MARINA COAST WATER DISTRICT

DRAFT

2015 URBAN WATER MANAGEMENT PLAN

Prepared by

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

May 2016

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Table i. Acronyms Used in this Report

Acronym	Description
afy, ac-ft/yr	Acre-feet/year
ccf, hcf	Hundred cubic feet
gpd	Gallons per day
gpcd	Gallons per capita day, or gallons per person per day
mgd	Million gallons per day
BMP	Best management practice
CASGEM	California Statewide Groundwater Elevation Monitoring
CAW, CalAm	California American Water Company
CDPH	California Department of Public Health
CPUC	California Public Utilities Commission
CSUMB	California State University – Monterey Bay
DMM	Demand management measure
DWR	California Department of Water Resources
FORA	Fort Ord Reuse Authority
GSA	Groundwater Sustainability Agency
LAFCO	Local Agency Formation Commission
MCWD, District	Marina Coast Water District
MCWRA	Monterey County Water Resources Agency
MPWMD	Monterey Peninsula Water Management District
MRWPCA	Monterey Regional Water Pollution Control Agency
OMC	Ord Military Community
POM	Presidio of Monterey
PWM GWR	Pure Water Monterey Groundwater Replenishment Project
SB	California Senate Bill
SGMA	Sustainable Groundwater Management Act
SRDP	Salinas River Diversion Project
SVWP	Salinas Valley Water Project
SVGB	Salinas Valley Groundwater Basin
UCMBEST	University of California Monterey Bay Education, Science and Technology Center
UWMP	Urban Water Management Plan

Table ii. Units of Measure Used in this Report

Unit	Equals
1 acre-foot	= 43,560 cubic feet = 325,851 gallons
1 cubic foot	= 7.48 gallons
1 CCF	= 100 cubic feet = 748 gallons
1 MGD	= 1,000,000 gallons/day = 1,120 acre-feet / year

Section 1 - Plan Preparation

1.1 Background

The California Water Code, Division 6, Part 2.6, Section 10610 et. seq. (California Urban Water Management Planning Act) requires any municipal water supplier serving over 3,000 connections or 3,000 acre-feet of water per year (afy) to prepare an urban water management plan.

In adopting the Urban Water Management Planning Act, the state declared as policy that:

a) The management of urban water demand and efficient use of water shall be actively pursued to protect both the people of the state and their water resources;

b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions;

c) Urban water suppliers shall be required to develop water management plans to actively pursue the efficient use of available supplies.

Through the Urban Water Management Planning Act, the state recognizes that water is a limited, though renewable, resource and that a long-term reliable supply of water is essential to protect the economy. It also recognizes that, while conservation and efficient use of water is a statewide concern, planning for this use is best done at the local level. Therefore each supplier is required to submit its plan to the State Department of Water Resources.

In preparing this 2015 Urban Water Management Plan (UWMP), the Marina Coast Water District (MCWD) reviewed its 2005 and 2010 UWMPs, schedule of water conservation best management practices actions and other supply development actions. Redevelopment of the former Fort Ord, greatly delayed by the economic downturn at the time the 2010 UWMP was published, is resuming at a brisk pace. The ongoing multi-year drought of record and associated conservation measures continue to impact supply and demand. These developments are reflected in the updated demand projection tables in this report.

1.2 Public Participation in Plan Development

MCWD has encouraged public participation in the development of this Urban Water Management Plan. Notice of plan development was placed on MCWD's website in May 2016. MCWD's Water Conservation Commission, a public advisory group which helps shape MCWD's conservation programs, was also notified.

On May 23, 2016 the draft UWMP was made available for public inspection at MCWD's offices and at local libraries. A public hearing was held for the plan on June 6, 2016 as noted in the Board resolution reproduced in Appendix A.

1.3 Agency Coordination

The Urban Water Management Planning Act modified under SB 1518, effective January 1, 2003, requires MCWD to notify affected land use jurisdictions of plan development and provide an opportunity to review the draft plan. Requests to participate in development of the plan, and copies of the draft plan were sent to each affected land use jurisdiction, the United States Army, which holds groundwater rights with MCWD's Ord Community Service Area, and the Monterey County Water Resources Agency (MCWRA). A notice of hearing for the draft UWMP was publicly published and sent to all public agencies MCWD serves including the cities of Marina, Monterey, Seaside, and Del Rey Oaks, the U.S. Army, the University of California Monterey Bay Educational, Science and Technology Center (UCMBEST), California State University – Monterey Bay (CSUMB), California State Parks Monterey District and Monterey County (see Table 1.1). Additionally, MCWD notified the Fort Ord Reuse Authority (FORA) the Monterey Regional Water Pollution Control Agency (MRWPCA) and the Monterey Peninsula Water Management District (MPWMD) of the plan's development and availability. Copies of these notices are in Appendix D.

MCWD will provide each of the public agencies listed above and the California State Library with a copy of the final plan. A final copy of the plan and appendices will be posted on the MCWD website: www.mcwd.org.

Table 1.1 Coordination with Appropriate Agencies

Coordinating Agencies	Was sent the initial projections	Provided feedback on initial projections	Was sent a notice of intention to adopt	Was sent a copy of the draft plan	Commented on the draft plan	Attended public hearing	Not involved/ No information
U.S. Army	X		X	X			
City of Marina	X		X	X			
City of Seaside	X		X	X			
City of Del Rey Oaks	X		X	X			
City of Monterey	X	X	X	X			
County of Monterey (RDH)	X		X	X			
CSUMB	X		X	X			
UCMBEST	X	X	X	X			
State Parks	X		X	X			
FORA	X	X	X	X			
CalAm			X	X			
MCWRA			X	X			
MRWPCA			X	X			
MPWMD			X	X			
General Public							

1.4 Plan Adoption

The 2015 Urban Water Management Plan was adopted by the Marina Coast Water District Board of Directors on _____, 2016. A copy of the resolution approving the plan is included in Appendix A.

1.5 Plan Implementation

The District has adopted policies and procedures that facilitate implementation of the plan, with many of the actions already in progress:

- The District Code of Ordinances includes mandatory prohibitions on water waste, water shortage contingency actions, and enforcement provisions.
- MCWD prepares Water Supply Assessments and Written Verifications of Supply for proposed projects and provides them to the land use jurisdiction.
- MCWD reviews project plans compared to water allocations made by the land use jurisdictions. If a development's proposed connections exceed the allocated supply, MCWD contacts the affected jurisdiction to resolve the discrepancy before allowing the connections in question.
- MCWD monitors new developments to ensure the average water demand does not exceed the water allocation made by the land use jurisdiction, and works with project owners and the affected jurisdiction when water uses habitually exceeds the allocation.
- New water supply projects as reflected in this plan are in the approved Capital Improvements Program. MCWD has entered into formal agreements with Monterey Regional Water Pollution Control Agency to implement the Pure Water Monterey Groundwater Replenishment Project (urban recycled water), as discussed in Section 4.
- MCWD has a full-time water conservation staff that provides customer assistance and manages the rebate programs discussed in Section 6.
- MCWD will be required to implement the Sustainable Groundwater Management Act discussed in Section 4.

Section 2 - System Description

2.1 District Location, History and Operations

The Marina Coast Water District is located on the coast of the Monterey Bay at the northwest end of the Salinas Valley (Figure 2.1). The District was formed in 1960 to provide potable water service to all residential, commercial, industrial, environmental, and fire protection uses in the unincorporated community of Marina. The original boundary was coincident with the Marina Fire District. In 1970, MCWD constructed a wastewater treatment plant and installed a wastewater collection system to serve the community. The City of Marina incorporated in 1975, but MCWD remained separate. In 1991, MCWD constructed a pilot recycled water system, providing tertiary treated wastewater for irrigation of public streetscapes and parks near the wastewater plant. This system operated only until 1992, when the wastewater collection system was connected to the regional wastewater system operated by the Monterey Regional Water Pollution Control Agency. The Marina wastewater treatment plant was retired, and MCWD now provides wastewater collection services only, with treatment performed at the regional plant. In 1996, MCWD constructed a seawater desalination facility to explore the feasibility of extracting seawater through shallow wells along the beach.

2.1.1 Central Marina Service Area

MCWD's current jurisdictional boundary[1] and Central Marina service area encompasses 3.2 square miles, and its sphere of influence encompasses an addition 2.4 square miles (see Figure 2.2). In 1996, MCWD entered the Annexation Agreement and Groundwater Mitigation Framework for Marina Area Lands among MCWD, Monterey County Water Resources Agency (MCWRA), J.G. Armstrong family and RMC Lonestar (now CEMEX), to annex into Monterey County Zones of Benefit 2 and 2A. Under that agreement, MCWD may pump up to 3,020 AFY of Salinas Valley Groundwater for delivery to the Central Marina service area.

The agreement recognized the Armstrong property's right to use the groundwater underlying the property for irrigation but limited the property to 20 afy of potable water. The Armstrong property could withdraw an additional 150 afy of potable water when the property was annexed to Zones 2/2A and an additional 150 afy every two years thereafter, up to a total of 920 afy for potable purposes. Armstrong would be required to pay annexation fees to MCWRA in order to annex to Zones 2/2A. The Armstrong Ranch annexation to Zones 2/2A will be effective when LAFCO approves concurrent annexation to MCWD and the City of Marina.

The agreement limited the CEMEX property to its historic pumping rate of 500 afy of non-potable water. The CEMEX property could be annexed to MCWD upon payment of annexation fees to MCWRA. If CEMEX wanted to receive potable water, then CEMEX would be required

[1] Boundaries per the Local Area Formation Commission (LAFCO) of Monterey County

to pay an additional annexation fee to MCWRA. The CEMEX annexation to Zones 2/2A will take effect when the CEMEX property is annexed to MCWD.

If and when these properties are annexed into MCWD, the District would have the right to pump and deliver those quantities of water to customers within those areas.

2.1.2 Ord Community Service Area

The District also provides potable water delivery and wastewater conveyance services within the boundaries of the former Fort Ord Army Base, known as the Ord Community. The Ord Community lies to the southeast of the City of Marina and the District's Central Marina service area (see Figure 2.2). The Ord Community encompasses a 44 square mile area, of which about 20 square miles is designated for redevelopment, with the balance being parks and open space.

In 1991 the former Army base was downsized and realigned pursuant to the Defense Base Closure and Realignment Act of 1990, with closure in 1994. Portions of the base were retained for use by the U.S. Army under the control of the Presidio of Monterey (Presidio Annex), with the balance being converted to civilian use under the guidance of the Fort Ord Reuse Authority (FORA), a public agency created for this purpose by the State of California. FORA's membership includes the land use jurisdictions encompassed by the former Fort Ord lands and others on the Monterey Peninsula. FORA is governed by a 13-member board with representatives from the following jurisdictions:

- City of Carmel
- City of Del Rey Oaks
- City of Marina
- City of Monterey
- City of Pacific Grove
- City of Salinas
- City of Sand City
- City of Seaside
- County of Monterey

The Base Reuse Plan also included provisions for three institutions of higher learning:

- California State University, Monterey Bay (CSUMB)
- University of California, Monterey Bay Environmental Science and Technology Center (UCMBEST)
- Monterey Peninsula College

MCWD is an ex officio member of FORA.

FORA has the statutory authority to provide for public capital facilities, including but not limited to, water and wastewater facilities and capacity allocations on the former Fort Ord in support of the Base Reuse Plan. However, FORA has a limited statutory life and needed a reliable, long-term entity to provide public services to the area.[2] In May 1997, the FORA Board approved the preparation of a Public Benefit Conveyance (PBC) application to the federal government for transfer of the water distribution and wastewater collection systems to MCWD. In June 1997, the U.S. Army and MCWD signed a caretaker agreement authorizing MCWD to operate the water and wastewater collection systems. In February 1998, MCWD and FORA executed an agreement for water and wastewater facilities, providing for the ownership and operation of water and wastewater facilities acquired from the federal government for the benefit of the Ord Community service area. Title for these systems was transferred from the U.S. Army through FORA to MCWD in 2001, and the systems were subsequently interconnected. In 2007, MCWD combined the water system permits for the Central Marina and Ord Community service areas into a single California Department of Public Health permit, No. 2710017.

Under the 1993 Agreement between the United States of America and the Monterey County Water Resources Agency concerning Annexation of Fort Ord into Zones 2 and 2A of the Monterey County Water Resources Agency, MCWRA allocated 6,600 afy of potable groundwater to the Army for use on Fort Ord. This amount is about equal to the peak historic water use on Fort Ord. Of this, MCWRA requires that not more than 5,200 afy may be pumped from the 180-Foot and 400-Foot aquifers, to reduce the risk of seawater intrusion. When the U.S. Army conveyed the water and wastewater rights and infrastructure on the former Fort Ord through FORA to MCWD, the Army retained a portion of the groundwater pumping rights and wastewater treatment capacity for the Presidio of Monterey Annex (also called the Ord Military Community). The U.S. Army contracted directly with MCWD to provide municipal water supply and wastewater collection services within the Ord Military Community[3].

The Marina Coast Water District Board does not allocate water supply to projects, but instead advises customer land use jurisdictions as to the current and historic water use within their boundaries and the estimated remaining supply available for new developments. Within the Ord Community, the FORA Board has managed the allocation of Salinas Valley groundwater

[2] Pursuant to Government Code 67700, FORA will sunset on June 30, 2020. The water and wastewater facilities and rights were deeded from FORA to MCWD in 2001, so no change in ownership of those facilities and rights will occur when FORA sunsets.

[3] Potable Water Utility Service for the Presidio of Monterey Annex, Contract DABT67-98-C-1001, dated 5/12/00, and Wastewater Collection Utility Service for the Presidio of Monterey Annex, Contract DABT67-98-C-1002, dated 5/12/00.

supplies among the seven land use jurisdictions, and they, in turn, sub-allocate water supply to specific projects. Water allocations are discussed in a technical memorandum in Appendix F.

Service to the Ord Community outside the Presidio of Monterey Annex is provided under the 1998 agreement with FORA. In 2006, the Local Agency Formation Commission (LAFCO) of Monterey County published the Municipal Services Review of the Monterey Peninsula Area, and stated that MCWD may pursue annexation of the Ord Community. At some indeterminate date, MCWD may consider applying to LAFCO formal annexation of all or portions of the former Fort Ord into the District. No formal decision has yet been made by the MCWD Board.

Figure 2.1 MCWD Vicinity Map

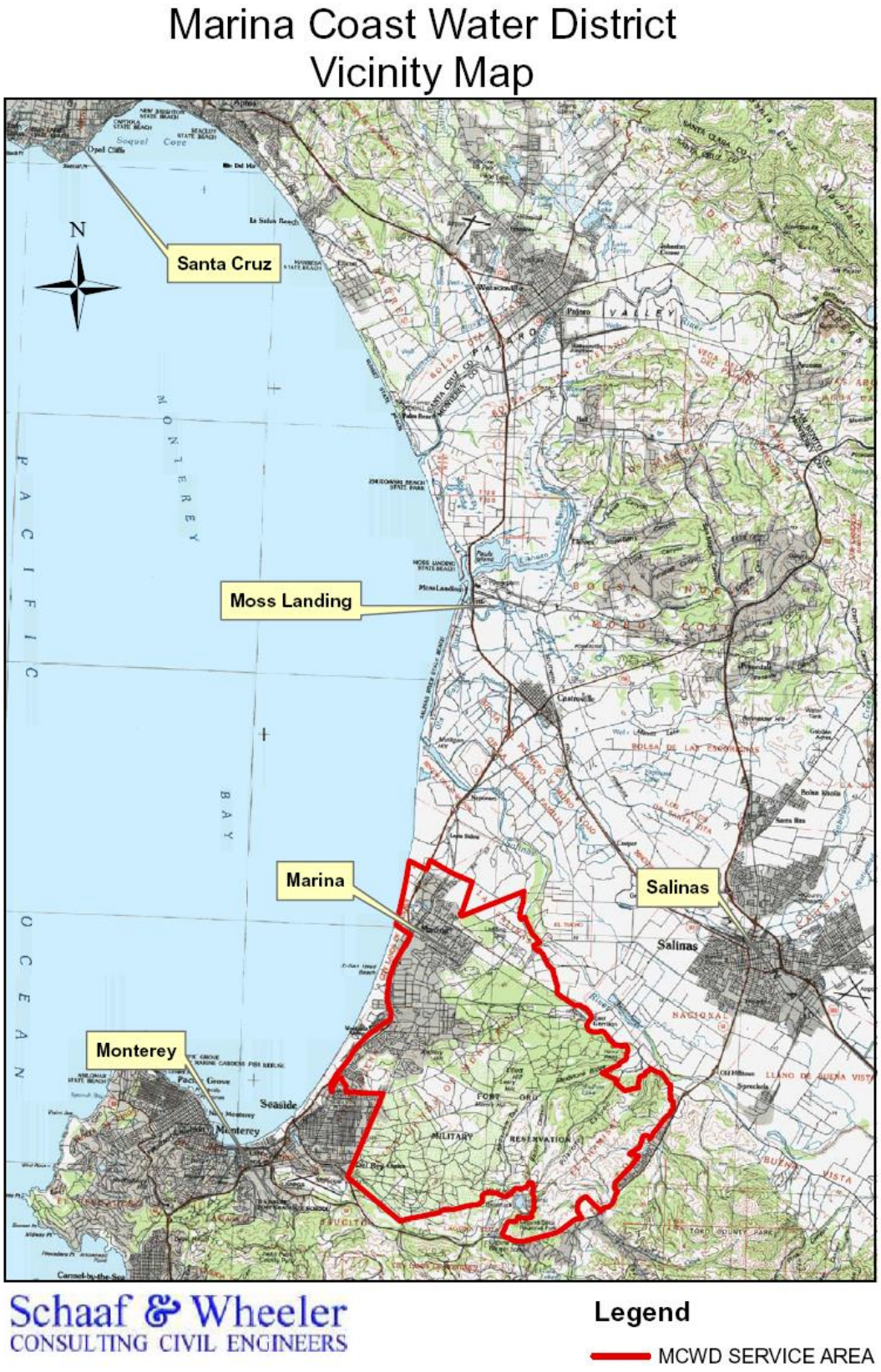
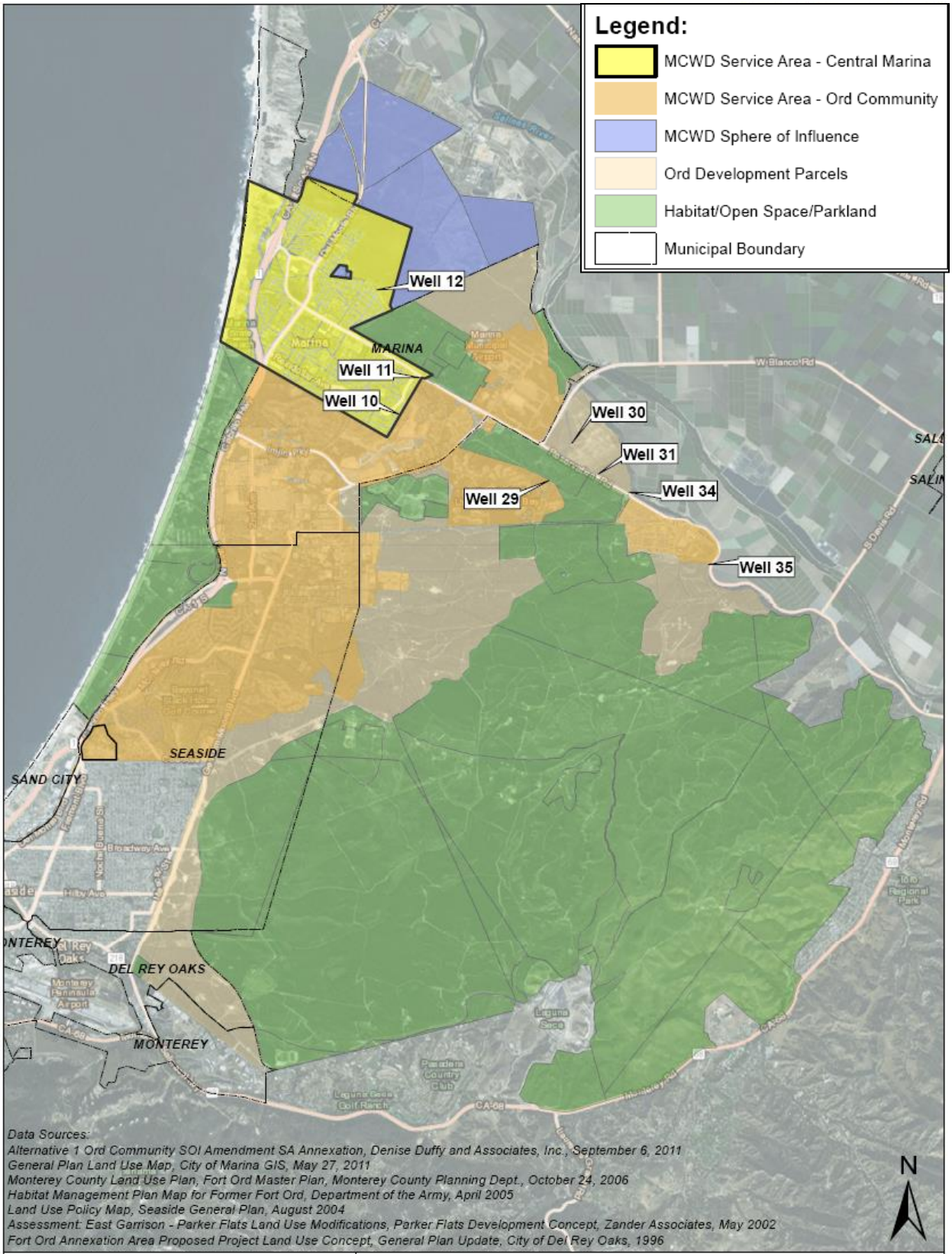


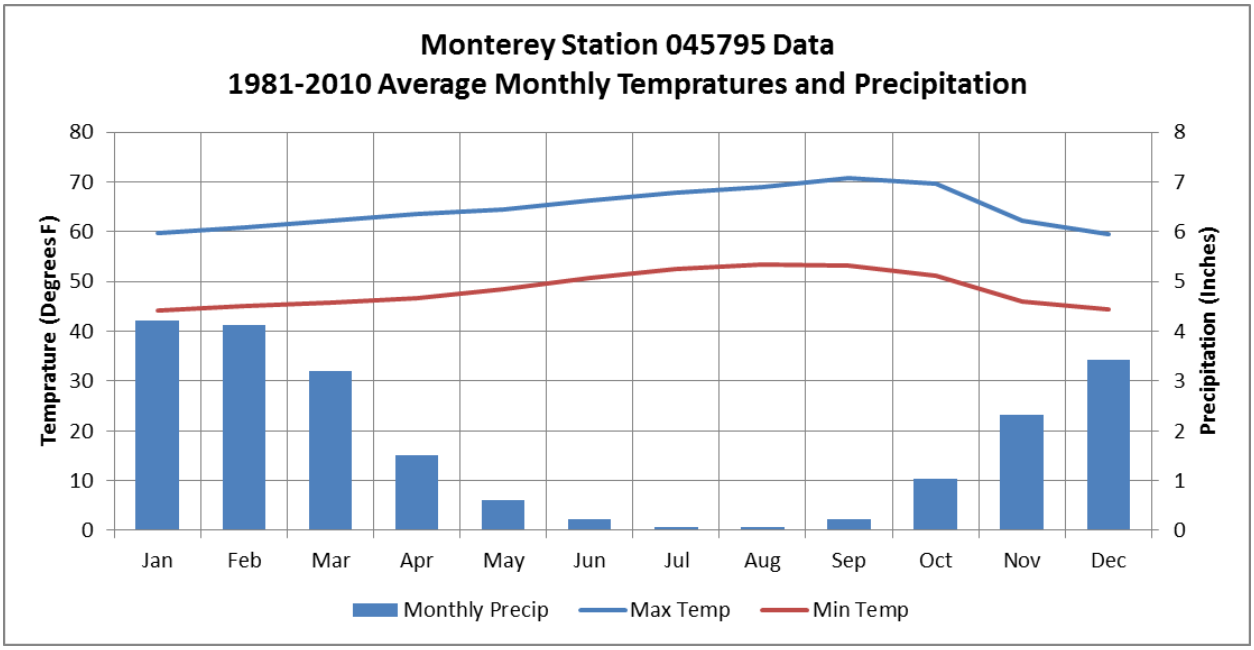
Figure 2.2 MCWD Service Areas



2.2 Climate

Marina has a cool summer-type Mediterranean climate with precipitation falling exclusively as rain, predominantly between October and May. The nearest official weather station is seven miles away in Monterey, California. Average climate data from this station from 1981-2010 is depicted in Figure 2.3.

