City of Mission Viejo	☑	☑

City of Aliso Viejo	☑	☑
City of Dana Point	☑	☑
Orange County	☑	☑
NOTES:		

Section 10.3 Public Participation

MNWD encouraged the active involvement of diverse social, cultural, and economic constituents of the population and community within its service area prior to and during preparation of the 2015 UWMP. As discussed herein, that public interest and involvement in the UWMP was encouraged through various means, including public noticing of the availability of the draft document for review during normal business hours at the District headquarters. This notice, which included the time and location of the public hearing on the UWMP, a copy of which is included in Appendix 6, was published in the OC Register newspaper once a week for two consecutive weeks with at least five days between each notice.

The hearing was conducted June 16, 2016 at 6:00 p.m. during a regularly scheduled meeting of the MNWD Board of Directors at MNWD's Main Office in Laguna Niguel. Public hearing notifications were sent to cities in Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, MNWD worked closely with many other entities to develop and update this planning document, including but not limited to other water suppliers that share a common source, water management agencies, and other relevant public agencies to the extent practicable. MNWD also encouraged public involvement by holding a public hearing for residents to learn and ask questions about their water supply and all related aspects of the 2015 UWMP, as further discussed below.

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Table 10-1, the County of Orange, and other interested parties by April 16, 2016. Individual letters were also sent to cities within the District's service area and the Building Industry Association about the development of this UWMP and the public review hearing. A copy of the Notice of Public Hearing is included in Appendix 6. The hearing provided an opportunity for all residents, businesses, and other stakeholders in the District's service area to learn and ask questions about their water supply and the key elements of the District's 2015 UWMP such as baseline values, water use targets, and

implementation planning. Specifically, MNWD also ensured during the public hearing that (1) the community and interested stakeholders were provided an opportunity to provide input on the District's implementation plan for complying with SBX7-7, (2) the District considered the economic impacts of its implementation plan for complying with SBX7-7, and (3) the District confirmed the method it has adopted and continues to use for determining its SBX7-7 urban water use target. Copies of the draft plan were made available for public inspection at MNWD's office 30 days prior to the public hearing.

This UWMP was adopted by the Board of Directors on June 16, 2016. A copy of the adopted resolution is provided in Appendix 7. A staff report and presentation reviewed the information-gathering process, the data obtained and other resource planning agencies, and the conclusions that served as the basis of the Draft Plan. The President of the Board of Directors then opened the Public Hearing where all comments were recorded.

As required by California Water Code, the MNWD summarized Water Conservation Programs implemented to date, and compares the implementation to those as planned in its 2010 UWMP.

Members of the Board of Directors reviewed the Final Draft Plan on June 15, 2016 at the Finance and Information Technology Board meeting. The Committee recommended that the Board of Directors approve the 2015 UWMP at its June 16, 2016 meeting. The seven-member MNWD Board of Directors approved the 2015 UWMP at its June 16, 2016 meeting. See Appendix 7 for the resolution approving the Plan.

Section 10.4 Urban Water Management Plan Submittal

The District's Final 2015 UWMP and related data tables were provided electronically to DWR through the WUEdata online submittal tool that DWR developed. Copies of the 2015 UWMP will be submitted to the California State Library, MWDOC, City of Laguna Niguel, City of Aliso Viejo, City of Laguna Hills, City of Mission Viejo, City of Dana Point, City of San Juan Capistrano, County of Orange, and other entities in accordance with the UWMP Act. MNWD will make the Final 2015 UWMP available for public review at MNWD's offices during normal business hours no later than 30 days after filing the document with DWR.