Figure 2.3 Local Climate Averages



The moderating effect of the Pacific Ocean and its relatively cold water allows for mild summertime temperatures in Marina. This effect suppresses summertime irrigation demands for landscaping as compared to inland locations, especially when advection fog moves in from the Pacific Ocean, enveloping the immediate coast in response to heating inland. Unlike inland locations, summertime temperatures generally peak in September rather than July.

Peak summertime temperatures usually occur when high pressure is resident in the Great Basin (Santa Ana conditions), allowing for an offshore flow and compressional heating of the atmosphere.

Precipitation averages about 20 inches annually. Table 2.1 depicts monthly average evapotranspiration (ETo) at the nearest California Irrigation Management Information System (CIMIS) stations. Note that the ETo rate increases the more distant from the coast.

Table 2.1 Local Evapotranspiration Rates (inches)

City	CIMIS Station ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
Castroville	19	1.6	2.0	3.1	4.2	4.8	4.8	4.1	3.6	3.2	2.7	1.8	1.5	37.2
Salinas North	116	1.6	1.9	3.1	4.1	4.7	4.9	4.5	4.2	3.5	2.8	1.8	1.5	38.6
Pacific Grove	193	1.6	2.0	3.1	4.2	4.8	4.8	4.1	3.6	3.2	2.7	1.8	1.5	37.2
Laguna Seca	229	1.6	2.0	3.1	4.2	4.8	4.8	4.1	3.6	3.2	2.7	1.8	1.5	37.2

2.2.1 Current Statewide Drought

Since 2013, the state has been experiencing below-average rainfall, with 2013 being the driest year on record. Governor Brown declared a drought state of emergency in January 2014, and the State Water Resources Control Board (SWRCB) implemented a series of emergency regulations mandating water conservation measures and urban water use reporting. The District called for voluntary water conservation in January 2014, and implemented Stage 3 mandatory water use restrictions in November 2014. The Stage 3 restrictions included mandatory reductions in landscape watering, which significantly reduced water use. MCWD was assigned a water conservation goal of 12% compared to year 2013 water use (4,431 AF). The District achieved significant savings, reducing demand by 10% in 2014 (4,026 AF) and 27% in 2015 (3,228 AF).

2.3 Population

MCWD historically served only the City of Marina, which incorporated in 1975. In 1997, the District began providing service to the Ord Community under agreement with FORA. Table 2.2 depicts MCWD's growth from 1960 to 2010. Between 1920 and 1970, population increases for Marina were quite steady. From 1970 to 1980 the population nearly tripled. Growth rates moderated in the 1980s, with the population reaching a near-term peak in 1990. With the closure of Fort Ord as a military base in 1994, the City and MCWD experienced a decline in population (the on-base population was estimated at 31,000 in 1990). A longer discussion of historic population can be found in Appendix E.

Table 2.2 Historic Population

Service Area	1960	1970	1980	1990	2000	2010
City of Marina*	3,310	8,343	20,647	26,436	18,927	19,718
Ord Community**					14,886	10,762
Total	3,310	8,343	20,647	26,436	33,813	30,480

Source: U.S. Census Bureau
*City of Marina totals include the portion of the city within the Ord Community
**Ord Community totals excludes the City of Marina portion. Ord population shown only for period served by MCWD.

With redevelopment of the Fort Ord lands, population growth is expected to return, with population projections shown in Table 2.3. These projections include redevelopment of the Ord Community, including portions of the cities of Seaside, Del Rey Oaks, and Monterey, campuses for the University of California and California State University, and lands remaining under the jurisdiction of the County of Monterey within the boundaries of the former Fort Ord.

Table 2.3 Projected Population

Service Area	2010*	2015	2020	2025	2030	2035
Central Marina	13,646	17,703	18,770	24,504	25,620	26,736
Ord Community	16,834	14,672	21,694	32,144	39,015	43,425
Total	30,480	32,375	40,464	56,648	64,635	70,161

* 2010 population aggregated by service area.

The above projections are based upon the existing population plus the anticipated occupancy of new residential development, as projected in Section 3. A more detailed discussion of the methodology can be found in Appendices C and E. The projected totals for 2035 are approximately equal to the 2030 projection in the 2010 Urban Water Management Plan (about 70,000 persons). The projection in the 2010 UWMP assumed that a recent housing project in the Ord Military Community would provide additional homes, but instead the housing authority moved personnel from older housing stock into the new units as part of a phased upgrade plan. Additionally, some of the projected redevelopment has been deferred beyond the 20-year planning horizon of this report due to the economic recession from December 2007 to June 2009.

2.4 Demographic Factors

Three industries have historically driven the local economy: agriculture in the Salinas Valley, tourism along the Pacific Coast and the Monterey Peninsula, and the military with bases at Fort Ord, the Presidio of Monterey and the Naval Postgraduate School. The closure of Fort Ord in 1994 greatly reduced the military contribution, but that has been replaced by higher education on the former Fort Ord. California State University – Monterey Bay is the largest campus within the Ord Community, which also contains the smaller campuses of Monterey College of Law and Monterey Peninsula College. The University of California Monterey Bay Education, Science and Technology Center is located at the Marina Municpal Airport.

Tourism and recreation are significant portions of MCWD's current and future customer base. Central Marina currently has hotels and visitor-serving commercial sectors, as well as Marina State Beach. The Ord Community has Fort Ord Dunes State Park and approximately 24 square miles of open space managed by the Bureau of Land Management. BLM's regional office is now located in Marina. The existing Bayonet and Blackhorse Golf Courses are being developed by the City of Seaside into a resort community. The City of Del Rey Oaks plans to add a golf resort to their portion of the Ord Community.

Within the District's service area there is a high percentage of residential use (95% of customer accounts, 85% of total water sales). This high percentage results in a low per capita water demand. Residents have historically worked on the former Fort Ord, as well in the nearby urban centers of Monterey, Salinas and the more distant San Jose/Silicon Valley; or in the agricultural industry of rural Monterey County. Employment on the former Fort Ord has not yet recovered to pre-closure levels.

As Central Marina and the Ord Community are redeveloped, a mix of commercial, office and light industrial uses are proposed, which will increase the average per capita water demand rate. Industries with high water-use are anticipated to be constrained due to the limited water supply available to the jurisdictions.

Section 3 - Water Demands

3.1 Current Water Use

Marina Coast Water District has two separate service areas: Central Marina, which encompasses the portion of the City of Marina outside the former Fort Ord, and the Ord Community. All water service connections in the Central Marina area are metered. Fort Ord did not have individual service meters while it was an active military base, and portions of the housing areas within the Ord Community remain without meters. Water meters continue to be installed in areas of the Ord Community in phases by the various property owners. Water use by customer type for calendar year 2010 is shown in Table 3.1, and year 2015 is shown in Table 3.2. The water use in the Ord Community without meters was estimated at 0.33 acre-feet/year per residential connection in 2010, and reduced to 0.28 acre-feet/year per residential connection in 2015.

Table 3.1 Water Deliveries in 2010

	Central Marina		Ord Community		Ord Non-metered		Total
Water use sectors	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**Ac-Ft**
Single family	3,305	829.8	1,011	200.8	601	210.0	1,240.6
Multi-family	251	505.0	1,385	592.4	600	200.0	1,297.4
Commercial	234	232.5	70	95.4			327.9
Industrial	0	0.0	3	6.7			6.7
Institutional/governmental	25	67.9	136	214.6			282.6
Landscape	72	107.9	105	705.6			813.5
Agriculture	0	NA	0	NA			0.0
Other	0	NA	0	NA			0.0
Total	3,887	1,743.2	2,710	1,815.5	1,201.0	410.0	3,968.7

Table 3.2 Water Deliveries in 2015

	Central Marina		Ord Community		Ord Non-metered		Total
Water Use Sectors	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**Ac-Ft**
Single family	3280	741.0	1334	227.1			968.1
Multi-family	261	399.2	1636	505.6	735	205.8	1110.6
Commercial	232	231.7	75	95.3			327.0
Industrial	0	0.0	2	0.2			0.2
Institutional/governmental	25	41.7	136	114.2			155.9
Landscape	18	242.9	139	389.3			632.3
Agriculture	0	NA	0	NA			0
Other	0	NA	0	NA			0
Total	3816	1656.6	3322	1331.7	735	205.8	3,194.1

MCWD began providing water for irrigation of Bayonet/Blackhorse Golf Courses in Seaside in 2010. Prior to this, the City of Seaside provided irrigation supply from wells within the Seaside Groundwater Basin, which was the source of supply for this demand at the time the former Fort Ord closed. In 2015, the City transitioned back to using Seaside Groundwater Basin wells for the golf courses, which is reflected in the reduced usage for landscape irrigation.

3.2 Projected Water Demands

3.2.1 Central Marina Service Area Demands

In October 2000, the City of Marina adopted a comprehensive General Plan laying out future land use over a 20-year planning horizon to the year 2020. The General Plan was amended in 2005 and 2006, and the housing element was updated in 2009. In the adopted General Plan the City's population (anticipated to expand into current spheres of influence) is projected to be 38,800 by 2020[4]. This includes increases in both Central Marina and the City's portion of the Ord Community. The economic recession from December 2007 to June 2009 delayed much of this redevelopment by five to ten years. The Marina General Plan estimates water consumption for the City will average 7,720 afy based upon the projected land uses and population. It also includes portions of the Ord Community that are either within the City limits or within its adopted and proposed spheres of influence. These areas include portions of the UCMBEST Center and CSUMB, which have specific allocations of water under the FORA Reuse Plan.

Even with the resumption of development in recent years, the City's average per-capita water demand is low, and has been trending downward for the last ten years due to aggressive water conservation programs. Per capita demands will continue to be affected by conservation efforts, future land use changes as well as increases in density of housing use (persons/unit). Marina has had a historically low job-to-housing balance ratio due, in part, to the fact that the City has been a bedroom community to the former Fort Ord, Monterey and San Jose areas. The General Plan will allow for greater balance in jobs-to-housing. This trend will tend to increase the average per capita water consumption, as more commercial and industrial activity will occur relative to population. If housing density increases, this would have an opposite influence, suppressing per capita demand.

In the 2005 UWMP, the City of Marina forecasted planned development through 2025. These plans within the City of Marina include 276 single-family homes, 1,050 hotel rooms and 102,000 square feet of retail uses. In 2010, the City drafted a Downtown Vitalization Specific Plan, for which a water supply assessment was also drafted. Under this plan, the City projects the addition of 380,000 square-feet of commercial space and 2,400 new multi-family dwelling units, targeting a pedestrian friendly downtown. Although it has not yet been formally adopted, the draft specific plan was reflected in the 2010 UWMP and in this update.

There are two significant undeveloped areas north of Central Marina: Armstrong Ranch and the CEMEX (formerly RMC Lonestar) Property. MCWD currently serves minor domestic uses on the Armstrong Ranch, and in the future, MCWD will serve municipal and industrial demands as they may occur on these properties. Current agricultural demands are met via private wells.

[4] This population includes an estimated 3,400 residents of the existing Fredericks-Schoonover Park, a housing area in Marina's sphere of influence.

Marina's General Plan accounts for growth within portions of the Armstrong Ranch, which was annexed into the City in 2007. The Marina Station Development Project on the Armstrong Ranch comprises 1,464 residential units and about 856,000 square feet of retail, office and light industrial space. Development density will be constrained by the available water supply as provided under the 1996 Annexation Agreement and Groundwater Mitigation Framework for Marina Area Lands, annexing the Armstrong Ranch lands to the MCWRA Zones 2 and 2A. According to that agreement, the Salinas Basin groundwater allocation for the Armstrong Ranch is 920 afy. This is further discussed in Section 4.

Similarly, the CEMEX Property, for which there are no near-term development plans, has a groundwater allocation under the annexation agreement of 500 afy, corresponding to current estimated use on the property. If CEMEX were to be developed for visitor-serving or recreation uses, it could only occur after the year 2020 pursuant to the Urban Growth Boundary Initiative. Planned development in these areas is included in the subtotals discussed in Section 3.2.4.

3.2.2 Ord Community Service Area Demands

The Fort Ord Reuse Authority developed the Draft Fort Ord Reuse Plan in 1996, and released the associated Draft Environmental Impact Report (DEIR). This plan and DEIR assessed the impacts of planned reuse on the environment, including demand for utility services. The DEIR noted that at full build out, some 40 to 60 years in the future, water demands for Ord Community lands would be 18,262 afy, or 11,662 afy in excess of current potable water supply now available to the lands under groundwater allocations from the Salinas Valley groundwater basin. Recognizing that plans did not exist to accommodate this excess demand, it was concluded in the DEIR that the Reuse Plan had a significant unavoidable environmental impact. It was also stated that the 7,000 acre-foot water use on the former Fort Ord lands (6,600 Salinas Basin, 400 Seaside Basin) provided sufficient supplies to allow for expected redevelopment through 2015.

In adopting a Final EIR, Reuse Plan and Master Resolution governing redevelopment of former Fort Ord lands to civilian uses, FORA agreed to constrain redevelopment on former Fort Ord lands by limiting the number of new residential housing units to 6,000 until the Reuse Plan is reassessed, and additional water supplies identified. FORA further recognized that the supply of Salinas Basin groundwater available to serve redevelopment, or reuse, projects is limited by a 1993 agreement with the MCWRA. Under that 1993 Agreement, 6,600 afy of Salinas Basin groundwater is available for use on Ord Community lands. Since the closure of Fort Ord, that total quantity of water has been allocated between FORA and the U.S. Army, with FORA sub-allocating its share of this Salinas Basin groundwater supply to its member land-use jurisdictions to support redevelopment projects within the Ord Community. FORA manages its groundwater allocation and sub-allocations through a Development and Resource Management Plan that annually tracks water use.

One of the mitigation measures in the Final EIR, Reuse Plan and Master is the development of 2,400 afy of additional water supply for the Ord Community, which will allow development beyond the initial 6,000 dwelling units. FORA is working with MCWD to develop this supply under the Regional Urban Water Augmentation Project, which is discussed in Section 4.4.1.

In 2015, as part of this UWMP update, MCWD surveyed land use jurisdictions responsible for development decisions within the Ord Community Service area for their development plans through the year 2035. Where used in this plan, individual responses from the Cities of Marina, Seaside, Del Rey Oaks and Monterey, the County of Monterey, CSUMB, UCMBEST, and the U.S. Army are detailed in Appendix C. These responses were correlated with the City of Marina General Plan Housing Element, City of Seaside General Plan Housing Element, the City of Seaside's Implementation Plan, 2007-2012, Seaside-Fort Ord Redevelopment Project Area, and the Monterey County General Plan.

3.2.3 Demand Projection Methodology

The primary method for developing future water demands in this Plan is through consolidating information from approved Specific Plans and the associated Water Supply Assessments, when available. Water supply assessments have been prepared per the requirements of SB 610 for the developments listed in Table 3.3. These documents contain detailed estimates of water demand for residential, commercial and irrigation use type, and are used as the basis of water supply allocation by the land use jurisdiction to the projects.

Table 3.3 Water Supply Assessments Used to Update the UWMP

Development	Jurisdiction	Year Prepared
Cypress Knolls	Marina	2006
Dunes on Monterey Bay (University Villages)	Marina	2007
Marina Heights	Marina	2003
Marina Station	Marina	2006
Resort at Del Rey Oaks	Del Rey Oaks	2007
Seaside Main Gate	Seaside	2007
East Garrison	Monterey County	2004
Monterey Downs	Seaside/County	2012

Within the last five years, only one water supply assessment was completed. The Monterey Downs Project includes a residential development, the Monterey Horse Park and the California Central Coast Veterans Cemetery. The project is located in both the City of Seaside and unincorporated Monterey County, and would be annexed into the City of Seaside. In the 2010 UWMP, the Horse Park portion of the project was included in the Monterey County growth project, but has been moved under the City of Seaside for this update. Also in the last five years, the Whispering Oaks Business Park Specific Plan was adopted by Monterey County in 2011, but later rescinded in 2012. That project was included in the 2010 UWMP, but has been removed from this update.

Where water supply assessments do not exist, land-use development forecasts were used. California State University Monterey Bay and the U.S. Army – Ord Military Community projections are from their approved master plans. The projections provided by the other land use jurisdictions for areas outside specific plan areas reflect planning estimates based on the approved General Plans. The anticipated additional land uses in various categories were tabulated by year, and demands were calculated by applying water use factors for those uses. These factors (see Table 3.4) are general in nature and ultimate actual use can vary significantly, especially among the broad categories of commercial and industrial uses.

Table 3.4 Water Demand Factors Applied in the UWMP

Land Use	Units	Multiplier
SF Residential (< 5 units / acre)	dwelling unit	0.5
SF Residential (5-8 units / acre)	dwelling unit	0.33
Residential (8-15 units / acre)	dwelling unit	0.25
Multifamily (> 15 units / acre)	dwelling unit	0.25
Hotel, Motel and Timeshares	unit	0.17
Retail	square-feet	0.00021
Restaurant*	square-feet	0.00145
Office / R&D	square-feet	0.000135
Other Commercial	square-feet	0.0003
Light Industrial	square-feet	0.00015
Governmental	square-feet	0.0003
Institutional	square-feet	0.0003
Schools (K-12)*	square-feet	0.0003
Higher Education*	square-feet	0.0003
Landscape (non-turf)	acre	2.1
Landscape (turf)	acre	2.5

* typical per seat factor converted to square-feet

Some of the above usage factors were compared to actual usage for year 2015:

- Hotel/motel: 0.11 AFY/room (interior demand)
- Multifamily Residential (Apartments): 0.12 AFY/DU (interior only)
- Multifamily Residential (Duplex/Fourplex): 0.24 AFY/DU

Note that mandatory drought restrictions were in place that year, and overall water use was 25% below average. Detailed customer data from 2012 was not available to evaluate usage in an average weather year. The differences are significant enough to merit reevaluating the hotel/motel and apartment demand factors using data from a non-drought year. Single-family housing areas were also evaluated, but due to the mix of housing types and landscapes within a

given subdivision (the smallest level of aggregated data), typical usage factors could not be determined.

On-campus uses specific to CSUMB were evaluated as well, using ten years of meter data compiled by the campus facilities staff. The following demand factors are recommended for use in evaluating the next campus master plan update, which is currently being drafted:

- Dormitory: 0.031 AFY/bed
- Academic Building: 0.00002 AFY/sq-ft
- Dining Hall: 0.00016 AFY/sq-ft
- Gymnasium: 0.00005 AFY/sq-ft

MCWD modified its District Code in August 2005 to require additional conservation measures in the construction of new development and remodeling. These new requirements include incorporation of hot water recirculation systems and high efficiency clothes washers for residential units, and zero-use urinals for non-residential construction. These residential requirements are expected to achieve the State water conservation goal of an average indoor per capita consumption rate of 55 gallons per person per day.

It has been observed that during the development process and in the preparation of water supply assessments and written verifications of supply, more sophisticated forecasts are made by disaggregating indoor and outdoor uses when the proposed land use data is sufficient to support such analyses. These assessments generally result in lower projected water demands than the general methods used in this Plan. In a long-term forecast such as provided here, the precise types of uses and plot plans that will be constructed and maintained over the long term cannot be precisely known. As development proceeds, market forces will dictate the specific land uses within non-residential zones and refined plans for residential uses will allow for more detailed consumption projections. The Urban Water Management Planning Act recognizes this fundamental nature of demand forecasting in requiring updated Urban Water Management Plans every five years. In the case of MCWD, where development in the next twenty years is expected to dramatically change the nature of the community and more than double its population and water demands, these periodic updates will be critical to MCWD's ability to plan for future demands as they are identified.

3.2.4 Summary of Demand Projections

The projected 20-year water demands in this Urban Water Management Plan are roughly equal to the 20-year projection in the 2010 UWMP (both approximately 12,200 acre-feet/year). This lack of increase is due to a number of factors.

First and foremost, the economic downturn that began in 2007 severely slowed the pace of redevelopment in the Ord Community. Five residential developments were under construction in 2007: East Garrison in Monterey County, Dunes on Monterey Bay and Marina Heights in Marina, Seaside Resort in Seaside and Doe Park (formerly Stilwell) Housing in the Ord Military

Community. Of these, only Doe Park was completed. Two affordable housing (apartment) projects within East Garrison and the Dunes on Monterey Bay were completed in 2014. East Garrison resumed construction in 2013, and has completed 70 market-rate units. The Dunes on Monterey Bay did not add market rate units until 2015. The other developments are not expected to resume construction until 2016 at the earliest. Similarly, most of the other development within the Ord Community has been delayed. Full reuse of the former Fort Ord may not occur until 2035 or later, versus the previous prediction of full reuse before 2020. Deferred projects include the golf resort near the Marina Airport, the Seaside east housing developments, and 2 million square-feet of projected office/research and development space within UCMBEST.

The second factor responsible for the lower water demand projection is the erroneous assumption in the 2010 UWMP that the Doe Park development would provide additional dwelling units within the Ord Community. As stated earlier in this report, that project provided replacement housing units for the Ord Military Community, and residents were moved from older housing stock into the new development.

The third factor contributing to reduced water demand is that housing within CSUMB and portions of the Ord Military Community are now metered, and data shows that actual water use declines with the installation of meters and transition to commodity-rate billing. The 2010 UWMP assumed that unmetered units used 0.33 AFY/dwelling unit. In this update, that factor has been revised down to 0.28 AFY/dwelling unit. The District is working with the Ord Military Community to install meters on the remaining occupied units. Additionally, several housing areas including Preston Park, CSUMB East Campus Housing and the older portions of the Ord Military Community have undergone water conservation retrofits within the last five years, replacing toilets with high-efficiency 1.28 gallon/flush units, shower heads with 2.0 gpm heads, and faucets with 1.5 gpm aerators.

Table 3.5 depicts the total expected growth in demands from all currently expected development and population growth through 2035. Due to the current drought restrictions, demand values reflect the actual year 2012 demands (typical year for rainfall) plus the actual/projected development within each jurisdiction. Included for comparison are the existing allocations of groundwater supply by jurisdiction, which are explained in Section 4.

It should be noted that in 2010, the District began providing Salinas Valley groundwater for golf course and landscape irrigation at Seaside Resort (Bayonet and Blackhorse Golf Courses). This demand had been previously met with Seaside basin groundwater, from existing wells owned by the City of Seaside. In 2015, the City resumed operation of their Seaside Groundwater Basin wells. As discussed in Section 4, the District plans to supply recycled water for urban landscape irrigation in the near future. This early conversion to MCWD supply from the City's allocation

of Salinas Valley groundwater allowed the City of Seaside to reduce their pumping from the Seaside Groundwater Basin, as part of the Seaside Basin Watermaster's management plan.

As discussed in Section 2.1.2, the 6,600 AFY of existing groundwater pumping rights for the Ord Community have been allocated among the land use jurisdictions. Table 3.5 shows that the current groundwater allocation for Central Marina is sufficient to meet projected demands through 2035. The City of Marina's Downtown Vitalization Specific Plan is projected for build-out by the year 2045, and will require the development of additional water supply for that service area by 2040. The Ord Community is projected to exceed its current Salinas Valley groundwater allocation by the year 2025. This is discussed in detail in Section 4, Water Supply.

Table 3.5 Water Demand by Jurisdiction (afy)

	Jurisdiction	2012*	2015	2020	2025	2030	2035	Notes	Allocation
Ord	U.S. Army	620	633	663	825	825	825		1,577
	CSUMB	404	404	442	632	755	779		1,035
	Del Rey Oaks	0	0	186	551	551	551		243
	City of Monterey	0	0	0	130	130	130		65
	County of Monterey	8	52	377	539	539	539		720
	UCMBEST	3	3	94	299	515	515		230
	City of Seaside	657	657	997	1,852	2,447	2,876	1	1,012
	State Parks and Rec.	0	0	12	18	20	25		45
	Marina Ord Comm.	264	285	901	1,572	1,702	1,704	2	1,625
	Assumed Line Loss	395	348	348	348	348	348		348
Marina	Armstrong Ranch	0	0	0	680	680	680		920
	Cemex	0	0	0	0	0	500		500
	Marina Central	1,823	1,823	2,184	2,491	2,606	2,725		3,020
	Subtotal - Ord	2,351	2,382	4,021	6,766	7,833	8,293		6,900
	Subtotal - Marina	1,823	1,823	2,184	3,171	3,286	3,905		4,440
	Total	4,174	4,204	6,205	9,937	11,119	12,197		11,340

*Actual demands from calendar year 2012 used to represent a non-drought year.

1 Seaside includes Seaside Resort Golf Course (250 AFY temp use).

2. Allocation includes 1325 AFY groundwater and 300 AFY existing pilot desalination plant

3.3 Projected Water Demand by Sector

Table 3.6 shows the projected water consumption by use sector in the period 2015-2035.

Table 3.6 Water Demand by Sector (afy)

Water use sectors	Existing*	2015	2020	2025	2030	2035
Single family	1,037	1,101	1,717	2,728	3,128	3,432
Multi-family	1,378	1,391	1,658	2,351	2,734	2,971
Commercial	289	289	1,220	2,339	2,616	2,645
Industrial	3	3	24	214	250	750
Institutional/Governmental	231	231	276	501	503	508
Landscape	753	755	875	1,337	1,420	1,423
Agriculture	0	0	0	0	0	0
Other (provision for loss)	482	435	435	467	467	467
Total	4,174	4,204	6,205	9,937	11,119	12,197

* Actual demands for 2012

Note: Provision for loss includes both Central Marina and the Ord Community

3.3.1 Lower Income Housing Demands

The Water Code requires water suppliers to document water demand projections for lower income single family and multi-family housing within their UWMPs. Lower income is defined in Section 50079.5 of the Health and Safety Code as less than 50% of the area median household income.

The housing elements of the general and specific plans for the land use jurisdictions served by MCWD all include Affordable Housing requirements. Affordable Housing, as required in the California Redevelopment Law and specified within Monterey County, includes four income levels: very low, low, moderate and workforce. Only the first two levels, very low income and low income, must be reported separately in the UWMP. The following discussion explains how the current and projected lower income housing water demands were estimated.

The City of Marina has a significant amount of existing affordable housing. Within the Central Marina Service Area, the City has 258 low and very low income multi-family units, and 2 single-family ownership units. Within the Ord Community, the City has 650 affordable housing units, of which 517 are low and very low income. All of the existing units are multi-family duplex, four-plex or apartments. The City requires new residential development of twenty or more units to include a minimum of 20% affordable housing. Within that 20%, 6% must be very low income, 8% must be low income and 6% must be moderate income. Based on approved specific plans, lower income projections for the City include 102 town homes and 23 single family homes in Marina Station, 116 apartments in Cypress Knolls, 53 duplexes in the Dunes on Monterey Bay, and 205 apartments within Marina Station. Of the 200 proposed dwelling units within the TAMC Transit Oriented Design development, 14% or 28 units are assumed to be lower income. Infill development is projected for Central Marina, but it is unknown if any projects will exceed the 20 dwelling threshold requiring an affordable component.

The City of Seaside currently has 51 affordable multi-family units in the Ord Community, of which 41 are designated for lower income households. Within the current housing projection, the City will require 25 affordable single family units in Seaside Resort to be affordable, and 72 affordable units elsewhere in the Ord Community. Of this, 68 units, or 67%, are assumed to be lower income. Within the Monterey Downs Specific Plan there are 256 affordable apartment units planned, with 128 assumed to be for lower income.

Monterey County requires 20% of all residential development or redevelopment to be affordable housing. Within that 20%, 6% must be very low income, 8% must be low income and 6% must be moderate income. Workforce housing requirements are then assigned on a project by project basis. Within the East Garrison Development, 196 low and very low income housing units are identified in the project specific plan, greatly exceeding the minimum requirement.

UCMBEST is expected to develop 330 multi-family and 200 single family units within the Ord Community, in unincorporated areas within the Marina Sphere of Influence. For these projects, we have assumed that 14% of the units will be restricted for lower incomes, as required by both the County and City.

The City of Del Rey Oaks has not yet developed its portion of the Ord Community. In the Environmental Impact Report for the Resort at Del Rey Oaks, 138 affordable apartment units (multi-family) are identified. We estimate 97 of those units will be lower income, based on the Monterey County ratio of 70% of affordable being low or very low income.

Two institutional entities within the Ord Community, CSUMB and the U.S. Army, provide housing within the Ord Community for their students and employees. Because the assignment of this housing is governed by different rules than the California Redevelopment Law, we have assumed it to be workforce housing (and not low income) for the purpose of this report.

For projects with an approved Water Supply Assessment (WSA), the projected water demands were based upon the demand rates for the applicable type of housing unit in the WSA. For existing housing units and all other projected development, demands were estimated using the multi-family residential demand factor of 0.25 acre-feet per year. The time-phasing of lower income housing was assumed to match that of the larger development. The results are shown in Table 3.7.

Table 3.7 Lower Income Housing Demands (afy)

	Jurisdiction	Existing*	2015	2020	2025	2030	2035
Ord	U.S. Army		0	0	0	0	0
	CSUMB		0	0	0	0	0
	Del Rey Oaks		0	0	24	24	24
	City of Monterey		0	0	0	0	0
	County of Monterey		6	17	36	36	36
	UCMBEST		0	3	14	26	26
	City of Seaside	10	10	28	48	107	168
	State Parks and Rec.		0	0	0	0	0
	Marina Ord Comm.	129	129	290	452	596	736
Marina	Armstrong Ranch		0	0	55	55	55
	Cemex		0	0	0	0	0
	Marina Central	65	65	85	105	119	133
	Subtotal - Ord	151	157	350	601	833	1,034
	Subtotal - Marina	65	65	85	160	174	188
	Total	216	222	435	761	1,007	1,221

*Existing (2012) demands estimated at 0.25 AFY/EDU

3.4 Water Conservation Baseline and Targets

The Water Conservation Act of 2009 (SB X7-7) requires each retail urban water supplier to establish baseline daily per capita water demand and water conservation targets, as outlined in California's 20x2020 Water Conservation Plan. The plan establishes a statewide goal of reducing average per capita water demand by twenty percent by the year 2020. The State estimated the average statewide demand for 2005 at 192 gallons per capita day (gpcd), with a statewide conservation target of 154 gpcd in 2020. An interim statewide target of 173 gpcd (ten percent reduction) by the year 2015 was also established. In the 20x2020 Plan, regional baselines and targets were also established.

The Marina Coast Water District is in the Central Coast Hydrologic Region. The regional baseline water demand was estimated to be 154 gpcd, the lowest in the state. The regional conservation targets are 139 gpcd by the year 2015, and 123 gpcd by the year 2020.

The Department of Water Resources (DWR) published detailed methodologies as to how baselines and targets are to be calculated. Baseline per capita water demands are calculated as a ten-year average water consumption rate for a period ending not earlier than December 31, 2004 and not later than December 31, 2010. This is calculated as gross annual water demand divided by average annual population. Water suppliers may choose any consecutive ten-year period within the allowable window, corresponding to calendar years, fiscal years or other standard reporting intervals. Once established, the baseline demand must be used for compliance reporting in 2015 and 2020, and the same reporting year (calendar, fiscal, etc.) must be used. If

the system-wide average water demand is 100 gpcd or less, the water supplier is not required to achieve additional conservation savings.

Historic water demand for MCWD is shown in Table 3.8. Annual population values were estimated using estimates from the California Department of Finance, as detailed in Appendix E. As can be seen, MCWD's average water demand has been at or below the regional 2020 target of 123 gpcd since 2009. The 10-year averages ending in 2004 and 2005 were not considered in selecting a baseline period, due to the large population changes in the mid-1990's when Fort Ord closed. Of the remaining periods, MCWD selected the period ending December 31, 2008, for calculating the baseline water demand, which is 135.3 gpcd. This period includes years with and without construction activity in the Ord Community, and is considered a more representative median than the lower value in later years.

Per Section 10608.20 of the Water Code, there are four methodologies available for calculating compliance targets, as listed below. A more detailed discussion of the methods and analysis are included at Appendix E.

- Method 1: Eighty percent of the water supplier's baseline per capita water use.
- Method 2: Per capita daily water use estimated using the sum of performance standards applied to indoor residential use; landscaped area water use; and commercial, industrial, and institutional uses.
- Method 3: Ninety-five percent of the applicable state hydrologic region target as stated in the State's April 30, 2009, draft 20x2020 Water Conservation Plan.
- Method 4: Estimated water savings by using conservation Best Management Practices (BMP) as prescribed by the California Urban Water Conservation Council (CUWCC). This method is similar to Method 2, but requires more detailed information on current water uses.

Table 3.8 Per Capita Water Demands

	Central Marina			Ord Community			System-Wide		
Year	Marina Pop.	Annual Water Use (MG)	Daily Per Capita (gals)	Ord Pop.	Annual Water Use (MG)	Daily Per Capita (gals)	Daily Per Capita (gals)	10-year Average (gpcd)	5-year Average (gpcd)
1995	16,685	657.6	108	5,000	913.0	500	198		
1996	16,465	690.5	115	7,796	811.4	285	170		
1997	16,586	699.6	116	10,593	838.7	217	155		
1998	17,128	606.1	97	11,119	679.7	167	125		
1999	17,331	730.4	115	11,327	780.6	189	144		
2000	17,574	749.4	117	11,563	772.7	183	143		
2001	17,715	744.6	115	11,701	726.0	170	137		
2002	17,781	751.5	116	11,867	696.2	161	134		
2003	17,805	712.1	110	11,808	698.7	162	131		
2004	17,876	737.0	113	11,757	789.5	184	141	147.8	
2005	17,672	715.1	111	11,805	649.6	151	127	140.6	
2006	17,509	582.1	91	11,645	817.5	192	132	136.8	
2007	17,493	528.6	83	11,572	958.3	227	140	135.3	134.0
2008	17,706	597.4	92	11,827	739.3	171	124	135.3	132.7
2009	17,852	639.2	98	11,891	676.5	156	121	132.9	128.7
2010	18,057	568.1	86	12,043	778.5	177	123	130.9	127.9

* Annual population values based upon CA Dept. of Finance estimates.

Water suppliers may select any of the four methods to calculate compliance water demand targets. They must also calculate the maximum allowable target, and select the lower of the two. The alternate maximum method consists of calculating a five-year average water consumption rate for a period ending not earlier than December 31, 2007 and not later than December 31, 2010. The 2020 conservation target must be less than or equal to 95% of the 5-year base daily per capita usage. MCWD selected the period ending December 31, 2008, for its 5-year baseline period, as reflected in Table 3.9.

Water demands within the District are already significantly below the state and regional averages due to aggressive water conservation practices. Therefore, MCWD has elected to use Method 3, which is a goal of 5% below the regional target. As seen in Table 3.9, the maximum allowable target is greater than the Method 3 target, so the Method 3 target may be used. The interim (2015) target is the average of the 10-year baseline and the 2020 target.

Table 3.9 District Baseline and Targets

Description	Year	Amount
Baseline Water Demand	2008	135 gpcd
Maximum Target (95% of 5-year baseline)	2020	126 gpcd
Method 3 Target (95% of Regional Target)	2020	117 gpcd
Interim Target	2015	125 gpcd

The District's actual 2015 water use was 3,228 AFY, and the population is estimated at 32,375 persons, resulting in an average 89 gpcd. This is well below the required conservation target, and was achieved by implementing District-wide conservation practices in addition to the statewide drought restrictions on urban water use. It is anticipated that water use will increase after the drought restrictions are removed, but that the average usage rate will remain below the conservation target due to the significant number of water conservation retrofits achieved in the past three years.

3.4.1 Plan for Meeting Urban Conservation Targets

Table 3.10 shows the total projected water demands for the District, the projected population and the resulting per capita water demands. The average demand per person increases in the future due to the projected non-residential development. Population projections are based upon the projected housing developments and the associated persons per unit in the respective specific plans. Where specific plans do not exist, the average persons per unit for the City or census tract were used. Population tables are included in Appendix C.

Table 3.10 Projected Per Capita Water Demands

	2015*	2020	2025	2030	2035
Projected Demand (AFY)	4,204	6,205	9,937	11,119	12,197
Projected Recycled Water (AFY)**	0	600	1,359	1,359	1,359
Net Potable Demand (AFY)	4,204	5,605	8,578	9,760	10,838
Projected Population	32,375	40,464	56,648	64,635	70,161
Projected demand per person (gpcd)	115.9	123.7	135.2	134.8	137.9
Water Use Targets (gpcd)	125	117	117	117	117
Projected Target Exceedance (gpcd)	None	6.7	18.2	17.8	20.9

* 2015 demands adjusted to non-drought condition. Actual use was 3,228 AFY.
**Based on RUWAP Recycled Water Project Schedule

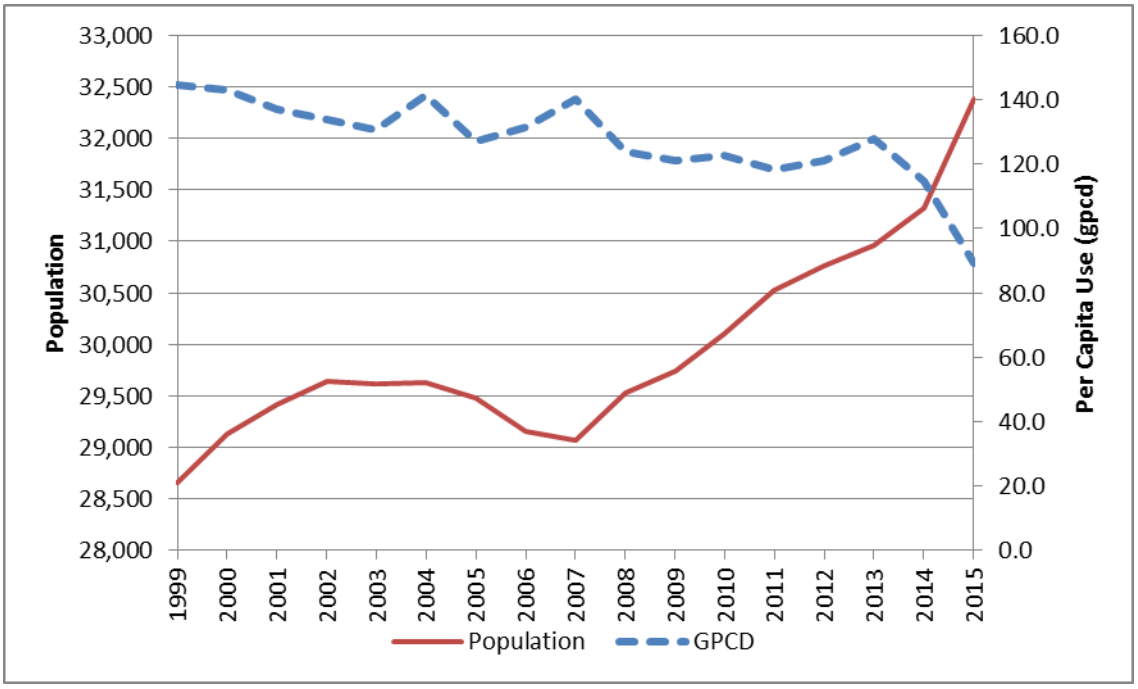
To reduce per capita demands below the compliance targets, the District has four strategies, in addition to the on-going water conservation efforts:

- First, MCWD is implementing an urban recycled water project for landscape irrigation.
- Second, the design standards for new construction exceed the State's plumbing code requirements.
- Third, the remaining non-metered customers will be metered and have a financial incentive to reduce water use.

- Finally, the phased redevelopment of the Ord Community will include the replacement of a significant amount of water distribution system that is over 50-years old. These replacements should reduce system water losses but are not reflected in this table.

As seen in the bottom line of Table 3.10, these measures will come close to achieving the conservation targets, but additional effort will be required. The District's water production and per capita demand rate have steadily declined over the past fifteen years due to water conservation retrofits, consumer education and replacement of existing housing stock. During the period 1999-2014, the District's service area population increased by 2,667 persons, but the overall water use declined by an average 41 acre-feet per year. The per capita usage rate declined by an average 2.0 gpcd/year over that period (see Figure 3.1). Assuming that decline continues, the District will continue to meet their demand target.

Figure 3.1 Population and Per Capita Usage



The use of recycled water to serve non-potable demands is a conservation measure recognized in the 20x2020 State Conservation Plan. As detailed in Section 4, MCWD included recycled water in the Regional Urban Water Augmentation Program, completed the project design and CEQA documents in 2007. On April 8, 2016, MCWD and MRWPCA entered into the Pure Water Delivery and Supply Project Agreement, wherein the District will receive up to 1,427 AFY of advanced treated recycled water from the Pure Water Monterey Project. As shown in Table 3.10, the project is expected to provide 600afy in 2020, and increase to 1,359 afy in 2025.

MCWD has adopted design guidelines and standards that exceed the state plumbing code requirements for water conserving fixtures, codified in Section 3.36 of the District Ordinances. New residential development is required to include high-efficiency toilets, hot-water

recirculation systems, and when provided, clothes washers must meet high efficiency standards. Non-residential development must include waterless urinals and HET or dual-flush toilets. All landscapes over 2,500 square-feet are separately metered and must meet the requirements of the State's model water-efficient landscape ordinance.

The final jurisdiction on Fort Ord with non-metered accounts is the Ord Military Community. The Army is removing and replacing their older housing areas by phases, and when complete, all housing units will be metered. The housing manager began working with the District to install meters in the older housing areas in 2014. Sixty-six of the existing units have been metered, but over 900 units remain. Of those, about 730 units are occupied.

Section 4 - Water Supplies

4.1 Water Sources and Water Rights

The sole source of water supply for the Marina Coast Water District is the Salinas Valley Groundwater Basin, described in detail in Section 4.2. Both Central Marina and the Ord Community Service areas have relied upon this source of supply since the areas were initially developed. The District owns and operates its production wells, and does not purchase wholesale water supply.

As discussed in Section 2, under the 1993 and 1996 Annexation Agreements for Zones 2 and 2A, MCWRA granted groundwater allocations of 6,600 AFY to the Army and 3,020 AFY to MCWD The 1996 Annexation Agreement recognized the Armstrong Ranch's right to use groundwater for overlying irrigation uses and allocated 20 AFY of potable water. The agreement reserved an additional 900 AFY of potable water (920 AFY total) for the Armstrong Ranch subject to annexation to Zones 2/2A and to MCWD and the City of Marina. The agreement also recognized and limited the CEMEX property to its historic use of 500 AFY of non-potable water use. Zone 2 was formed as a benefit and assessment zone to finance the construction and operation of Lake Nacimiento, and Zone 2A was formed as a benefit and assessment zone to finance the construction and operation of Lake San Antonio.

The 1996 Annexation Agreement established "a contractual process for the exercise of regulatory authority by the MCWRA under Water Code App. Section 52-22, and the MCWD under Water Code section 31048."[5] The purpose of the 1996 Annexation Agreement was to "establish a groundwater mitigation framework for the lands to be annexed, and will provide money from the Marina area for the MCWRA's Basin Management Plan and for Zones 2 and 2A, for management protection of the groundwater resource in the Salinas Valley Groundwater Basin and to reduce seawater intrusion."[6]

MCWRA's Backstop: Under the 1993 and 1996 Annexation Agreements, MCWRA has "allocated groundwater pumping rights" to Fort Ord and to the Marina Area Lands. Under the Annexation Agreements, MCWRA has agreed to backstop those groundwater allocations in the event that the actual available groundwater is not physically or legally available (e.g., because of a Salinas Valley Groundwater Basin adjudication).

Section 4.g of the 1993 Annexation Agreement states:

> g. Should future litigation, regulation or other unforeseen action diminish the total water supply available to the MCWRA, the MCWRA agrees that it will consult

[5] MCWRA Negative Declaration re: Annexation of Marina Area Lands to Zones 2/2A, dated February 21, 1996, at p. 4.

[6] Purpose section, Attachment B-1 to Initial Study for Marina Lands Annexation.

with the Fort Ord/POM Annex Commander. Also, in such an event, the MCWRA agrees to exercise its powers in a manner such that Fort Ord/POM Annex/RC shall be no more severely affected in a proportional sense than the other members of the Zone.

Section 8.1 of the 1996 Annexation Agreement states:

> 8.1. Equal treatment by MCWRA and MCWD. If future litigation, regulation or other unforeseen action diminishes the total water supply available to MCWRA, MCWRA agrees that it will exercise its powers so that MCWD, Armstrong and Lonestar shall be no **more** severely affected in a proportional sense than other lawful users of water from the Zones, based on the right before the imposition of any uniform and generally applicable restrictions as described in paragraph 8.2 to use at least the quantities of water from the Basin described in paragraphs 5.1., 6.9., and 7.2. MCWRA shall not at any time seek to impose greater restrictions on water use from the Basin by MCWD, Armstrong or Lonestar than are imposed on users either supplying water for use or using water within the city limits of the City of Salinas. MCWD, Armstrong and Lonestar will comply with any basin-wide or area-wide water allocation plans established by the MCWRA which indude MCWD, Armstrong and Lonestar, and which do not impose on use of water on the lands described in Exhibits "B", "C", and "D" restrictions greater than are imposed on users either supplying water for use or using water within the City of Salinas, and which satisfy the requirements of paragraph 5.2 of this Agreement and Framework.

Table 4.1 provides the recent groundwater production for the Central Marina and Ord Community service areas. Note that well capacity is not included in the table. MCWD has redundant well pumping capacity to accommodate maintenance shut-downs during peak days.

Table 4.1 Groundwater Production (acre-feet)

Year	Central Marina	Ord Community	Total (ac-ft)
2006	1,786	2,509	4,295
2007	1,622	2,941	4,563
2008	1,833	2,269	4,102
2009	1,962	2,076	4,038
2010	1,744	2,389	4,133
2011	1,698	2,348	4,047
2012	1,814	2,360	4,174
2013	1,467	2,964	4,431
2014	1,619	2,407	4,026
2015	1,420	1,808	3,228

The three water production wells in the Central Marina service area and one in the Ord Community are in the Deep Aquifer, as described in Section 4.2.1. MCWD is currently the only significant user of the Deep Aquifer, although there are Deep Aquifer wells serving the

Monterey Dunes Colony (120 homes) and the Armstrong Ranch. The other four wells in the Ord Community service area are in the 900-foot Aquifer.

Additionally, MCWD has a seawater desalination plant located at its main office adjacent to Marina State Beach. This facility is not currently in use, but has a design capacity of 300 acre-feet per year. It is discussed in Section 4.4.

Energy use by the District is provided in Appendix I.

4.2 Groundwater

4.2.1 Salinas Valley Groundwater Basin

Potable water for MCWD's Marina and Ord Community service areas comes from wells developed in the Salinas Valley Groundwater Basin.[7] This groundwater basin underlies the Salinas Valley from San Ardo to the coast of Monterey Bay. DWR Bulletin 118: California's Groundwater places Marina and Fort Ord in the Seaside Sub-basin (3-4.08, see Figure 4.1) of the Salinas Valley Groundwater Basin. The Bulletin 118 subbasins within the Salinas Valley Groundwater Basin (SVGB) are listed in Table 4.2.

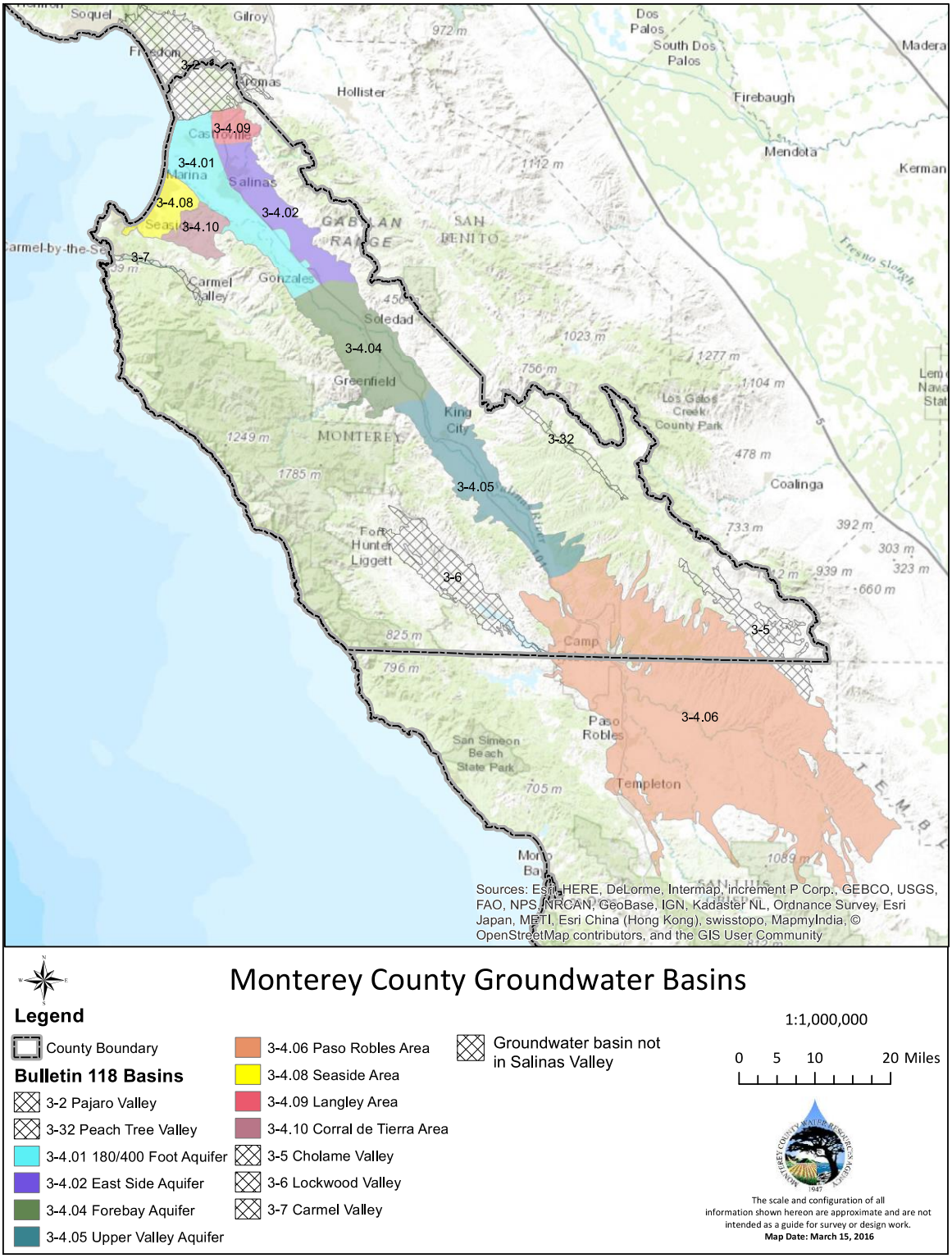
Table 4.2 DWR Subbasins within the Salinas Valley Groundwater Basin

DWR Basin /Subbasin	DWR Designation	Area (acres)	DWR Ranking	DWR CASGEM Overall Ranking
3-4	Salinas Valley Groundwater Basin			
3-4-01	180/400 Foot Aquifer	84,400	High/Critical*	24.0
3-4-02	East Side Aquifer	57,500	High	27.0
3-4-04	Forebay Aquifer	94,100	Medium	17.3
3-4-05	Upper Valley Aquifer	98,200	Medium	15.5
3-4-06	Paso Robles (Monterey & SLO Counties)	597,000	High/Critical*	23.3
3-4-08	Seaside	25,900	Medium	20.8
3-4-09	Langley	15,400	Medium	18.8
3-4-10	Corral De Tierra	15,400	Medium	15.0

*Designated as a Critically Overdrafted Subbasin by DWR January 2016

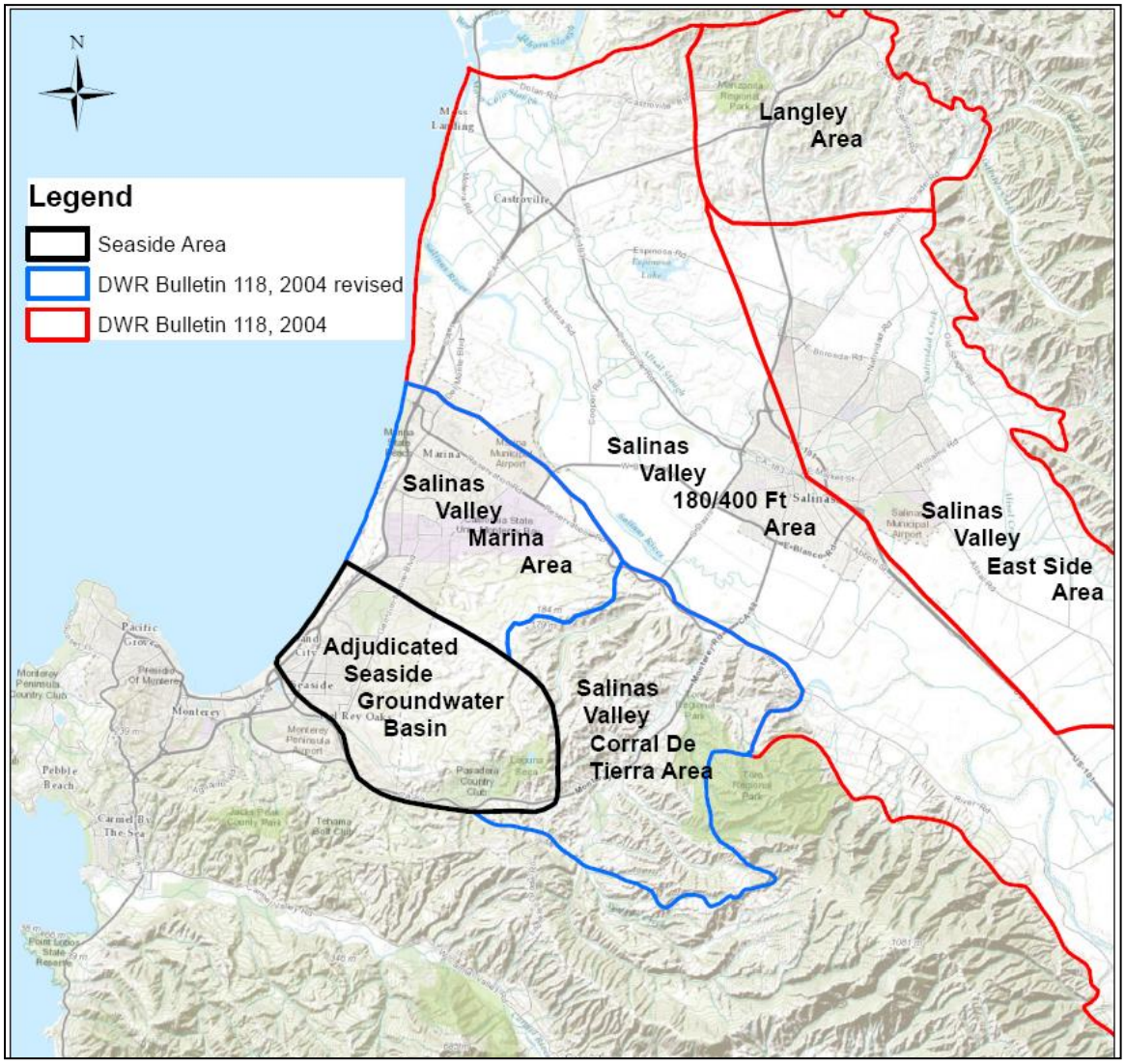
[7] See Figure 2.2 for well locations.

Figure 4.1 Monterey County Groundwater Basins and Sub-Basins[8]



[8] Boundaries from Figure 29, Central Coast Hydrogeologic Region, DWR Bulletin 118, Page 138

Figure 4.2 Proposed Modification to the Seaside Sub-Basin[9]



Separate hydrologic studies of the Marina[10] and Seaside areas have shown that the northern portion of the Seaside Sub-basin is connected to the 180/400 Foot Aquifer Subbasin, while the southern portion is separate from the Salinas Valley due to a ridge in the water-bearing formations. The southern portion of the Seaside Sub-Basin was formally adjudicated in 2006 and is managed by the Seaside Basin Watermaster. A basin boundary modification request has been submitted to DWR to adjust the boundaries of the Seaside and Coral de Tierra Subbasins to match the adjudicated boundary (see Figure 4.2) and to make the Adjudicated Seaside

[9] Plate 1: Regional Map Showing Location of Seaside Groundwater Basin Boundary, from the Basin Boundary Modification Application, prepared by MPWMD, 2016

[10] Harding ESE, Hydrogeologic Investigation of the Salinas Valley Basin in the Vicinity of Fort Ord and Marina

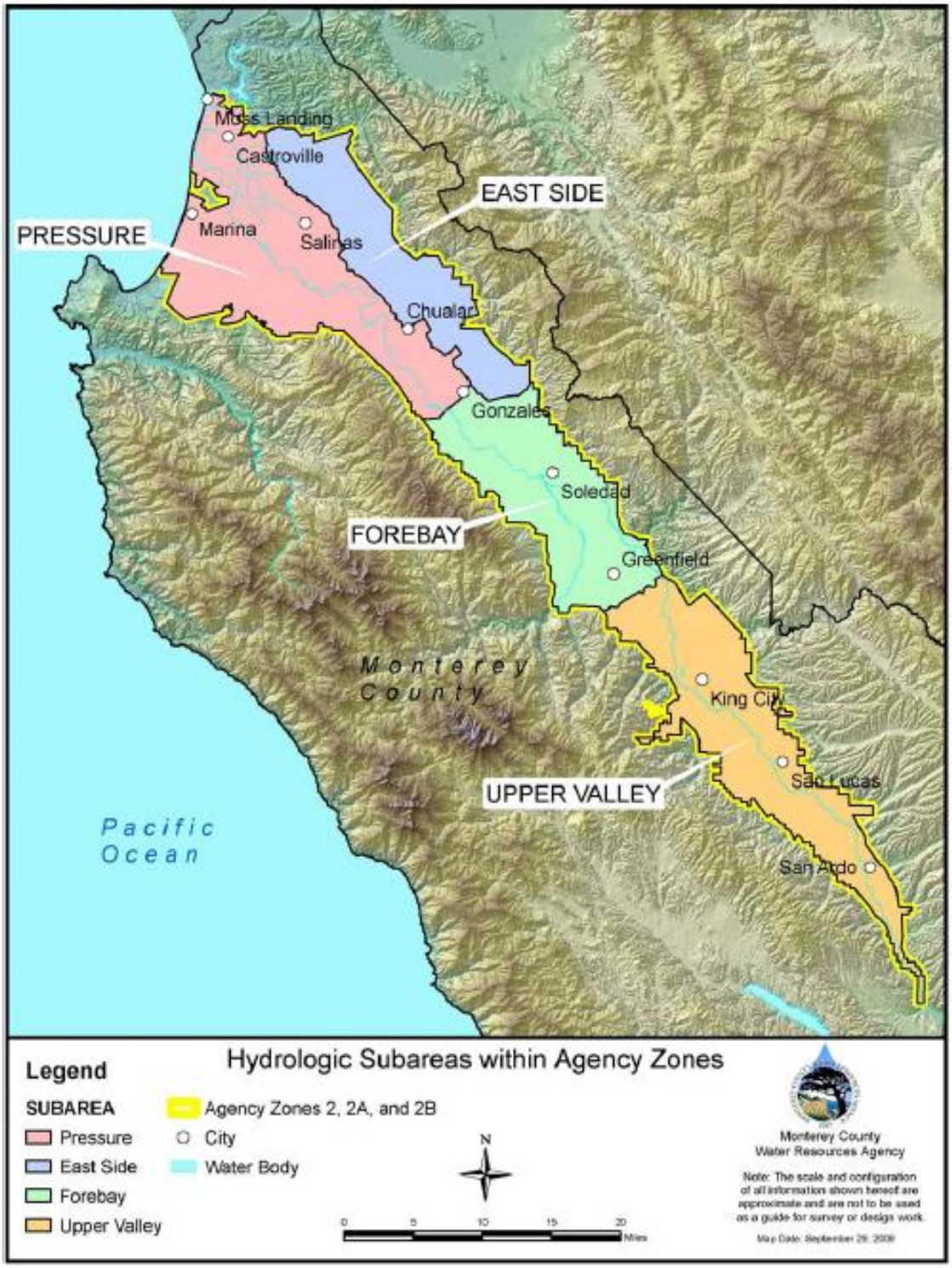
Groundwater Basin a new groundwater basin separate and apart from the Salinas Valley Groundwater Basin. The remaining northern portion of the Seaside Area Subbasin would be designated as the Marina Area Subbasin of the SVGB. A separate basin boundary modification has been submitted to DWR to modify the Paso Robles Area Subbasin. Because that modification does not affect MCWD's service area, it is not discussed in this report.

MCWRA reports and documents generally use Zone 2/2A designated subareas, Pressure, East Side, Forebay and Upper Valley (Figure 4.3), which do not conform with the DWR Bulletin 118 Subbasins. The Pressure Subarea combines three DWR Bulletin 118 Subbasins: the 180/400 Foot Aquifer Subbasin, a portion of the Seaside Subbasin, and a portion the Corral De Tierra Subbasin. The southwest corner of the Pressure Subarea boundary is coincident with the annexation boundary for Fort Ord. Similarly, MCWRA's Forebay Subarea combines the DWR Bulletin 118 Forebay and Arroyo Seco Subareas. To avoid confusion over subbasin and subarea designations and references, this Plan shall use the DWR Bulletin 118 subbasin designations, except that it shall refer to the area north of the adjudicated Seaside Groundwater Basin but within the SVGB as the "Marina Area" and the area adjoining and north of the Marina Area but south of the Salinas River as the "North Marina Area" within the 180/400 Foot Aquifer Subbasin. Portions of MCWD's Central Marina and Ord Community service areas extend into the North Marina Area, but all of the District's current wells are located within the Marina Area.

The 180/400 Foot Aquifer Subbasin is delineated vertically into three distinct aquifer zones, consisting of aerially extensive, largely horizontally continuous, deposits of sand and gravel that exist at various depths below ground surface in the subarea. These three aquifers are commonly referred to as the 180-Foot, 400-Foot and Deep aquifers. The 180-Foot and 400-Foot aquifers derive their names from the average depth below the valley floor at which the water bearing sand and gravel deposits are encountered. The Deep Aquifer consists of an aggregation of all sand and gravel deposits that exist below the 400-Foot Aquifer including aquifers in the Aromas Sand, the Paso Robles Formation and the Purisima Formation, not all of which are hydraulically connected. The shallowest alluvial aquifer in the basin is the A-Aquifer, which is perched on top of the Salinas Valley Aquitard, above the 180-Foot aquifer, and overlies most of the 180/400 Foot Aquifer Subbasin. Toward the coast, the A-Aquifer is comprised of mostly dune sand deposits, which are largely unconfined in the coastal area of the basin.

The 180-Foot Aquifer extends from Monterey Bay to Chualar beneath the Salinas Valley and westward from the valley under northern Ord Community and Central Marina. South of Chualar and in the Forebay area, the distinction between the 180-Foot and 400-Foot aquifers becomes less defined as the aquitards that effectively separate them become increasingly discontinuous.

Figure 4.3 MCWRA-designated Subareas of the Salinas Valley Groundwater Basin[11]



[11] Source: MCWRA 2009 Groundwater Summary Report

The 400-Foot Aquifer is comprised of geological materials assigned to older alluvium deposits and Aromas Sand. The aquifer system is present beneath the northern Salinas Valley and also extends westward beneath the northern portions of the former Fort Ord and Central Marina. In the Forebay area, the 400-Foot Aquifer is hydraulically connected with the 180-Foot Aquifer resulting in both aquifer zones receiving recharge from the Salinas River through the overlying recent alluvial deposits.

The Deep Aquifer System consists of two geologic formations – the Paso Robles and the underlying Purisma Formations. These formations are aerially extensive, and not only underlie the Salinas Basin but continue outside the basin to the north and south. The lowermost unit (Purisima Formation) extends to the north outcropping in Soquel and Santa Cruz, and to the south where it grades into the Santa Margarita Formation, an important aquifer in the Seaside Basin. Although slightly arbitrary in definition, the Deep Aquifer is commonly believed to begin at depths of approximately 600 feet below sea level and extend to depths of up to 2,000 feet or more in some locations. Non-water bearing Monterey Shale that constitutes the bottom of the Salinas Groundwater Basin underlies the Deep Aquifer system.

Studies by the United States Geological Survey indicate that Deep Aquifer water in the vicinity of Marina is not of recent origin. Uncorrected Carbon 14 dating of water from a test well in the vicinity of Marina's Deep Aquifer wells indicates the water is between 22,000 and 31,000 years old. The ancient nature of this water raises the possibility that recharge to this aquifer may be insufficient to sustain current pumping, but monitoring well data at the Marina Airport[12] indicates the aquifer is subject to seasonal variations similar to the upper aquifers. Recent stratigraphic analyses have indicated that these aquifers are connected hydraulically at certain locations with the 180-foot and 400-foot aquifers, which may be recharging the Deep Aquifer.[13]

Because the overlying clay layers isolate the aquifer systems in the 180/400 Foot Aquifer Subbasin from potential surface water recharge, most importantly the Salinas River, the primary mechanism for recharge is from lateral flow from the adjacent subareas. This means that most recharge for the aquifer systems in the 180/400 Foot Aquifer Subbasin comes from lateral flow from either the Eastside or Forebay Subbasins. Additionally, the deeper aquifers are believed to be recharged in whole or in part by water that has moved through the overlying aquifers (i.e., flow from the shallow aquifer partially recharges the 180-Foot Aquifer, which then partially recharges the 400-Foot Aquifer that in turn partially recharges the Deep Aquifer). Most of the recharge for the 180/400 Foot Aquifer Subbasin derives from the Forebay Subbasin due to natural recharge from the Salinas River, which is augmented by MCWRA's active management of Nacimiento and San Antonio reservoir releases to maximize river recharge.

[12] MCWD Well 34 Basis of Design Report, Martin B. Feeney, PG, September 2009

[13] Deep Aquifer Investigation Study, WRIME, 2003.

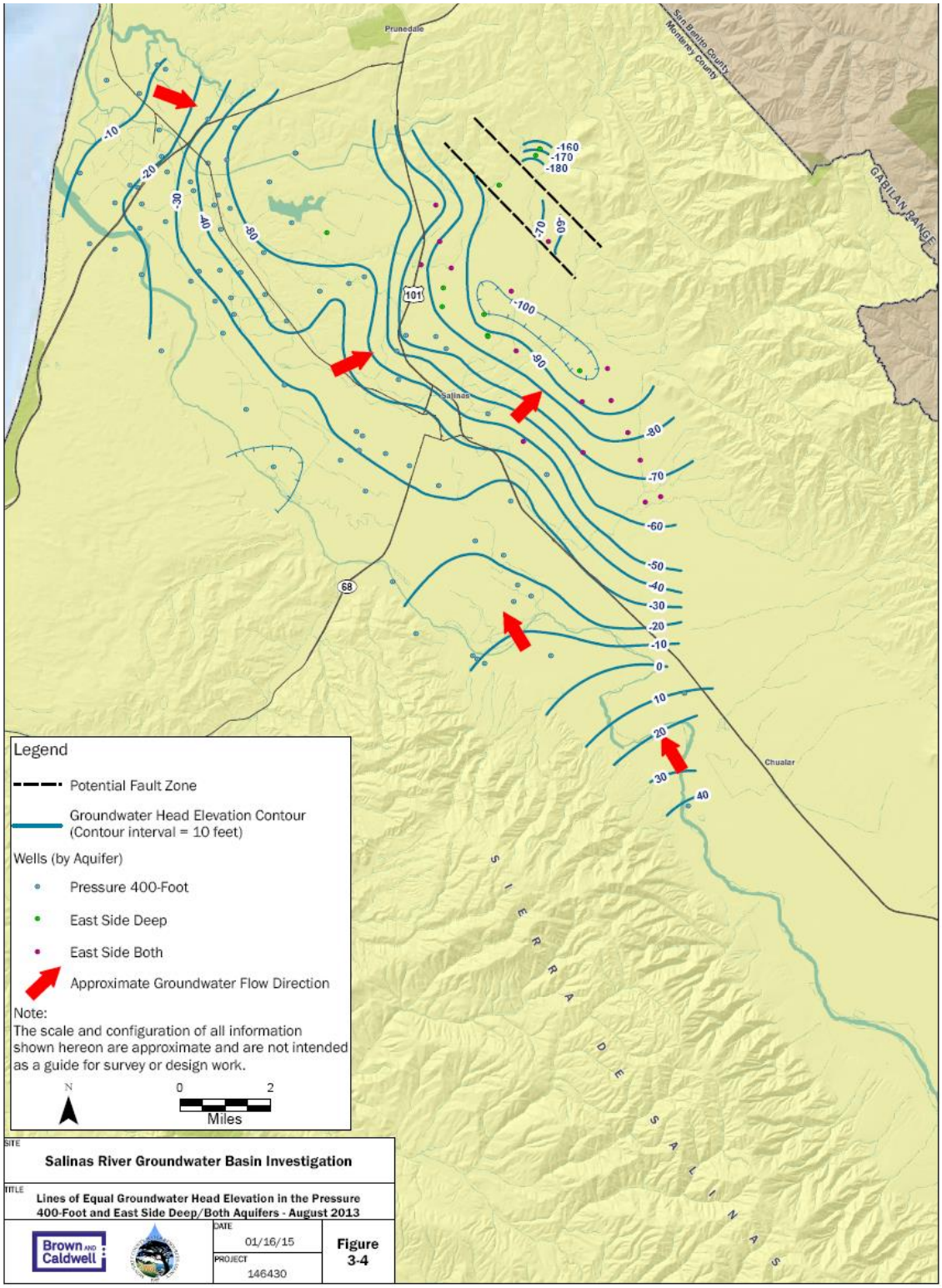
In a balanced condition, Salinas Basin groundwater would move through the basin and into the Monterey Bay through sea floor freshwater aquifer outcrop areas. As a result of basin-wide pumping, water levels in the 180/400 Foot Aquifer and East Side Subbasins have declined over time, contributing to a decrease in the amount of groundwater moving toward and into Monterey Bay and developing a trough or depression in groundwater levels in the East Side sub-basin (see Figure 4.4). The basin currently experiences a landward groundwater gradient of causing seawater intrusion, where the seawater has contaminated coastal aquifers and wells. While historic groundwater pumping throughout the basin contributes to the overdraft, only the basin's coastal areas adjacent or near to the Bay suffer from seawater intrusion. Seawater intrusion is further discussed in Section 4.2.5. The other basin subareas – Forebay and Upper Valley – tend to recharge rapidly and recover historic groundwater levels each year. The result has been a reversal of the seaward gradient.

The Salinas Valley Groundwater Basin has been in an overdraft condition with seawater intruding at an estimated rate of 11,000 to 18,000 afy into the 180/400 Foot Aquifer Subbasin.[14] MCWD's groundwater withdrawals are about 4,200 afy, or less than 1.0 percent of total annual basin withdrawals of about 524,500 afy[15]. Other than MCWD, only a small number of wells tap the deep aquifer, some of which also draw from the 400-Foot aquifer. Prior to receiving recycled water for crop irrigation, some agricultural lands in the Castroville area pumped water from the Deep Aquifer. These agricultural wells are currently used to meet supplemental needs during peak summer demands periods and are also part of the monitoring network overseen by MCWRA. Delivery of recycled water which replaces groundwater pumping has contributed to a recovery in groundwater levels in this area. Completion of the Salinas Valley Water Project in 2010 further reduced groundwater pumping and is anticipated to contribute to further restoration of coastal groundwater conditions.

[14] Salinas Valley Water Project Engineer's Report, RMC, 2003.

[15] Brown & Caldwell, State of the Salinas River Groundwater Basin, 2015

Figure 4.4 Groundwater Isoclines in the Pressure and East Side Basins[16]



[16] Source: Brown & Caldwell, State of the Salinas River Groundwater Basin, Figure 3-4

4.2.2 Sustainable Groundwater Management Act

On September 16, 2014, Governor Edmund G. Brown Jr. signed three bills into law, which are collectively known as the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015. SGMA created a framework for sustainable, local groundwater management for the first time in California history. SGMA's core principles[17] are:

- Groundwater should be locally and collaboratively managed to address unique basin conditions and challenges.
- Groundwater should be managed sustainably.
- The state's role should complement and support the goal of local sustainable groundwater management.
- Water rights should be protected.

Previously adjudicated basins, including the Seaside Groundwater Basin, are exempt from the SGMA except for some minor annual reporting required to be filed with DWR.[18] The Seaside Basin Watermaster will continue to manage that Basin without any state oversight under SGMA. MCWD will continue to work and cooperate with the Watermaster.

SGMA requires the creation of one or more groundwater sustainability agencies (GSA) within each subbasin to develop and implement a local groundwater sustainability plan or coordinated plans allowing 20 years to achieve groundwater sustainability. The GSA is the primary local agency responsible for achieving SGMA's groundwater sustainability goal within that timeframe. SGMA grants the GSA new and additional powers and authorities to those powers and authorities already granted the local agency under its enabling law. For example, a GSA may conduct investigations, measure and limit extraction, require the registration and metering of wells, impose fees for groundwater management, enforce the terms of the groundwater sustainability plan, and construct in-lieu or direct groundwater recharge projects.[19]

SGMA grants local public agencies the authority to manage groundwater within high- and medium-ranked priority subbasins and basins. DWR classifies the existing Seaside Subbasin of which the Marina Area is a part as a medium-ranked priority subbasin. The 180/400 Foot Aquifer Subbasin is classified as a high-ranked priority subbasin and in January 2016 was further designated by DWR as a Critically Overdrafted Subbasin.[20] The Marina Area will have until

[17] CalEPA, DWR, SWRCB, et al., Groundwater Legislation Implementation Fact Sheet, December 4, 2014.
[18] Water Code Section 10720.8(a)(21) and (f).
[19] Water Education Foundation, *The 2014 Sustainable Groundwater Management Act: A Handbook to Understanding and Implementing the Law*, published 2015.
[20] See http://www.water.ca.gov/groundwater/sgm/pdfs/COD_BasinsTable.pdf,

January 31, 2022,[21] to be adopted and managed under a groundwater sustainability plan. However, the 180/400 Foot Aquifer Subbasin as a Critically Overdrafted Subbasin must be managed under a groundwater sustainability plan two years earlier by January 31, 2020.[22]

The "sustainability goal" is defined as "the existence and implementation of one or more groundwater sustainability plans that achieve sustainable groundwater management by identifying and causing implementation of measures targeted to ensure that the applicable basin [or subbasin] is operated within its sustainable yield." (Water Code, § 10721, subd. (t).) The sustainability goal is to be achieved in the subbasin or basin within 20 years of the implementation of the groundwater sustainability plan. (Water Code, § 10727.2, subd. (b).) "Sustainable yield" is defined as "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result." (Water Code, § 10721, subd. (v), emphasis added.)

The required "base period" for purposes of developing groundwater sustainability plans is the period before January 1, 2015. Water Code Section 10727.2(b)(4) states, "[t]he [groundwater sustainability] plan may, but is not required to address undesirable results that occurred before, and have not been corrected by, January 1, 2015."

"Undesirable result" is defined in Water Code Section 10721(w) as follows:

> (w) "Undesirable result" means one or more of the following effects caused by groundwater conditions occurring throughout the [Sub]basin:
> (1) Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Overdraft during a period of drought is not sufficient to establish a chronic lowering of groundwater levels if extractions and recharge are managed as necessary to ensure that reductions in groundwater levels or storage during a period of drought are offset by increases in groundwater levels or storage during other periods.
> (2) Significant and unreasonable reduction of groundwater storage.
> (3) Significant and unreasonable seawater intrusion.
> (4) Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
> (5) Significant and unreasonable land subsidence that substantially interferes with surface land uses.
> (6) Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

[21] Water Code Section 10720.7(a)(2).
[22] Water Code Section 10720.7(a)(1).

Undesirable Result – Seawater Intrusion. Section 4.2.5 below discusses seawater intrusion in the North Marina Area. The sustainability goal for the 180/400 Foot Aquifer Subbasin must be achieved by 2040, which includes rolling back seawater intrusion within the subbasin to at least the condition and extent which existed on January 1, 2015.

Undesirable Result – Water Quality Degradation. A chloride concentration of 500 milligrams per liter (mg/L) is the short-term California Department of Public Health Secondary Drinking Water Standard for chloride and may be used as a measure of impairment of potable drinking water. The existing 2011 Water Quality Control Plan for the Central Coastal Basin, which must be addressed in a groundwater sustainability plan, incorporates by reference SWRCB Resolution No. 88-63, Adoption of Policy Entitled "Sources of Drinking Water." Resolution No. 88-63 is Appendix A-9 of the Basin Plan and provides that "All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards with the exception of: 1. Surface and ground waters where: a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system." The U.S. Environmental Protection Agency ("USEPA") defines "Underground source of drinking water (USDW)" at 40 CFR 144.3 to mean an aquifer or a portion of an aquifer containing fewer than 10,000 mg/l TDS. Water Code Section 10783(g)(2) of the Groundwater Quality Monitoring Act of 2011 specifically cites to the USEPA definition of USDW. While the protection of sources and potential sources of groundwater for drinking is a paramount concern, the water quality necessary for all beneficial uses of groundwater must be protected in the groundwater sustainability plan, including non-potable irrigation and industrial uses.

MCWD is actively participating in the Salinas Valley Groundwater Stakeholder Forum, which is a facilitated process to develop consensus on the formation of GSA or GSAs within the SVGB and the coordinated development of one or more groundwater sustainability plans for the SVGB. Unlike all of the other subbasins within the SVGB, the Marina Area is wholly within MCWD's potable water service area, MCWD and the Army hold the groundwater rights, MCWD already performs water supply planning and groundwater extraction management for the entire Marina Area, and in working with MRWPCA to implement the Pure Water Monterey Project, MCWD has the right to deliver 1,427 afy of advanced treated water within the Ord Community as a major in-lieu groundwater recharge project.

4.2.3 Basin Management

Where groundwater basins are in or projected to be in overdraft, the Water Code[23] requires UWMPs to provide detailed descriptions of efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. The 180/400 Foot Aquifer Subbasin has been

[23] Water Code §10631(b)(2)

declared by DWR to be in Critical Overdraft. MCWD will actively participate in the GSA formed for that subbasin. MCWD is already taking actions to preserve and protect the groundwater aquifers from which MCWD draws potable water and its continuing ability and right to access groundwater. MCWD is also exploring new alternative water sources to augment groundwater supplies. MCWD is developing a Seawater Desalination Project and a Recycled Water Project, as discussed in Section 4.4.

MCWRA has been and is currently working to eliminate basin overdraft and seawater intrusion. The current program builds upon action taken in the 1940s when MCWRA's predecessor agency, the Monterey County Flood Control and Water Conservation District, initiated development of the Nacimiento and San Antonio dams and reservoirs to augment water resources within the County. From the time it was formed, MCWD has cooperated with the MCWRA to further water resources development within the Salinas Valley.

In 1991 and 1992, MCWRA developed and approved the Monterey County Water Recycling Projects to deliver recycled wastewater for irrigation use in the Castroville area, so that groundwater pumping could be reduced in that area. The project is commonly referred to as the Castroville Seawater Intrusion Project (CSIP). In the project, recycled water is produced and used along the coast in lieu of pumping groundwater for agricultural irrigation. The project has operated successfully since 1998, reducing groundwater pumping and the rate of seawater intrusion.

To further address basin overdraft and seawater intrusion, MCWRA's Salinas Valley Water Project (SVWP) was developed (see Section 4.2.6). The project included modifying the spillway at Nacimiento Reservoir, adjusting the operations of Nacimiento and San Antonio reservoirs to increase releases into the Salinas River, and construction of the Salinas River Diversion Facility (SRDF) near Marina. Water diverted from the river is added to the CSIP distribution system, further reducing the volume of coastal groundwater pumped for agriculture. The projects were completed in 2010, and operated from 2010 through 2013, delivering 3,000 to 5,000 AFY for CSIP. Due to the statewide drought and resultant low water levels in the reservoirs, the SRDF was not operated in 2014 and 2015.

The Pure Water Monterey Project is currently being pursued by the Monterey Regional Water Pollution Control Agency (MRWPCA) and the Monterey Peninsula Water Management District (MPWMD). The project will develop new sources of water supply and convey them to the MRWPCA Regional Treatment Plant, where they will be recycled as either Advanced Treated Water for indirect potable reuse in the southern Seaside Groundwater Basin, or as additional Tertiary Treated Water for CSIP. The project is expected to off-set approximately 4,300 AFY of groundwater pumping in the 180/400 Foot Aquifer Subbasin.

4.2.4 Integrated Regional Water Management Plan

In 2005, the Monterey County Water Resource Agency, the Marina Coast Water District and the Castroville Water District formed the Salinas Valley Water Management Group to spearhead regional planning for the Salinas Valley Region of Monterey County. In May 2006, they published the Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan. The plan outlined regional goals, objectives and strategies in the areas of water supply, water quality, flood protection and environmental enhancement. Strategies in the Functionally Equivalent Plan that addressed water supply were the Salinas Valley Water Project, the MCWD Eastern Distribution System and the City of Soledad Water Recycling Project.

In 2012, the Greater Monterey County Integrated Regional Water Management Plan was adopted, replacing the 2006 FEP. That plan included several water supply projects, including stormwater capture for additional CSIP supply, the Inter-Lake Tunnel Project to connect the San Antonio and Nacimiento Reservoirs, the RUWAP Urban Recycled Water Project, and the initial wells for a Regional Seawater Desalination Project.

In 2013, the Monterey Peninsula, Carmel Bay, and South Monterey Bay Integrated Regional Water Management Plan (IRWMP) was adopted, updating the earlier 2007 Monterey Peninsula IRWMP. That plan included water quality enhancement projects, but no water supply projects.

4.2.5 Seawater Intrusion

While sufficient production capacity (versus water availability) to meet the projected ultimate demand within MCWD's service areas can be provided, there is concern that seawater intrusion may eventually degrade water quality in the Marina Area Subbasin where MCWD's wells are located and render all or a number of them unfit for domestic water supplies without further treatment, such as desalination. Similarly, there has been concern that hazardous substance contamination detected at the former Fort Ord might adversely affect the quality of water MCWD is serving within its Marina and Ord Community service areas (discussed in Section 4.2.6).

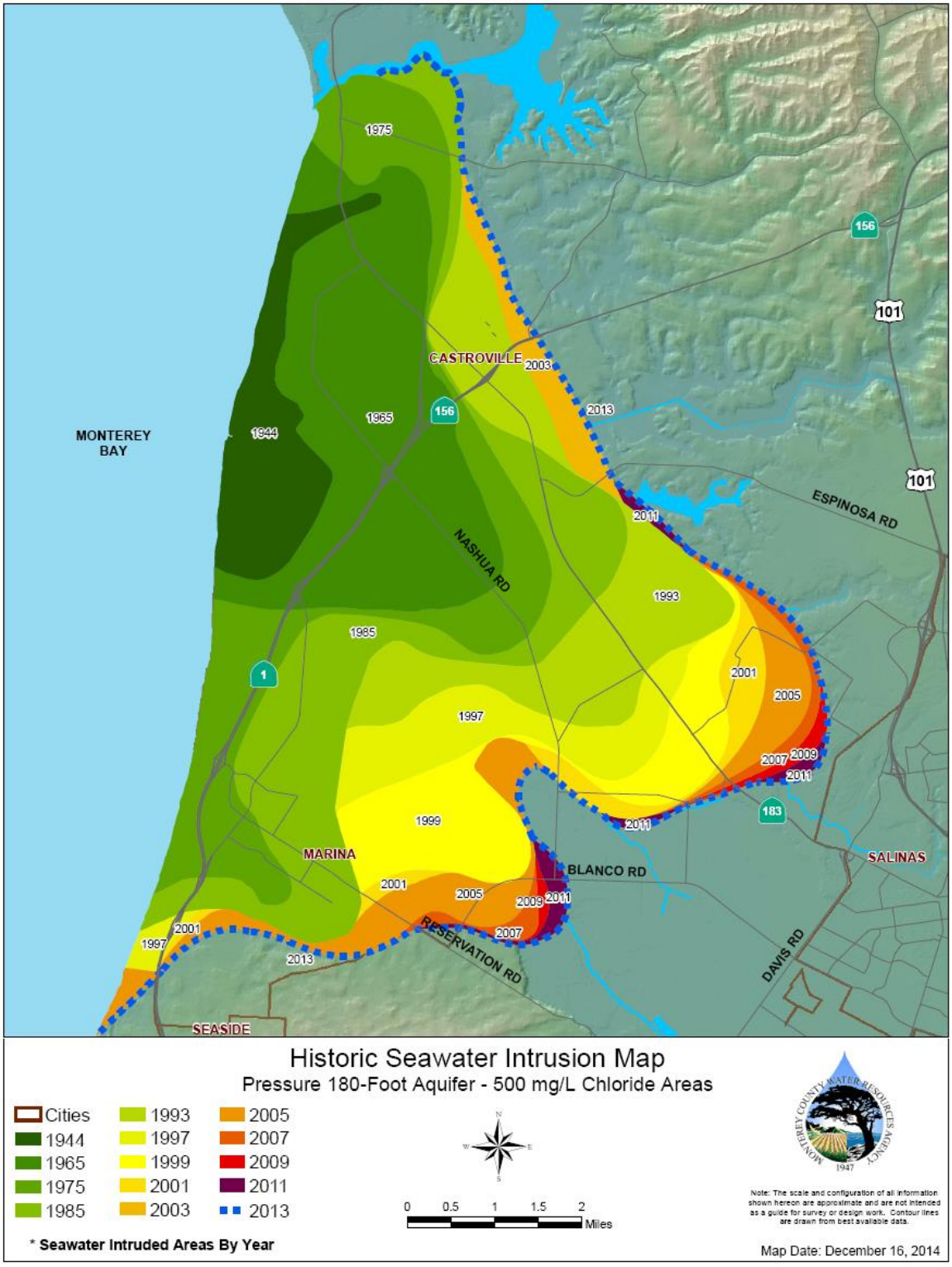
Seawater intrusion into 180-Foot and 400-Foot aquifers was identified along the coast over 50-years ago. The areas of seawater intrusion may be tracked using chloride concentration. A chloride concentration of 500 milligrams per liter (mg/L) is the upper California Department of Public Health Secondary Drinking Water Standard for chloride (250 mg/L is recommended) and is used as a measure of impairment of drinking water (water above 500 mg/L may still be suitable for non-potable uses). The line of chloride concentration (isohaline) of 500 mg/L water is used as the basis for determining the seawater intrusion front as shown on Figure 4.5 and Figure 4.6. Wells within the intruded areas were progressively moved further inland or into deeper aquifers. Note that these maps trace the timing and location of the "intrusion front" and do not reflect the current condition of groundwater behind the intrusion front.

Historically, MCWD supplied its Marina service area with water from 11 wells (MCWD-1 through MCWD-9, and two replacement wells) screened in the 180-Foot and 400-Foot aquifers. Between 1960 and 1992, some of those wells indicated varying degrees of seawater intrusion and were replaced, first moving from the 180-Foot aquifer to the 400-Foot aquifer, and later moving to the Deep Aquifer. The District currently has three Central Marina wells in the Deep Aquifer, MCWD-10, MCWD-11 and MCWD-12, constructed in 1983, 1986 and 1989 respectively. These wells are depicted in Figure 2.2.

The U.S. Army's original wells serving the former Fort Ord were located in the Main Garrison area near Marina. When wells indicated varying degrees of seawater intrusion, the Army in 1985 installed four wells further inland. Located near the intersection of Reservation and Blanco Roads in Marina (Figure 2.2), the wells draw from the 180-Foot and 400-Foot Aquifers (well numbers FO-29, FO-30, FO-31 and FO-32). Well FO-32 suffered a screen failure and was shut down in the late 1990s. The District added Wells 34 (in the Deep Aquifer) and Well 35 (in the 400-ft Aquifer) in 2011.

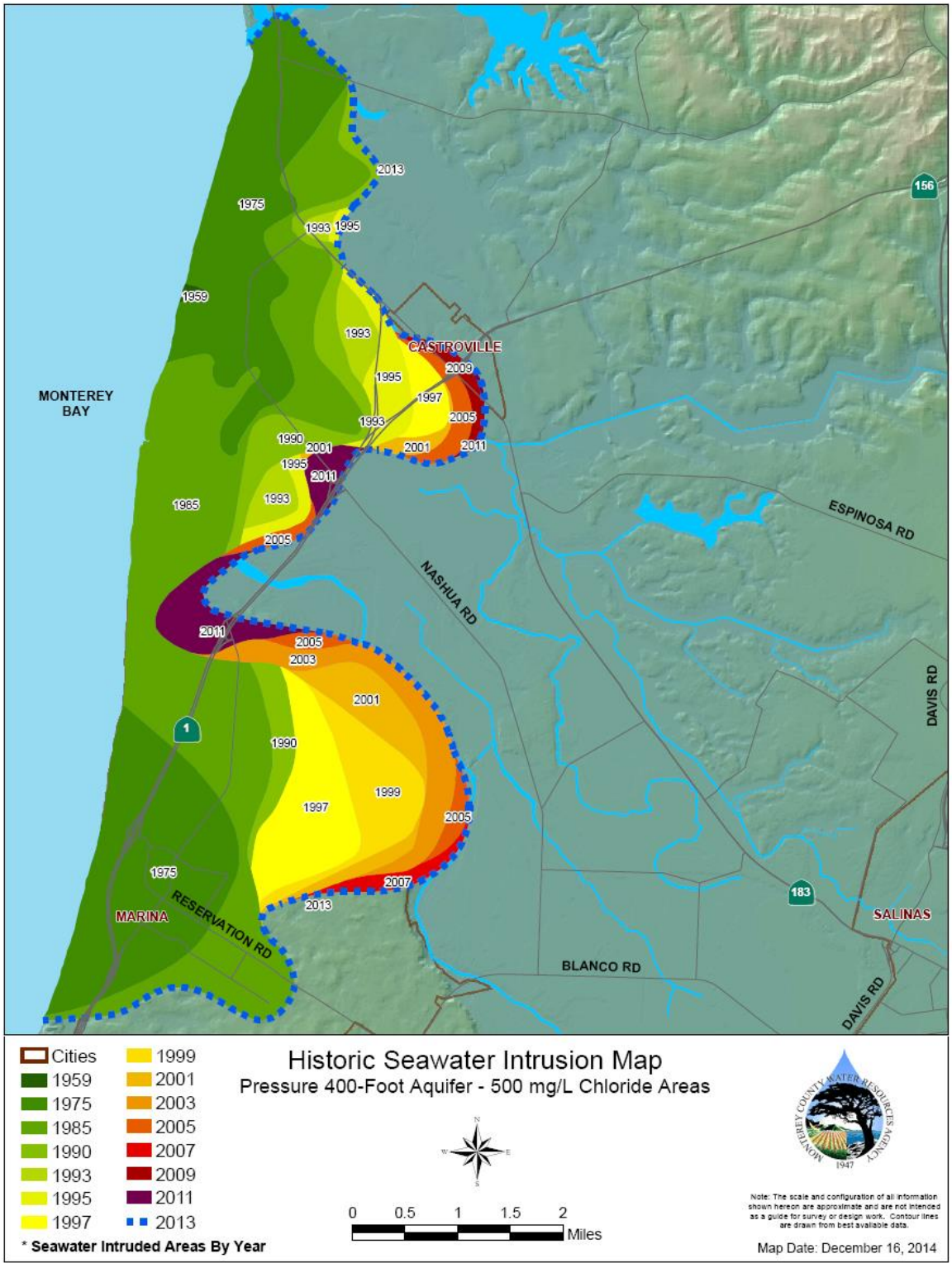
Ongoing monitoring by MCWRA indicates that the seawater intrusion front continues to migrate inland, particularly in the 180-Foot Aquifer, but as discussed below, groundwater conditions behind the front appear to be improving in some areas south of the Salinas River. Based upon the information available at the time, MCWD's 2007 Water System Master Plan identified the need for a phased replacement of wells in the threatened area. Additional data on the migration and extent of seawater contamination can be found in the Final Report Hydrogeologic Investigation of the Salinas Valley Basin in the Vicinity of Fort Ord and Marina, Salinas Valley California, April 2001.

Figure 4.5 Historic Seawater Intrusion in the 180-ft Aquifer[24]



[24] Source: MCWRA website

Figure 4.6 Historic Seawater Intrusion in the 400-ft Aquifer[25]



[25] Source: MCWRA website

Recent investigations being conducted in and around the North Marina Area as part of the Monterey Peninsula Water Supply Project have identified an occurrence of freshwater within the shallow dune sand aquifer and the underlying 180-foot aquifer within the area delineated as first experiencing seawater intrusion between 1975 and 1985. Water level data from wells in the shallow dune sand aquifer appear to show protective water levels that are sufficiently above sea level to prevent seawater intrusion in the shallower sediments. This condition, combined with the reduction in pumping in the 180-Foot aquifer in the North Marina Area, appears to have slowed seawater intrusion in this portion of the coastline. Water quality test results for chloride concentrations in the Dune Sand (A-Aquifer) and the 180-ft Aquifer zones is shown in Figure 4.7[26].

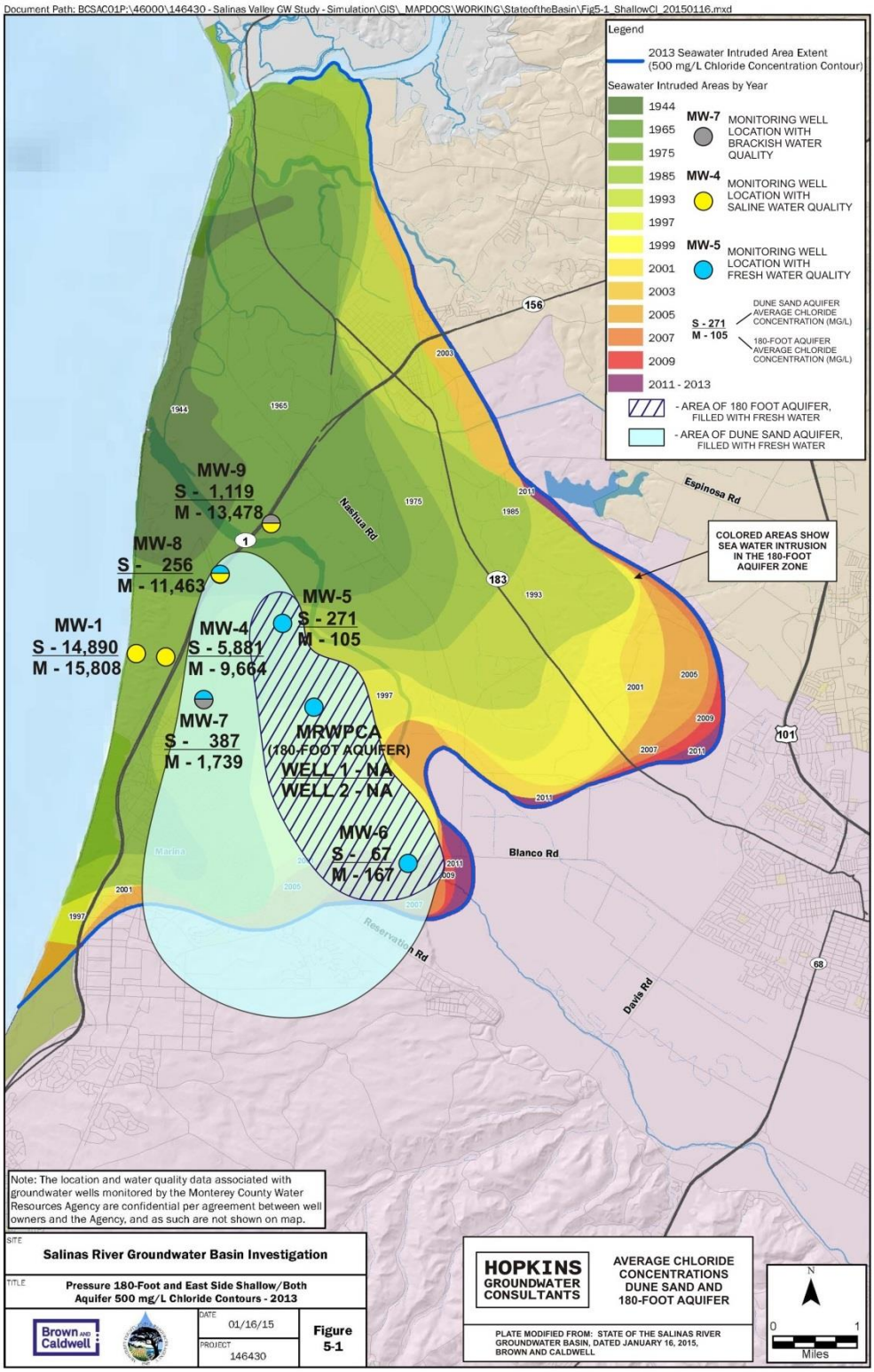
This recent data may suggest a change of groundwater conditions in this coastal section of the 180-ft Aquifer or they may just reveal the groundwater conditions in an area previously lacking in data. While the freshwater in this area contains salts and nutrients that are derived from overlying land uses that include agriculture, landfill, and wastewater treatment plant and composting facilities, the chemical character is not sodium chloride, which is indicative of seawater. Instead, the chemical character of groundwater in these new wells is calcium chloride and calcium bicarbonate[27]. Future use of this area for a potable groundwater supply may be unlikely; however, these conditions do show a retardation of seawater intrusion in these shallower aquifer zones in this coastal portion of the Salinas Valley Groundwater Basin, which provides some protection for inland uses of the 180-ft Aquifer.

There is some concern that the Deep Aquifer may become affected by seawater intrusion. MCWD operates a monitoring well installed between the Monterey Bay and the Marina production wells. That monitoring well serves as an early warning system to identify any seawater intrusion that might later affect MCWD's production wells, located further inland. Once identified, the District can install or begin operating one or more back-up wells to replace any potential future loss of production capacity.

It should be noted that water from the deep wells contains acceptable levels of chloride and total dissolved solids, which should not be misinterpreted as a sign of seawater intrusion. This natural salinity does not prevent the use of this water for municipal demands. The levels of chloride (average 99 mg/L) and total dissolved solids (average 386 mg/L) have not increased in the 25-years MCWD has operated the deep wells.

[26] See Technical Memorandum by Hopkins Groundwater Consultants in Appendix E.
[27] Ibid.

Figure 4.7 Dune Sand Aquifer and 180-Foot Aquifer Chloride Concentration Data[28]



[28] Source: Hopkins Groundwater Consultants, 2016

Another concern is that the Deep Aquifer may be connected to, and affect seawater intrusion in, the upper aquifers. Preliminary findings regarding the Deep Aquifer in the Ord Community area indicate that there is some vertical connectivity between the Deep Aquifer and the overlying aquifers. According to the Deep Aquifer Investigative Study, WRIME, May 2003, increased pumping of the Deep Aquifer would be expected to increase the rate of seawater intrusion in the middle and upper aquifers, but to a lesser extent than if the increased pumping occurred in the middle or upper aquifers. In that report, WRIME modeled the effect of increasing groundwater pumping from the Deep Aquifer by two to five times the baseline rate of 4,800 afy. The model predicted that, in the absence of other actions to control seawater intrusion, the landward flow of groundwater would increase as a result.

In 2008, that model was updated by Geoscience Support Services, Inc[29], and WRIME[30] to analyze the Regional Desalination Project (discussed in section 4.6.2). In those studies, the pumping of seawater-intruded groundwater from the 180-Foot Aquifer was modeled using 10-wells (Geoscience) and 5-wells (WRIME). Both studies concluded that pumping intruded groundwater from the 180-Foot Aquifer along the coast would halt and eventually reverse the landward flow of seawater-intruded groundwater in the upper aquifer. However, the pumping would develop a trough along the wellfield axis, resulting in lower static water levels in the 180-ft and 400-ft aquifers. In 2015, Geoscience updated the modeling for the Monterey Peninsula Water Supply Project with similar results[31].

MCWD is fully cooperating with the MCWRA's program to actively manage and protect the long-term availability of the Salinas Valley groundwater resource. Existing management efforts, reviewed above, include the successful implementation of the Castroville Seawater Intrusion Project and implementation of the annexation agreements that limit groundwater pumping and provide assessment revenue supporting MCWRA's activities to augment Basin water supplies. Those activities include ongoing operation of Nacimiento and San Antonio reservoirs to maximize groundwater recharge through dry-season storage releases that percolate through the Salinas River's streambed. As described in more detail in Section 4.2.7 below, those activities also include the MCWRA's development, approval and implementation of the Salinas Valley Water Project. Implementation of the Sustainable Groundwater Management Act will also better focus groundwater management activities in the Marina Area Subbasin and the adjoining North Marina Area of the 180/400 Foot Aquifer Subbasin.

[29] North Marina Ground Water Model, Evaluation of Potential Projects, July 25, 2008

[30] Groundwater Modeling Simulation of Impacts for Monterey Regional Water Supply Project, 20,000 AFY Desalination Pumping Scenario, October 29, 2008

[31] Monterey Peninsula Water Supply Project, Groundwater Modeling and Analysis, April 2015

4.2.6 Groundwater Contamination and Control

The former Fort Ord was identified by the U.S. Environmental Protection Agency (EPA) as a National Priority List federal Superfund site on the basis of groundwater contamination discovered on the installation in 1990. The facility was listed "fenceline to fenceline," covering all 28,000 acres. Initial investigations pinpointed 39 sites of concern in addition to two Operable Units (the Fritzsche Army Airfield Fire Drill Pit and the Fort Ord landfill) which had been investigated during the 1980s. The sites of concern included motor pools, vehicle maintenance areas, dry cleaners, sewage treatment plants, firing ranges, hazardous waste storage areas, and unregulated disposal areas. An additional two sites were added during the investigation process: one, a defueling area located at Fritzsche Army Airfield; the other, a fire drill burn pit in East Garrison. In all, 43 sites were investigated.[32]

In 2001, trichloroethylene (TCE), a cleaning solvent, was detected by the Army in one of the three water supply wells at the former Fort Ord. Subsequently, upon the transfer of ownership of the well to MCWD, MCWD also detected the presence of TCE in June 2002. TCE levels detected are below the Maximum Contaminant Levels (MCL) for potable use. The contamination is coming from an abandoned landfill and a fire training pit that were formerly used by the Army, but are now closed. The Army has responded to the landfill contamination problem by installing extensive groundwater cleanup systems to remove the contamination and prevent its further migration. The Army has also been monitoring groundwater quality at the former Fort Ord for a number of years to better understand the location and movement of groundwater contamination caused by the closed landfills.

State and federal safe drinking water MCL standards for TCE are set at 5.0 parts per billion, or approximately ten times higher than detected. Detection of TCE, even at the low concentration levels, was reported by MCWD, as required by law, to the California Department of Public Health (DPH). No additional action was deemed necessary by DPH because the concentration levels are well below the MCL of 5.0 parts per billion. Both MCWD and the Army regularly monitor the former Fort Ord wells to assess concentration changes. The 2015 TCE detections in the Ord Community wells ranged from non-detect to 1.8 parts per billion[33]. TCE detections have been intermittent since the initial detection in 2001.

MCWD continues to monitor the affected well, and all other wells, for TCE and other contaminants on a regular basis. Any changes in contaminant plume migration due to increased MCWD pumping will be monitored and appropriate actions taken. MCWD maintains close coordination with the U.S. Army Corps of Engineers, who manages groundwater cleanup efforts

[32] www.Fortordcleanup.com Mactec Engineering and Consulting, Inc.

[33] EPA test method 524.2 is accurate to +/- 20%.

on the former Fort Ord. The Corps of Engineers recently published an update to their mitigation program, depicted in Figure 4.8.

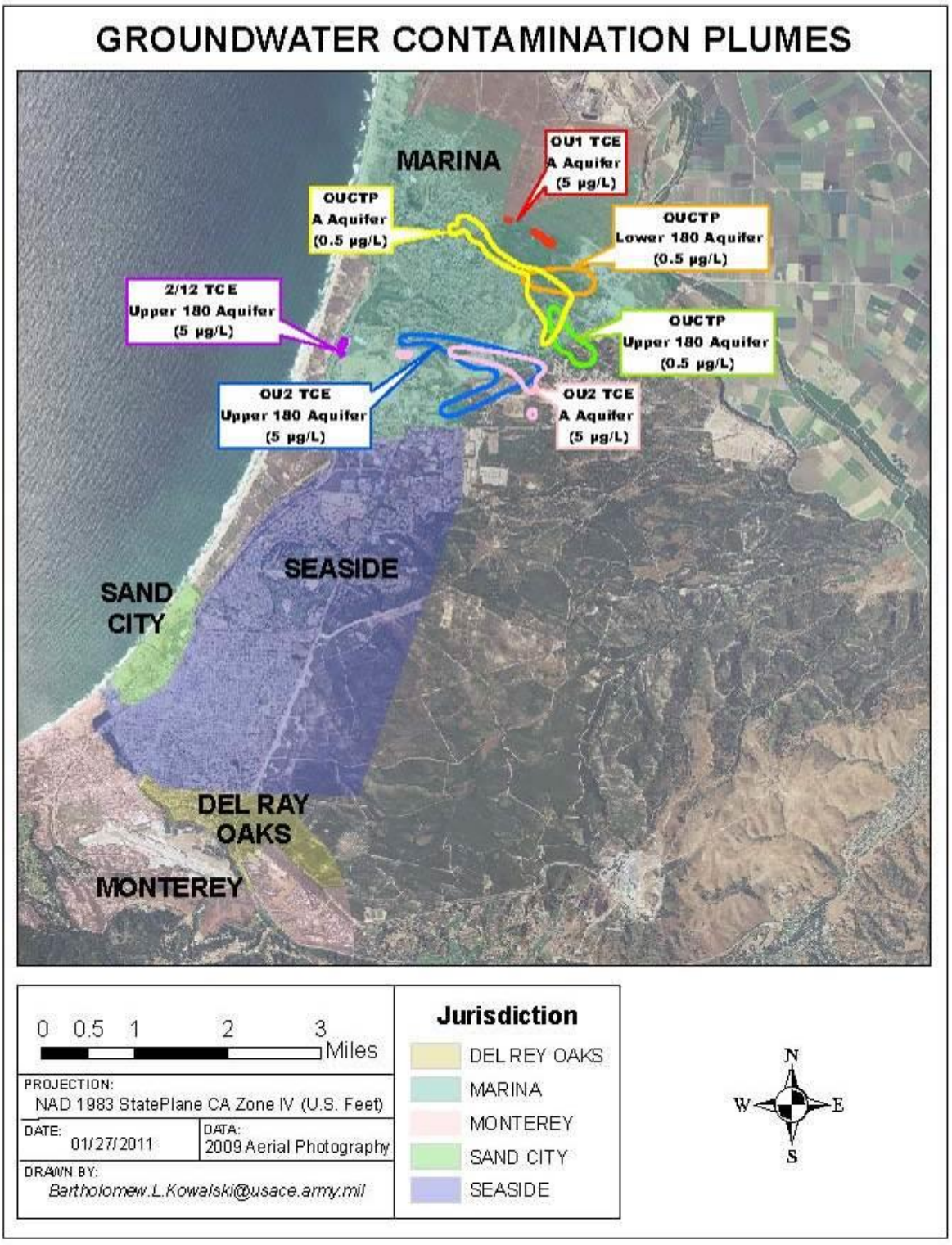
The Defense Department is required by law to clean up contamination to below allowable contaminant levels set by the State Department of Public Health as a public health protection measure. Groundwater samples are taken quarterly and compiled in annual status reports. Additionally, all data is summarized in documents known as five-year reviews. It is expected that final groundwater cleanup may take another 30 years to complete. Additional information on groundwater cleanup and other base contamination remediation actions can be found at www.fortordcleanup.com.

Because Fort Ord is on the National Priority List, section 9604(i) of the federal Superfund law (Comprehensive Environmental Response Compensation and Liability Act, or "CERCLA") requires the federal Agency for Toxic Substances and Disease Registry ("ATSDR") to complete an assessment of whether any hazardous substances at the site pose a threat to human health. ATSDR analyzed whether hazardous substances released at Fort Ord might threaten human health by contaminating drinking water wells serving Marina and Ord Community. ATSDR's final health assessment concludes as follows:

- There are no detections of groundwater contaminants at levels of health concern in the presently "active" drinking water wells on Ord Community. The water at Ord Community is safe to drink. Because the drinking water wells currently in use in the Ord Community are located far from sources of contamination, drilled to deep aquifers that are not likely to be contaminated, and monitored regularly, the Ord Community's drinking water supply should be safe to drink in the future.
- Because the concentration of groundwater contamination detected in the past in the Ord Community and Marina drinking water wells was low and the duration of exposure was short, adverse health effects will not likely result.
- The water supplied by drinking water wells presently used by Marina is safe to drink. Further, because Marina's drinking water wells are drilled to deep aquifers and the quality of the water is monitored regularly, Marina's drinking water should be safe to drink in the future.[34]

[34] See ATSDR Public Health Assessment, Fort Ord, Marina, Monterey County, California (Community Health Concerns and Potential Pathways of Exposure).

Figure 4.8 Groundwater Contamination Plumes[35]



[35] Source: U.S. Army Corps of Engineers, Fort Ord Office

The Salinas Basin has experienced nitrate contamination, a pollutant coming primarily from animal confinement activities (dairies, feedlots) and from irrigated agriculture, sewage treatment plant effluent and septic tanks. This contaminant is a concern, particularly in upper reaches of the 180-Foot Aquifer. Although certain wells in the Salinas Valley have exceeded the state health standard of 45 mg/L of nitrate as NO3, nitrate levels in the 400-Foot Aquifer are low due to intervening clay layers between the 180-Foot and 400-Foot aquifers.

No nitrate contamination is evident in, or in the vicinity of, any of the MCWD's wells. Due to the location of the nitrate sources at or near the ground surface, remote from MCWD's wells, with contamination in only the upper reaches of the shallowest, 180-Foot Aquifer, nitrate contamination does not pose a threat to MCWD's sources of groundwater supply.

4.2.7 Salinas Valley Water Project

MCWRA has maintained and operated Nacimiento and San Antonio reservoirs since they became operational in 1957 and 1967, respectively. The operation of both reservoirs has been, and continues to be, for two primary hydrologic functions: flood control and conservation, i.e. the storage and release of runoff to recharge the Salinas Valley Groundwater Basin via the Salinas River.

On June 4, 2002, the MCWRA adopted a basin-wide program, known as the Salinas Valley Water Project (SVWP or Project), to continue addressing water supply issues in the Salinas Valley Groundwater Basin. MCWRA's adoption of the SVWP followed its certification of a Final Environmental Impact Report / Environmental Impact Statement on June 4, 2002. The Project's documentation including the Final Engineers Report and complete Environmental Impact Report can be accessed at: http://www.mcwra.co.monterey.ca.us/projects/projects.php.

The objectives of the SVWP are:

- Halting seawater intrusion;
- Continuing conservation of winter flows for recharge of the Salinas Valley basin through summer releases;
- Providing flood protection;
- Improving long-term hydrologic balance between recharge and withdrawal; and
- Providing a sufficient water supply to meet water needs through the year 2030.

The SVWP was specifically developed to provide for the long-term management and protection of groundwater resources in the Salinas Valley Groundwater Basin by: (1) providing a source of water to the Basin by reoperating Nacimiento and San Antonio reservoirs and capturing water via a seasonal surface diversion structure to provide water for agriculture; and (2) maintaining present conservation release practices to recharge the groundwater basin. To do that, the SVWP includes the following components:

- Modification of Nacimiento Dam spillway;
- Reoperation of Nacimiento and San Antonio reservoirs;
- Salinas River recharge, conveyance and rediversion;
- Distribution/delivery of water; and
- Delivery area pumping management.

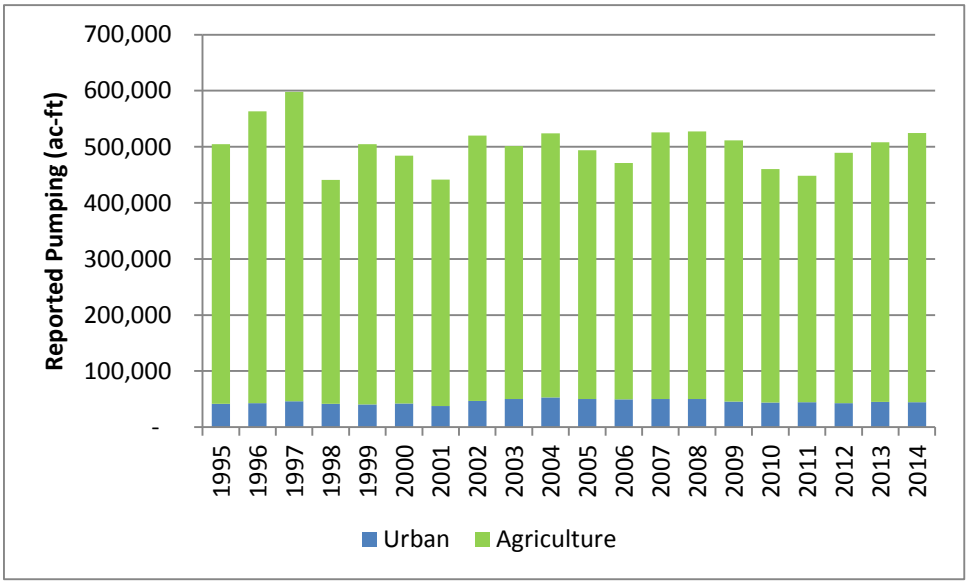
The Project includes operation and maintenance of the Nacimiento and San Antonio reservoirs, modification of the spillway at Nacimiento Dam, and installation of a rubber inflatable dam on the Salinas River to allow for rediversion of about 10,000 acre-feet of reservoir releases to be made available in lieu of groundwater pumping for irrigation. In total, by 2030 an additional yield of 37,000 afy is expected.

The Salinas Valley Water Project EIR anticipated that water demands on the basin would decline by about 20,000 afy, from 463,000 afy in 1995 to 443,000 in 2030, due to urban and agricultural conservation efforts, conversion of agricultural lands and some crop shifting.[36] This overall decline was expected to occur despite the projected doubling of the population served by the Salinas Valley Groundwater Basin, from 188,949 in 1995 to 355,829 in 2030. The reported SVGB pumping in 2014 was 524,487 ac-ft, with an estimated population of 320,000. Irrigated acreage was approximately equal, with 173,200 acres in 1995 and 179,500 acres in 2014. Water demand for agriculture was above average in 2014 due to the drought (see Figure 4.9). While the anticipated decline in urban water demand has borne out, agricultural demand has remained steady as growers have increased their crop production per acre.

The Project was constructed in 2008 to 2010, and the Salinas River Diversion Facility was placed in operation in April 2010. Due to the state-wide drought that began in 2013, the SRDF was not operated in 2014 or 2015. Given the limited (4-year) period of initial operation, it cannot yet be determined if this project will halt seawater intrusion in the 180/400 Foot Aquifer Subbasin of the Salinas Basin, or if additional measures will be required. MCWRA intends to monitor the effects of the implementation of the Plan and pursue additional remedies as needed if seawater intrusion is not arrested. MCWD will participate in this monitoring and evaluation process, with existing monitoring wells throughout the District.

[36] Salinas Valley Water Project, Draft Master EIR, 1998, p. 3-15

Figure 4.9 Salinas Valley Groundwater Pumping, 1995-2014[37]



The State Water Resources Control Board has also been closely monitoring the MCWRA's ongoing efforts to stop seawater intrusion in the Salinas Valley Groundwater Basin and has provided almost $7 million in funding to the MCWRA for development of this seawater intrusion solution. After reviewing the technical documents assessing the beneficial effect of the Salinas Valley Water Project on seawater intrusion, the SWRCB concluded "that seawater intrusion can be stopped."[38]

4.3 Water Transfer Opportunities

MCWD does not share a boundary with other wholesale or retail water suppliers on its west, north or eastern boundary, but it does share boundaries with Seaside Municipal Water System and the California American Water Company – Monterey Service Area (CAW) along MCWD's southern boundary. Under current law, water supply from the Salinas Valley Groundwater Basin cannot be exported to customers in other basins. Therefore, any connections made must be for emergency use only or of a "zero-balance type" (volume added must equal volume withdrawn),.

In 2006, the District investigated the possibility of interconnecting with the Seaside Municipal Water System at a point near Seaside High School. Proposed was an emergency-only connection, for use in the event of large fire demands or catastrophic system failures. Although not constructed at the time, the possibility of a future emergency connection still exists.

In 2008-2009, the District constructed a new water main in General Jim Moore Blvd to serve the southern portion of the Ord Community, particularly Del Rey Oaks which is at the southern end

[37] MCWRA Annual Groundwater Extraction Summary Reports, 1995 to 2014
[38] Salinas Valley Water Project Final EIR at page 2-129

of General Jim Moore Blvd. At that time, CAW was working with the Monterey Peninsula Water Management District to develop an aquifer storage and recovery project for the Seaside Groundwater Basin, with injection wells located at the northern end of General Jim Moore Blvd. A joint-use agreement was entered into by MCWD and CAW for this new pipeline. Under the agreement, both agencies meter the amount of water added to and taken from the pipeline. The system must be managed to a net zero-balance in accordance with current law.

Additional transfer opportunities exist within Zone 2/2A of the Salinas Valley Groundwater Basin. MCWD could purchase the rights to existing groundwater supplies currently used elsewhere in the Salinas Valley and transfer the water to the District service area. This would require curtailment or reduction of well pumping on the donor land to allow increased pumping from District wells. Such transfers would have to be performed on a willing-seller, willing-buyer basis and with the cooperation of the Monterey County Water Resources Agency.

4.4 Future Water Supply

Looking at the projected demands in Table 4.3, the total Ord Community groundwater supply of 6,600 afy falls short of the total 2030 Ord Community demand of 8,293 afy by 1,693 afy. Considering only those jurisdictions with shortfalls, the Ord Community shortfall becomes 2,901 afy (calculated as the sum of the jurisdictional shortfalls). That shortfall may be reduced by up to 171 afy, if water supply from Monterey County is provided to the Monterey Downs Specific Plan area, which is located in unincorporated Monterey County but planned for annexation into Seaside. In the 2010 UWMP, the 20-year projected demand for the Ord Community exceeded the available groundwater supply by 1,572 afy (= 8,172 - 6,600). As in the 2010 UWMP, the Central Marina service area is not projected to exceed its current SVGB groundwater allocation within the planning period.

Table 4.3 Ord Community Groundwater Shortfalls

Jurisdiction	2035 Demand	Allocation	Shortage*
U.S. Army	825	1,577	0
CSUMB	779	1,035	0
Del Rey Oaks	551	243	308
City of Monterey	130	65	65
County of Monterey	539	710	0
UCMBEST	515	230	285
City of Seaside (Ord Portion)	2,876	1,012	1,864
State Parks and Rec.	25	45	0
City of Marina (Ord Portion)	1,704	1,325	379
Assumed Line Loss	348	348	0
Total	**8,293**	**6,600**	**2,901**

* Jurisdictions with surpluses are shown with 0 shortage.

As discussed in the following subsections, MCWD has been actively working towards developing additional water supplies to meet the needs of the Ord Community. This new supply

will come in the form of recycled water for urban landscape irrigation and desalinated water for potable demand. Table 4.4 shows the projected use of recycled water, as described in the Environmental Impact Report for the Regional Urban Water Augmentation Project. In the table, the desalination supply is the net potable shortfall after recycled water is supplied. Expanded tables showing demands by jurisdiction are in Appendix C.

Table 4.4 Projected Demand by Source (afy)

	2015	2020	2025	2030	2035
Groundwater	4,204	5,605	8,089	8,428	9,075
Recycled Water	0	600	1,359	1,359	1,359
Desalinated Water	0	0	489	1,332	1,763

4.4.1 Regional Urban Water Augmentation for the Ord Community

FORA's 1997 Final EIR, Reuse Plan and Master Resolution projected that redevelopment of the former Fort Ord would add approximately 8,700 new residential dwelling units and 4.9 million square feet of commercial/industrial development by the year 2015. Total water demand on the base was projected to by 9,000 afy. The water supply mitigation target in the Final EIR is 2,400 afy, calculated as the difference between the total demand and the 6,600 afy of existing groundwater supply (9,000 – 6,600 = 2,400). That original estimation assumed that the Bayonet/Blackhorse Golf Course would continue to be supplied by wells in the Seaside Groundwater Basin.

From 1998 to 2015, there have been 730 new dwelling units constructed and just under 1.0 million square feet of commercial development within the Ord Community (in addition to renovation of existing facilities and construction of over 500 replacement dwelling units). The development projections in this plan show an additional 10,400 dwelling units and 6.8 million square feet of commercial development being added over the next 20 years. The projected total water demand in the Ord Community is 8,300 afy in the year 2035. However, the sum of the projected supply shortfalls of the separate jurisdictions is about 2,900 afy. A portion of this projected future development will be considered above the amount mitigated under the Base Reuse Plan Final EIR.

MCWD's water supply plans include utilizing a combination of recycled water and desalination to meet the Ord Community's future demands as identified in the Fort Ord Base Reuse Plan. These plans are further described in MCWD's Environmental Impact Report for the Regional Urban Water Augmentation Project (RUWAP), certified in October 2004, and later amended in October 2006, February 2007 and April 2016. The RUWAP proposes to provide an additional water supply of 2,400 afy for the Ord Community area (also known as the former Fort Ord military base) as identified in the Fort Ord Reuse Plan. When the RUWAP EIR was prepared, it included the golf course in the list of potential recycled water customers, but did not increase the project size to account for the additional demand (approximately 400 afy).

The Water Augmentation Project as evaluated in the RUWAP EIR consisted of two distinct alternatives and one hybrid alternative. One alternative considered was wastewater recycling, and the other was desalination of seawater-intruded groundwater. The hybrid alternative was equal amounts of recycled and desalinated water (1,500 afy desalination, including incorporation of the currently idle desalination plant producing 300 afy and 1,500 afy of recycled supply).

On June 10, 2005, the MCWD and FORA boards of directors endorsed the "hybrid alternative" from the October 2004 Regional Urban Water Augmentation Project EIR and directed the staffs to begin scoping to develop specific plans for the additional 2,400 afy of supply to MCWD, with 300 afy of recycled water available to the Monterey Peninsula. The hybrid alternative includes a recycled water component and a desalinated water component. In 2007, the EIR was amended to increase the recycled water component to a maximum of 1,727 afy (1,427 for the Ord Community plus 300 afy for the Monterey Peninsula), with the total project remaining at 2,400 afy. Also in 2007, the Fort Ord Reuse Authority allocated the project's recycled water component among the land use jurisdictions in the Ord Community, as shown in Table 4.5.

Table 4.5 Recycled Water Allocations (afy)

Jurisdiction	Allocation
U.S. Army	0
CSUMB	87
Del Rey Oaks	280
City of Monterey	0
County of Monterey	134
UCMBEST	60
City of Seaside (Ord Portion)	453
State Parks and Rec.	0
City of Marina (Ord Portion)	345
Assumed Line Loss	68
Total	1,427

In 2012, the Monterey Regional Water Pollution Control Agency and the Monterey Peninsula Water Management District began planning the Pure Water Monterey Groundwater Replenishment Project, as described in Section 4.5.3, which includes the advanced treatment of recycled water for indirect potable reuse.

On April 8, 2016, MCWD and MRWPCA entered into an agreement which would provide up to 1,427 AFY of advanced treated water for urban landscape irrigation instead of the tertiary treated recycled water planned under the RUWAP. To address the remaining (potable) water augmentation under the Base Reuse Plan, MCWD, FORA, and MRWPCA entered into a memorandum of understanding on May 13, 2016, to explore the most cost effective and technically efficient mix of advance treated water, conservation, desalination, groundwater recharge and recovery, and other water sources, options, and alternatives to provide the additional 973 afy for the Ord Community.

4.4.2 Surface Water Supplies

The District is located along the Salinas River, and MCWD Board of Directors has considered purchasing surface water rights in the Salinas River Basin as a means of meeting long-term (beyond 2030) demands. MCWD has previously been in negotiations with a senior (pre-1914) water right holder but no purchase has been consummated. MCWD has also studied the possibility of constructing a surface water treatment plant, which would utilize surplus Salinas River water. That option potentially is available to meet additional demands beyond the 20-year planning horizon. Also, Phase II of the Salinas Valley Water Project, examined at a programmatic level in the SVWP EIR, calls for surface water to be made available to coastal urban water agencies in the future. MCWRA holds an undeveloped water right permit 11043 with a priority date of July 11, 1949, for diversion of up to 400 cfs of peak flows from the Salinas River. The State Water Resources Control Board amended the permit in 2013, setting a deadline of July 1, 2026, for completing the planning, permitting and construction of the intake and initiating diversions under the permit.

4.4.3 Stormwater Capture

The surface geology within the District service area is predominantly coastal dune sands, and stormwater disposal is primarily through the use of percolation basins. Within portions of the former Fort Ord there were stormwater collection systems that conveyed runoff to the Monterey Bay. These outfalls have been converted to on-shore percolation basins, and most of the areas served have been converted to local percolation ponds. Local percolation recharges the shallow, unconfined aquifer, with a portion of that reaching the 180-ft aquifer.

Because the existing stormwater systems are decentralized, terminating at numerous small percolation lots, stormwater capture for municipal use is not currently planned as a water source. In neighboring communities such as Pacific Grove, summer urban runoff is diverted to the sanitary sewer system to reduce discharges to the Monterey Bay, which also increases the amount of recycled water produced at the regional wastewater treatment plant. Capture of peak urban runoff during the winter months has the potential to cause sanitary sewer system overflows, so diversions are not made in the wet season.

4.4.4 Future Water Supply Assessments and Written Verifications of Supply

In the Ord Community the FORA Final EIR, Reuse Plan and Master Resolution provide mitigation for the initial redevelopment of the former Fort Ord. The 2,400 afy of new water supply mitigation was intended to meet the additional water demands projected to occur by the year 2015. On June 10, 2005, the MCWD and FORA board of directors endorsed the "hybrid alternative" from the September 2004 Regional Urban Water Augmentation Project EIR. This Project need is consistent with water required by the existing Fort Ord Base Reuse Plan. Additional development above the amount addressed in the Base Reuse Plan EIR will require separate environmental review and potentially additional water supply, which must be funded by

the project proponent. The 2035 net supply imbalance is 2,901 afy, of which 2,400 afy may be met under the RUWAP EIR. The potable component of the Augmentation Project will be allocated by FORA among its member land-use jurisdictions, just as FORA allocated its share of the 6,600 ac-ft of Salinas Valley groundwater and Phase 1 recycled water among its member land-use jurisdictions. No assumption is made here regarding reallocation of groundwater within the Ord Community, as each jurisdiction may foresee development beyond the 20-year planning horizon of this report. MCWD will continue to track actual development's consumption of water against estimates in order to plan supplemental supplies as may be necessary.

The water augmentation recycled supply is expected to be on-line by 2020. MCWD has not considered this supply to be "available" in its written verifications of supply because it does not meet the legal requirements to support tract map approvals, building permits or will-serve letters under SB 221. MCWD currently issues water supply verifications under the requirements of SB 221 and will-serve letters based on final subdivision map phases considering only that water which is currently available (SVGB and Marina desalination supply), up to the point where a given land use jurisdiction's allocation is fully allocated to projects. For purposes of this UWMP and requirements of SB 610 water supply assessments, the water augmentation supply is considered available for planning purposes within the 20 year time frame of the UWMP.

4.5 Recycled Water

4.5.1 Existing Water Recycling Systems

MCWD collects wastewater in its two wastewater collection systems serving the City of Marina and the Ord Community, and conveys it to an interceptor pipeline operated by the Monterey Regional Water Pollution Control Agency (MRWPCA). The wastewater is then conveyed to the MRWPCA Regional Treatment Plant (RTP) north of Marina. Wastewater is treated to secondary treatment standards at the RTP facilities and that water not designated for further treatment and recycling is discharged via an ocean outfall. Water designated for further treatment is conveyed to the adjacent Salinas Valley Reclamation Plant (SVRP) that currently produces about 14,000 AFY of tertiary-treated recycled water meeting the standards of Title 22 of the California Code of Regulations. The recycled water is delivered to the Castroville Seawater Intrusion Project (CSIP), irrigating farmland in the greater Castroville area, reducing demands on Salinas Valley groundwater and retarding seawater intrusion in that area. In 2015, 14,250 acre-feet of tertiary-treated water was delivered for crop irrigation. While MCWD has senior rights to recycled water through its agreement with the MRWPCA, MCWD does not currently use recycled water within its two service areas.[39] The existing CSIP system and two proposed water recycling projects are shown on Figure 4.11, which is at the end of the recycled water section.

[39] MCWD was the first agency to contract for recycled water with the MRWPCA, preceding subsequent contracts by others for recycled water supply.

The Marina Coast Water District has two points of connection to the regional wastewater collection system. Central Marina connects via a dedicated pump station. The total flow at that station was approximately 1,200 afy in 2015. The Ord Community connects via a gravity pipeline with a metering flume. The total flow at the flume was just under 900 afy in 2015. In 2015, municipal wastewater flows to the RTP were 19,700 afy, with MCWD contributing about 11%. As redevelopment occurs and water use increases, a portion of the increased wastewater flows may be made available as recycled water for urban use. The SVRP is capable of producing an average of 29.6 mgd of recycled water or about 33,000 afy. However, as agricultural demands are seasonal, this capacity cannot be fully utilized year round. To increase recycled water yield based on current wastewater flows, storage capacity to capture winter flows for summertime use would be required. As wastewater flows increase due to urban development, additional recycled water may be produced.

In 1989, MCWD entered into an annexation agreement with MRWPCA. This agreement established MCWD's first right to receive tertiary treated wastewater from the SVRP. MCWD has the right to obtain treated wastewater from MRWPCA's regional treatment plan equal in volume to that of the volume of MCWD wastewater treated by MRWPCA and additional quantities not otherwise committed to other uses. Although several methods of delivering recycled water from MRWPCA to Central Marina have been studied, none has yet been constructed. Detailed plans for the Ord Community recycled water delivery have been developed, as discussed below.

MCWD operated its own water reclamation facility from 1994 to 1997 under the California Regional Water Quality Control Board (RWQCB) Waste Discharge Requirement (WDR) No 91-95 and Monitoring Report No. 92-95. These water reclamation requirements specify the user sites, water quantity, water quality, and a monitoring and reporting program. In 1997 MCWD discontinued production at its water reclamation facility and directed the raw wastewater flow to the MRWPCA RTP under the annexation agreement.

4.5.2 RUWAP Recycled Water System

MCWD and MRWPCA have been jointly pursuing an urban recycled water project,[40] which forms the recycled water alternative in the Regional Urban Water Augmentation Project. Planning for this project found that a total of 1,727 afy could be made available for urban use without adding seasonal recycled water storage (Phase 1 Project). 1,427 afy of recycled water would be supplied for urban irrigation within the Ord Community, and the remaining 300 afy could be used in other jurisdictions on the Monterey Peninsula. MCWD's right to purchase recycled water has a contractual upper limit in the summer months, so providing this volume of recycled water supply requires the commitment of summertime flows from MRWPCA and

[40] Regional Urban Recycled Water Distribution Project Report, RBF, 2003.

MCWRA. Seasonal storage would allow recycled water, for which there would otherwise be little demand during the winter, to be made available for irrigation demands in warmer months, rather than discharging treated wastewater to the ocean. Projected Phase II demands that could be served through additional distribution lines and seasonal storage facilities could bring the total recycled water demand to about 3,000 afy, with 2,171 afy of demand that could be served within MCWD.

In 2006, the District began design of the recycled water system. In the Basis of Design Report, the projected non-potable water demands were recalculated, as shown in Table 4.6. Potential Phase 1 uses generally included planned or existing landscapes along the recycled trunk main alignment, such as the existing Bayonet/Blackhorse Golf Course in Seaside, the sports fields at CSUMB, and the proposed golf resort in Del Rey Oaks. The total of existing irrigation demands (1,935 afy, see Table 4.6) exceeds the size of the Phase 1 project (1,427 afy, see Table 4.5), which targets customers along the main pipeline route. Potential Phase 2 uses generally included planned or existing landscapes that required construction of lateral pipelines from the trunk main. Potential customers identified but not included in the Phase 1 project may be included in the future Phase 2.

Construction of a recycled water distribution system was estimated to cost $34 million in the 2006 Basis of Design Report. Therefore, full use of the project capacity is required to minimize the per customer costs.

Table 4.6 Non-Potable Water Demand Projections (ac-ft/yr)

Jurisdiction	Phase 1	Phase 2	Total
U.S. Army		38	38
CSUMB	202	109	311
Del Rey Oaks	338		338
City of Monterey			0
County of Monterey	47	614	661
UCMBEST	55		55
City of Seaside (Ord Portion)	806	140	946
State Parks and Rec.		5	5
City of Marina (Ord Portion)	435	391	826
Marina Sphere			0
Marina Central	52	87	139
Subtotal	1,935	1,384	3,319
Outside MCWD	300	59	359
Total	2,235	1,443	3,678

Under the RUWAP EIR, the Recycled Water Project was resized to 1,727 afy, with 1,427 afy going to the Ord Community and 300 afy going to the Monterey Peninsula. Phase 2 of the project was not addressed in the EIR, but remains an available demand management strategy for both MCWD and California American Water.

MCWD, in coordination with the MRWPCA and MCWRA as part of its Water Augmentation Project, has designed a transmission line through Marina, the Ord Community, and into the City of Seaside. MCWD has constructed approximately four miles of recycled pipeline to date, taking advantage of opportunities to install pipelines while roads were being reconstructed by the Fort Ord Reuse Authority. MCWD has designed the remainder of the recycled water distribution system, and is awaiting funding and redevelopment water demands before proceeding with the construction.

Subject to Monterey County Department of Environmental Health and State Department of Public Health approval, MCWD requires the installation of recycled water pipelines to serve all recreational and common irrigated open space areas within new developments (MCWD Code § 4.28.030, Recycled Water Service Availability). This requirement is waived only when the land use jurisdiction indicates that future recycled water will not be allocated to a project. The City of Seaside has adopted a more restrictive standard, requiring residential front yards to be plumbed for future recycled water in addition to recreational and common areas.

4.5.3 Pure Water Monterey Project

The Pure Water Monterey Groundwater Replenishment Project is currently being pursued by the Monterey Regional Water Pollution Control Agency (MRWPCA) and the Monterey Peninsula Water Management District (MPWMD), with cooperation from MCWD, MCWRA and the City of Salinas. The project will develop new sources of water supply and convey them to the MRWPCA Regional Treatment Plant, where they will be recycled as either Advanced Treated Water for indirect potable reuse in the Seaside Groundwater Basin, or as additional Tertiary Treated Water for CSIP. The project is expected to off-set approximately 4,300 AFY of groundwater pumping for irrigation in the Pressure Subarea. The adopted EIR for the project is available at: http://purewatermonterey.org/reports-docs/cfeir/. The groundwater replenishment component replaces the MRWPCA's previously planned urban recycled water deliveries to the Monterey Peninsula under RUWAP.

The sources of supply identified in the Pure Water Monterey project include: secondary-treated municipal wastewater which is currently discharged to the ocean outfall (i.e., winter flows); agricultural wash water from vegetable processing, which is currently treated at the Salinas Industrial Wastewater Treatment Facility (SIWTF); urban run-off from the City of Salinas and City of Monterey; and surface water diversions from the Blanco Drain, Reclamation Ditch and Tembladero Slough, which primarily carry agricultural tile drainage during the summer months. All of these flows would be conveyed to the regional treatment plant, most using available capacity in the existing wastewater interceptor system and at the Salinas Pump Station (SAPS). A new Advanced Water Treatment Facility (AWTF) would be constructed within the MRWPCA property north of Marina. Advanced Treated Water for indirect potable reuse would be conveyed to the Seaside Groundwater Basin in a new pipeline, and the additional tertiary-treated recycled

water would be conveyed to irrigators using the existing CSIP system. A simplified diagram of the project is provided in Figure 4.10.

The proposed alignment for the Pure Water Monterey advanced treated water pipeline is the same as for the MCWD RUWAP recycled water trunk main. The two agencies have agreed to share a single pipeline, and to deliver advanced treated water for urban irrigation instead of tertiary-treated recycled water as originally planned. Due to the size and length of the trunk main, combining the two projects results in a significant cost savings. The source water for the MCWD portion of the project is the municipal wastewater which was originally slated for tertiary treatment.

On April 8, 2016, MCWD and MRWPCA entered into the Pure Water Delivery and Supply Project Agreement wherein the Product Water Conveyance Facilities will be designed, constructed, owned, and operated by MCWD with a capacity sufficient to convey the 5,127 afy of advance treated water and wherein MCWD will have the right to utilize up to and including a net 1,427 afy of the AWTF's treatment capacity to serve the Ord Community and to implement the recycled water portion of the Regional Urban Water Augmentation Program. As shown in Table 3.10, the project is expected to provide 600 afy in 2020, and increase to 1,359 afy in 2025. The project functions as an in-lieu groundwater recharge project and will be a major component of any groundwater sustainability plan for the Marina Area.

On April 18, 2016, the MCWD Board of Directors adopted Amendment 3 to the RUWAP EIR, evaluating shared use of the trunk main and delivering advanced treated water. This completed the CEQA process covering MCWD's work under the Pure Water Delivery and Supply Project Agreement.

Figure 4.10 Pure Water Monterey Schematic (partial)

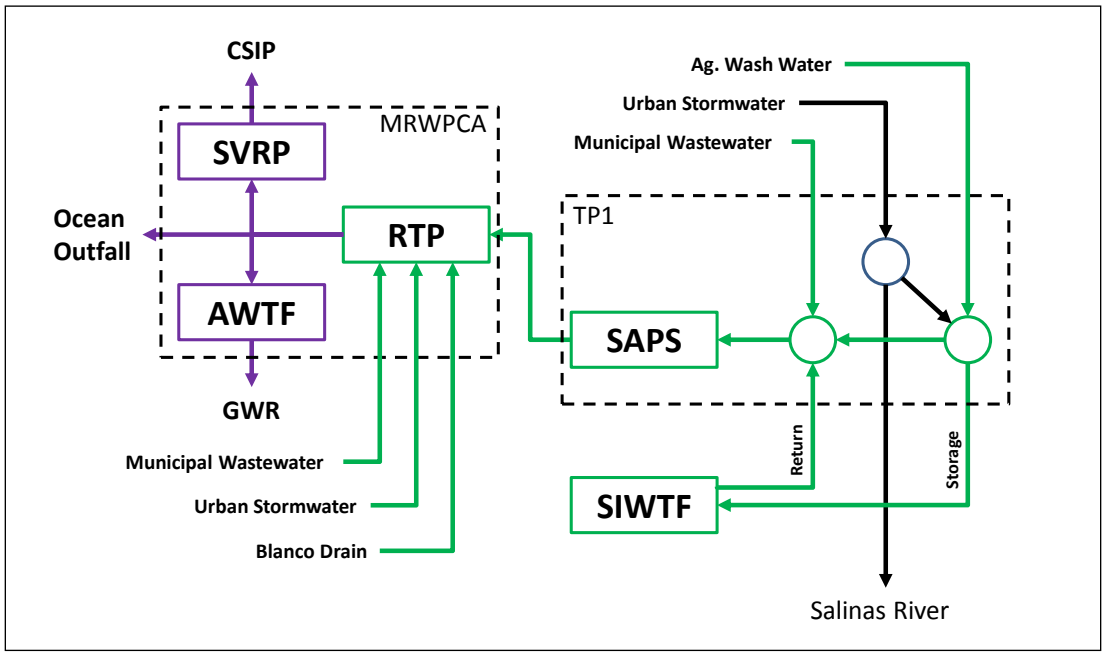
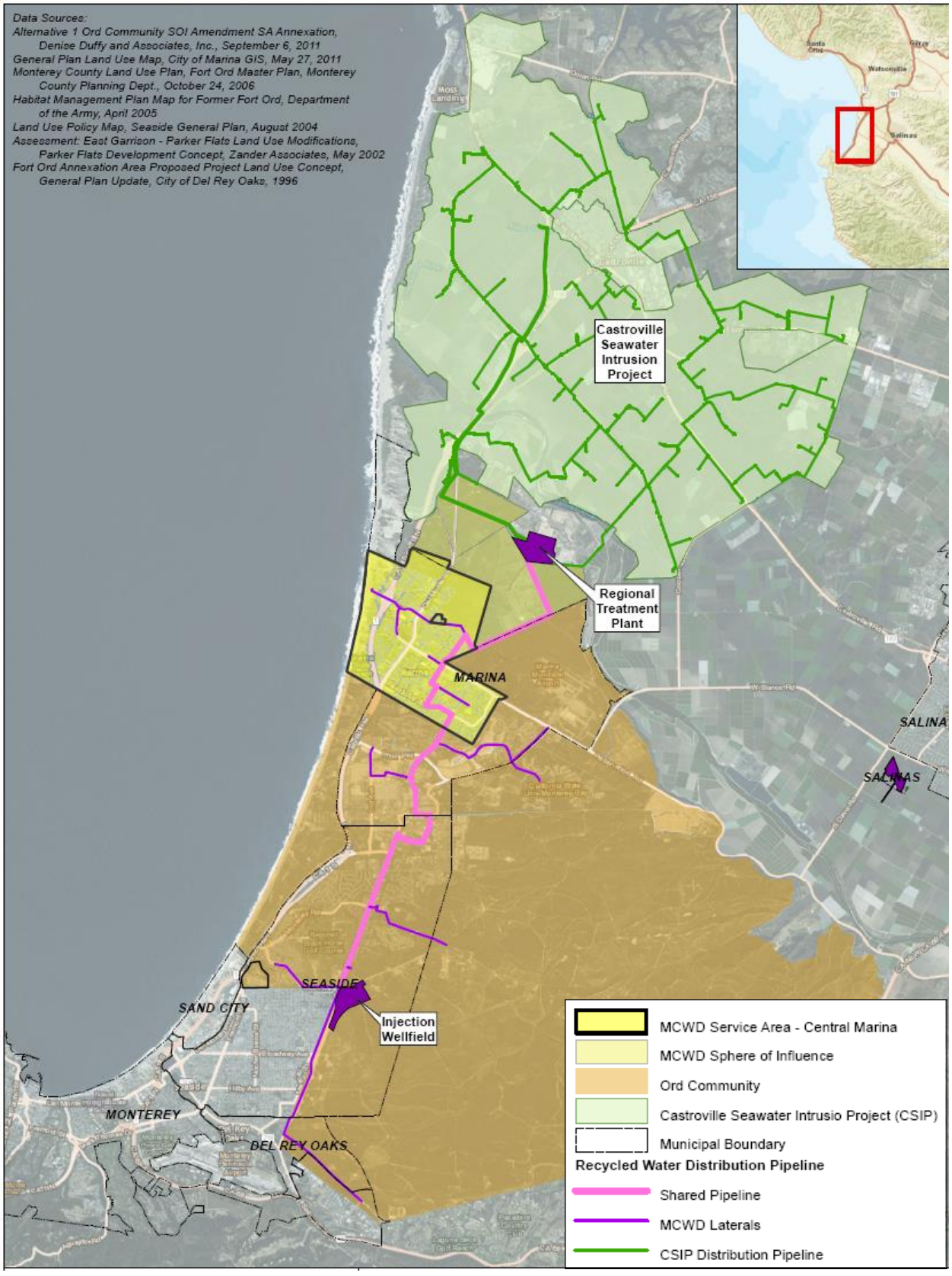


Figure 4.11 Planned and Existing Recycled Water Systems



4.6 Desalinated Water

4.6.1 Existing Desalination Facilities

In 1996, MCWD constructed a seawater desalination facility to explore the feasibility of extracting seawater through shallow wells along the beach. This small seawater desalination plant is located at the former wastewater treatment plant site on Reservation Road between Dunes Drive and the Monterey Bay. The source water for the plant comes from a shallow well located on Marina State Beach. This was constructed as a pilot facility, used to verify that adequate seawater supply could be produced from beach wells, and to test the use of beach injection wells for the disposal of brine (the salty water that remains after potable supply is separated from seawater using reverse osmosis). The Monterey Bay is a national marine sanctuary, so open ocean intakes and discharges were not allowed.

This plant is considered an available supply in the context of this UWMP, and SB 610 and 221. It is currently idle; however, the supply from the plant could be restored to function, if necessary[41]. The plant capacity is scheduled to be replaced as part of a larger future desalination facility, as described below. The 300 AFY supply was allocated to the Ord Community under a 2006 agreement with three developers for specified new developments in the Marina portion of the Ord Community. In 2009, MCWD issues notices of default to all three developers.

A similarly-sized desalination plant (300 afy) was constructed in Sand City in 2010, using multiple wells for groundwater extraction and brine disposal. This is the first coastal desalination facility permitted since the Monterey Bay was designated a national marine sanctuary. The plant is operated by California American Water Company as part of their Monterey Service Area. These plants, along with the locations of proposed desalination facilities, are shown on Figure 4.12, which appears at the end of the desalination section.

4.6.2 Planned Desalination Facilities

Under the Regional Urban Water Augmentation Project, MCWD evaluated replacing the pilot plant with a larger facility capable of producing up to 3,000 afy of potable water per year. Of the 3,000 afy, 2,400 afy was proposed to augment the future needs of Ord Community, 300 afy was replacement for the current plant's capacity; and an additional 300 afy was considered to help satisfy demands on the Monterey Peninsula, outside of MCWD's service area. In the final EIR for the Regional Urban Water Augmentation Project, the desalination portion was reduced to 1,500 afy, with 1,200 afy for the Ord Community and 300 afy to replace the existing Central Marina plant.

[41] In the 2007 MCWD Desalting Plant Condition Assessment prepared by CH2M-Hill, the time required to rehabilitate the existing plant was estimated at 12 to 16 months. Due to coastal erosion around the intake well, that estimate should be increased to 24 to 30 months.

In 2007, a Desalination Facility Basis of Design Report was published for the RUWAP desalination component. That study analyzed locating the 1,500 afy plant at the former Fort Ord Main Garrison Wastewater Treatment Plant. That facility, located on the coastal side of Highway 1, has been inactive since the sewer system was connected to the MRWPCA regional interceptor in 1990. Aside from reusing an existing disturbed site, the proposed location was preferred over the existing desalination plant location due to its set-back from the coastal bluff. The coastal bluff along that portion of the Monterey Bay experiences an average of 1-foot of erosion per year, so locating the facility further extends its estimated service life. Vertical water wells would be drilled into the 180-ft aquifer and/or the shallow aquifer to supply seawater-intruded groundwater. Water treatment would consist of desalination using reverse-osmosis (RO), followed by conventional disinfection. Product water would be pumped into the existing municipal distribution system. The brine from the RO treatment system would be blended with additional water from the source wells, and then disposed of using wells or infiltration galleries in the coastal dune.

In 2006, California American Water Company (CAW) began the preliminary design of their Coastal Water Project (CWP), which would provide up to 11 million gallons per day (12,320 afy) of desalinated water for their Monterey Service Area, in order to reduce withdrawals from the Carmel River and the Seaside groundwater basin. CAW had been ordered to reduce pumping from the river under State Water Resources Control Board Order 95-10. Two plant sites were considered, one in Moss Landing at the former National Refractory site, and one in North Marina adjacent to the Monterey Regional Water Pollution Control Agency regional wastewater treatment plant. The MRWPCA site was preferred because of the existing deep ocean outfall that may be used for brine disposal. Seeing an opportunity for efficiency through combined efforts, MCWD, CAW, MCWRA and CPUC worked cooperatively to study and include a regional desalination facility in the CWP EIR as an alternative project to the CAW-only desalination facility. MCWD had a pre-existing purchase option for land adjacent to the MRWPCA plant, which facilitated an agreement between the two agencies. The shared Regional Desalination Facility was certified as the environmentally superior alternative in the Final Coastal Water Project EIR adopted by the California Public Utilities Commission – Division of Ratepayer Advocates (CPUC-DRA). MCWD subsequently purchased the land for the plant.

In 2010, MCWD entered into an agreement with the MCWRA and CAW to jointly develop the Regional Desalination Facility, to be located adjacent to the MRWPCA treatment plant with an initial capacity of 10 mgd. The source water for the plant was to be seawater-intruded groundwater from the 180-Foot Aquifer. This provides a source of supply that does not involve an open ocean intake. Wells in the seawater intruded portion of the 180-Foot Aquifer would both capture seawater that is entering the aquifer, and mitigate the existing intrusion by drawing water back towards the coast. Under that agreement, MCWRA would construct and operate the

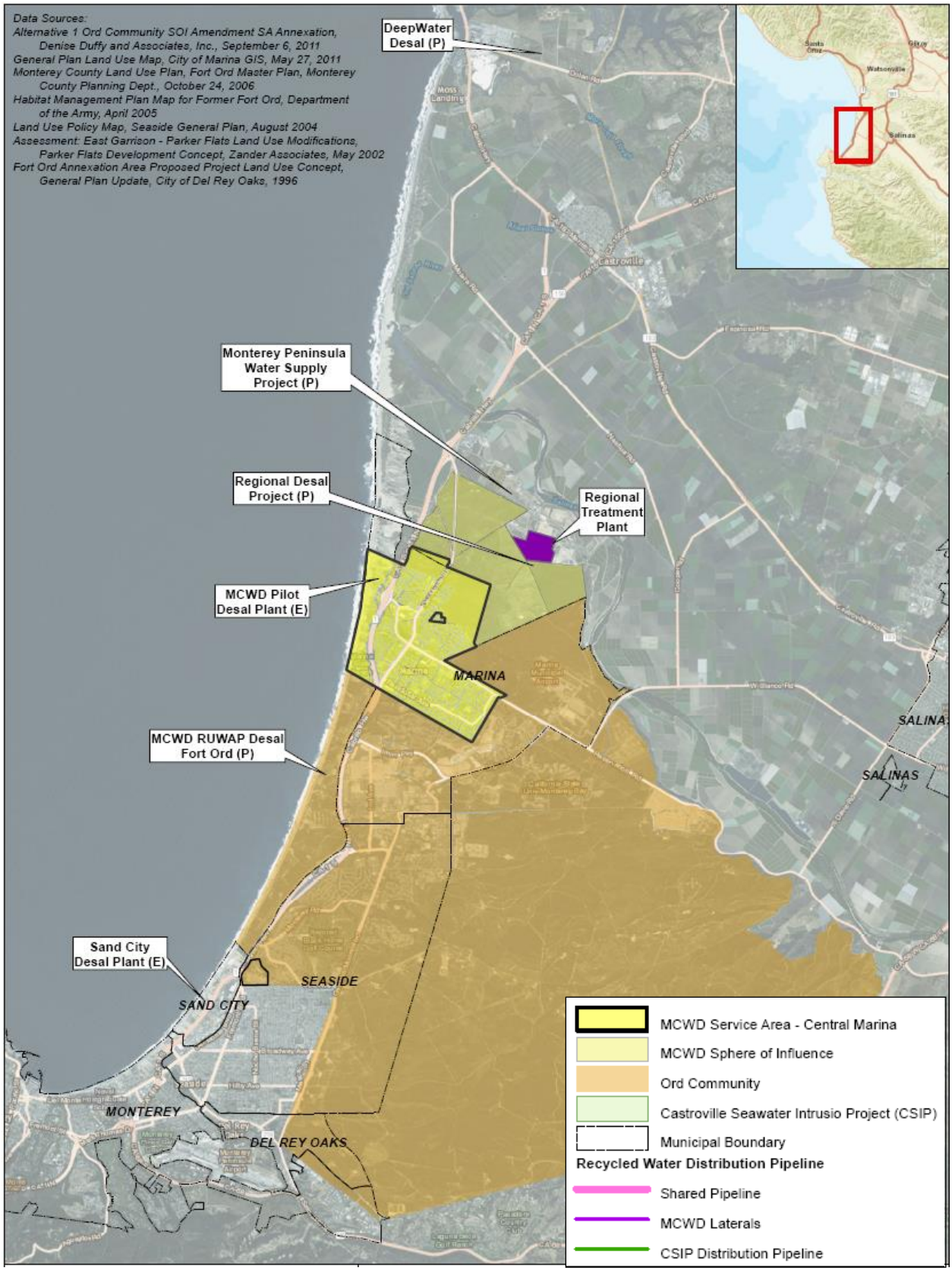
well-field, MCWD would construct and operate the treatment plant and a portion of the transmission pipeline, and CAW would construct the remainder of the transmission main. Because a portion of this supply is Salinas Valley groundwater which cannot be provided to customers outside MCWRA Zones 2/2A, MCWD would to take that portion of the plant yield and reduce pumping from their existing wells. CAW would initially take the full desalinated seawater yield. When the potable demands in the Ord Community exceed the available groundwater allocation, MCWD may take desalinated seawater (in addition to the groundwater component), up to the limits established in the CWP EIR. Due to litigation over the validity of inter-agency agreements, the parties are no longer jointly pursuing the Regional Desalination Project.

The evaluation of a RUWAP desalination facility option is part of the May 2016 MCWD-FORA-MRWPCA study of alternatives to supply additional potable water for the Ord Community.

CAW is currently pursuing the Monterey Peninsula Water Supply Project, which includes a 9.6 mgd seawater desalination facility located near the MRWPCA regional plant. CAW is proposing that the source water for this facility would come from slant wells on the CEMEX property within the North Marina Area. Water treatment would be by reverse osmosis, and brine disposal would be through the MRWPCA ocean outfall, just as in the Regional Desalination Facility. A test slant well was constructed in 2015, and has been operated from April 2015 through March 2016. The potential groundwater impacts from the proposed ten production slant wells are discussed in Section 4.2.5. The CPUC Draft EIR for the Monterey Peninsula Water Supply Project was issued for public comment in April 2015, but later withdrawn awaiting further results from the test well monitoring. The operational test is scheduled to run for an additional year to assess the response of the aquifer, which is difficult with the test coinciding with the extended drought. MCWD has expressed concerns that the project will affect the yield of their wells in the Marina Area Subbasin. The revised Draft EIR is scheduled for public release in late 2016.

One additional project being considered in Monterey County is DeepWater Desal LLC's Monterey Bay Regional Water Project, located in Moss Landing. The project does not have a local public agency as a sponsor, so the State Lands Commission is the CEQA lead agency for the environmental review. The June 2015 notice of preparation for the EIR includes this description: "A proposed 25,000 acre-feet per year seawater reverse osmosis desalination facility and co-located seawater-cooled 150-megawatt computer data center campus located on a 110-acre site approximately 1.5 miles east of Moss Landing in Monterey County, California. The Project would also include seawater intake and brine discharge pipelines that would extend west from Moss Landing Harbor to the upper reaches of the submarine Monterey Canyon and the north shelf, respectively, within Monterey Bay National Marine Sanctuary." The project is intended to provide wholesale water supply to cities and agencies in both Monterey and Santa Cruz Counties. The Draft EIR has not yet been issued for public review and comment.

Figure 4.12 Existing and Potential Desalination Facilities



Section 5 - Water Supply Reliability and Water Shortage Contingency Planning

5.1 Water Supply Reliability - Single and Multiple Dry Years

The Urban Water Management Planning Act requires a description of a water provider's supply reliability and vulnerability to shortage for an average water year, a single dry year or multiple dry years. Such analysis is most clearly relevant to water systems that are supplied by surface water. Since the bulk of MCWD's supply is groundwater and the remainder will come from recycled and desalinated supply, short- and medium-term hydrologic events over a period of less than five years usually have little bearing on water availability. The Salinas Valley Groundwater Basin has about 19.8 million acre-feet of storage capacity, and was estimated to hold 16.4 million acre-feet in 2013[42]. Annual water use from the SVGB is approximately 0.5 million AFY. Within the 180/400 Foot Aquifer Subbasin, storage was estimated to be 6.8 million acre-feet. The Salinas Basin is aided by two large storage reservoirs, Nacimiento and San Antonio, providing about 700,000 ac-ft of storage. These reservoirs regulate surface water inflow to the basin shifting winter flows into spring and summer releases for consumptive use, which also allows for increased basin recharge. The Salinas Valley Water Project has reduced groundwater pumping in the 180/400 Foot Aquifer Subbasin. Therefore, MCWD's groundwater supply is fully available in annual average, single dry year and multiple dry years.

Water demands within the District do vary with weather changes and under drought-year restrictions. The single driest year on record is 2013, with a record low rainfall of 3.3 inches at the Salinas Airport rain gage. Water use within the District increased from 4,173 afy in 2012 to 4,431 afy in 2013 (drought restrictions were not implemented until 2014). Adjusting for the population increase, the water use increased by 5.5% over an average weather year.

The driest three-year period on record was 1988-1990, with 21.7 inches of rainfall recorded at the Salinas Airport. Water usage records for that period were not available, so the second-driest period of record was used for the multiple dry year analysis: 2013-2015, with 23.2 inches of recorded rainfall. In 2013, the Governor and the State Water Resources Control Board identified the start of an extended drought, and in 2014 they mandated state-wide water conservation measures. As a result of the mandated conservation, the District's water demand declined to 4,026 afy in 2014, and 3,228 afy in 2015. A portion of that demand reduction was due to the Bayonet/Blackhorse Golf Course transitioning from MCWD supply to Seaside Groundwater Basin wells in 2015.

To estimate the water demand changes during a three-year drought, the actual water use was compared to the projected water demand, assuming the same per-person usage rate as in 2012

[42] Brown & Caldwell, State of the Salinas River Groundwater Basin, 2015

(see Table 5.1). Water usage for the golf course was removed from the system total, since that high-volume customer was not supplied by the District for the full analysis period, and in the future will be supplied using recycled water. The remaining water use was compared to the projected water use to develop a demand adjustment factor for the first, second and third years of a drought. As shown below, water demand increased by 1% over average in the first year, declined by 12% in the second year and by 25% in the third year.

Table 5.1 Multiple Dry-Year Demand Adjustment Factors

Year	**2012**	**2013**	**2014**	**2015**	**Units**
Year Type	Average	1st Dry*	2nd Dry	3rd Dry	
Population	30,767	30,961	31,325	32,375	persons
Water Use	4,174	4,431	4,026	4,174	AF
Golf Course Irrig.	264	456	524	138	AF
Net w/o Golf Irrig.	3,909	3,975	3,502	3,090	AF
Projected Use		3,934	3,980	4,114	AF
Factor		101%	88%	75%	

* 2013 is also the single driest year on record

Using the above factors, the District's projected water demands can be scaled to estimate drought response. The total projected demands are shown in Table 5.2. Because the demand is projected to decline under a multiple-year drought and the available groundwater storage greatly exceeds even a three-year demand, the available water supply is considered reliable in all years.

Table 5.2 Water Demands in Single and Multiple Dry Years

Year-Type	**2015**	**2020**	**2025**	**2030**	**2035**
Average	4,204	6,205	9,937	11,119	12,197
Single-Dry	4,246	6,267	10,036	11,230	12,319
Multiple Dry 1st Year	4,246	6,267	10,036	11,230	12,319
Multiple Dry 2nd Year	3,700	5,460	8,744	9,785	10,734
Multiple Dry 3rd Year	3,153	4,654	7,453	8,339	9,148

5.2 Water Quality Impacts on Reliability

The reliability of MCWD's water supplies relative to seawater intrusion and groundwater contamination are discussed at length in Section 4.2.5. Water quality and contamination monitoring programs are discussed in Section 4.2.6. While neither seawater intrusion nor groundwater contamination pose an immediate threat to water supply reliability, MCWD maintains active monitoring of intrusion and contamination status and participates in the analytical and management efforts undertaken by the Monterey County Water Resources Agency with respect to seawater intrusion remediation actions and by the U. S. Army Corps of Engineers relative to groundwater cleanup on the Former Fort Ord.

5.3 Water Quality Monitoring

Water quality monitoring and lab analysis is performed by Marina Coast Water District by its lab staff and under contract with state certified laboratories. Water samples from wells, water treatment plants, and point-of-use locations are collected and tested to assure water delivered to customers meets both state and federal standards. Results from water quality testing are published annually in MCWD's annual Consumer Confidence Report.[43] The quality of MCWD's water supplies meets the requirements of all current state and federal drinking water quality regulations.

Groundwater from the Marina and Ord water supply wells is disinfected with chlorine as a safeguard against microorganisms. In Marina, chlorine is also used to treat the naturally occurring sulfides at Well 12 that can cause odors.

MCWD's state-certified laboratory performs extensive water quality monitoring of the Marina and Ord drinking water supply. Regulations require weekly monitoring for coliform bacteria in the distribution system. The presence of coliform bacteria may indicate the presence of disease-causing organisms. One water sample from each of five sampling sites in Marina and from each of five in Ord is collected and analyzed each week. A different set of five is analyzed each week in a month for each water system. There are a total of 20 different sample sites in Marina and 20 different sample sites in the Ord Community from which water samples are collected.

To make sure that water quality is maintained from source to delivery, MCWD's laboratory also performs weekly monitoring of general physical and chemical parameters. Each week five water samples are collected from the Marina and Ord coliform sampling sites, from the Marina and Ord source wells and from the water reservoir in Marina. The water samples are tested for color, odor, turbidity, temperature, pH, conductivity, free chlorine residual and sulfides.

In addition, the Marina and Ord source wells are also tested for chloride, fluoride, nitrate, bromide and sulfate. The purpose of this monitoring is to detect any abnormal concentrations that might indicate problems within the system.

When in operation, the State requires the MCWD to monitor water quality at different stages of the Marina Desalination Plant treatment processes. Water samples are collected from the ocean (Monterey Bay), at the plant's seawater intake well and from its finished product water on a daily, weekly, monthly and quarterly schedule. Water samples are tested for coliform organisms, free chlorine residual, pH, turbidity, conductivity, total dissolved solids, temperature, chloride, sulfate, alkalinity, hardness and corrosive index. This monitoring program ensures that the desalination plant is operating properly and is producing water that meets or exceeds state and federal standards. As mentioned in Section 4.5, this plant is not currently in operation.

[43] See www.mcwd.org/water_quality.html.

MCWD monitors for compliance over 110 constituents in drinking water in varying schedules. Many of these constituents are naturally occurring substances. The Marina and Ord source wells, Marina's reservoir and the desalination plant are tested for general minerals such as calcium, magnesium, hardness; inorganic chemicals such as arsenic, chromium and other metals; organic chemicals such as solvents, pesticides and herbicides; radioactivity including radon; asbestos and other chemicals that are still not regulated and have no state or federal standards. Regulations also require that MCWD test for disinfection (chlorination) by-products such as total trihalomethanes and haloacetic acids in the distribution system. Lead and copper are tested from indoor water samples to check if materials used in home or building plumbing contribute to levels of lead and copper.

5.4 Water Production System Reliability

MCWD has undertaken specific measures to ensure its ability to supply water in the event that groundwater production is impaired by mechanical failure or any other potential problem, including water quality impairment.

In 2005, MCWD completed installation of the Ord/Marina Inter-Tie Project connecting the Ord Community water production and distribution system to the Central Marina water production and distribution system. The Ord/Marina Inter-Tie Project connected these two water systems that had been operated separately (each with three wells) into a single, six-well system that can be operated in an integrated manner to ensure physical production reliability for the system as a whole. The wells in Central Marina are in the Deep Aquifer, while the wells in the Ord Community were in the 180-Foot and 400-Foot aquifers. The connection added system redundancy, a basic emergency-response feature of many water systems. In 2007, MCWD combined the two water systems under a single permit from the California Department of Public Health.

Each of the five inter-ties connecting the Ord Community and Marina water systems is fitted with a bi-directional flow meter that continuously monitors and records the volume of water moving through each inter-tie, when it is being operated. These meters, combined with the existing meters on the wells, ensure a full accounting for all water produced by MCWD. The Supervisory Control and Data Acquisition (SCADA) system ensures that production of Salinas Valley groundwater delivered to the Ord Community remains within the 6,600 afy limitation imposed by the 1993 annexation agreement with the MCWRA, and that production of Salinas Valley groundwater delivered to Central Marina remains within the 3,020 afy limitation imposed by the 1996 annexation agreement with the MCWRA.

In 2007, MCWD completed the Marina Water System Master Plan for the combined system, which identified capital improvement projects required to improve reliability and meet the projected development demands. In 2008-09, MCWD replaced the D-Zone water tank with a larger reservoir, and replaced the E-Zone reservoir with a hydropneumatic booster pump station.

The preliminary designs have been completed for new storage tanks in the A- and B- pressure zones. MCWD is awaiting the resumption of development activity to complete those projects.

MCWD recently replaced Well 32 in the Ord Community with a new Well 34 on the same site, completed in the Deep Aquifer. The District also added a new Well 35 further east along Reservation Road at Watkins Gate Road.

5.5 Water Shortage Contingency Plan

To prepare a water supplier for the event of a water shortage, including a drought or an emergency shortage, the Act requires an UWMP to include a Water Shortage Contingency Plan (WSCP). The WSCP needs to include the following specific elements:

- Actions to be undertaken by the water supplier to prepare for, and implement during, a catastrophic interruption of water suppliers (e.g., a regional power outage, an earthquake, or other disaster).
- Stages of action, including up to a 50-percent supply reduction, and an outline of specific supply conditions at each stage.
- Additional, mandatory provisions against specific water use practices during water shortages (e.g., street cleaning).
- Consumption reduction methods in the most restrictive (drought) stages for up to a 50 percent reduction in demand.
- Penalties or charges for excessive use, where applicable.
- An analysis of the impacts of each of the actions and conditions described in the WSCP on the revenues and expenditures of the urban water supplier and proposed measures to overcome those impacts.
- A draft water shortage contingency resolution or ordinance.
- Description of a mechanism for determining actual water use reductions pursuant to the WSCP.

The District Board of Directors adopted an updated Water Shortage Contingency Plan on July 6, 2015, in Resolution No. 2015-33. The updated WSCP adds specific restrictions on water use that may be implemented at the time of a water shortage. Stages of action and triggers were not changed from the previously adopted WSCP. The Resolution and WSCP are included in Appendix F. Article 3.36.050 of MCWD Code of Ordinances allows for enforcement of the WSCP.

5.5.1 Actions in the Event of a Catastrophic Interruption

MCWD developed and adopted an Emergency Response Plan (ERP) in 2007 for emergency and disaster occurrences with guidelines and agreements for cooperative efforts with other State and

local agencies, as required by the State Department of Public Health. The ERP contains actions MCWD would initiate in the event of a catastrophic reduction in its water supply. Article 2.09, Local Emergency, of the District Code of Ordinances details the procedure for declaring an emergency and the procedures authorized for immediate response. MCWD conducts periodic table-top exercises with the emergency response offices of the jurisdictions it serves, and annual reviews of its emergency response plan.

5.5.2 Stages of Action, Mandatory Provisions, Reduction Methods

The District's Water Shortage Contingency Plan includes stages of action, mandatory provisions, and consumption reduction methods. Because the Salinas Valley Groundwater Basin supply is not drought susceptible, the triggers for the Stages of Action listed in Table 5.3reflect mechanical failures and/or water quality concerns, which are more likely to impact MCWD. The mandatory provisions and consumption reduction methods for each stage are detailed in the Water Shortage Contingency Plan at Appendix F.

Table 5.3 Water Shortage Contingency Plan - Stages of Action

Stage No.	Water Supply Conditions			% Shortage
	System Malfunction	Exceed Chloride Standard?	VOC Standards	
1	10% shortage	Not threatened	Not exceeded w/blending	0 - 10
2	10% - 25% shortage	May be threatened	Not exceeded w/blending	10 - 25
3	25% - 35% shortage	Expected	Not exceeded w/blending or remaining capacity reduced by up to 25%	25 - 35
4	35% - 50% shortage	Expected	Not exceeded w/blending or remaining capacity reduced by up to 35%	35 - 50
5	>50% shortage	Expected	Not exceeded w/blending or remaining capacity reduced by up to 50%	>50
Stages 1-5 may also be declared upon directive from the State of California or the County of Monterey to implement demand reduction measures in response to drought conditions				

5.5.3 Penalties or Charges for Excessive Use

Article 3.36.050 of District Code of Ordinances provides for a system of notices and fees for violations. Article 3.36.060 also allows for recovery of costs incurred abating a violation. Violation of provisions of the WSCP shall be enforced under these parts of the MCWD Code.

Table 5.4 summarizes the penalties and charges detailed in Article 3.36.050. The Code does not currently include more stringent penalties or charges for higher stages of a water shortage, but the Board of Directors may consider additional penalties if an extended shortage should occur.

Section 4 of the WSCP includes procedures for making appeals to the Board for relaxation of water use restrictions.

Table 5.4 Water Shortage Contingency – Penalties and Charges

Penalties or Charges	Stage When Penalty Takes Effect
Penalty for excess use: Written notice, date for correction	Applicable to all stages (i.e., not stage-specific)
Charge for excess use: $100 administrative fee for 1st notice; $200 for 2nd notice; $500 for each additional violation within one (1) year.	
Other: Costs of abatement	
Other: Costs of enforcement	
Other: Civil penalty of 50% of abatement and enforcement costs.	

5.5.4 Revenue and Expenditure Impacts

Enforcement of the Water Shortage Contingency Plan is assumed to be covered by enhanced revenues from application of excess use charges and penalties. District reserves may be used temporarily should revenues remain below expectations. MCWD's rate structure is based upon adopted rate ranges and allows for modification of rates on short notice within those ranges. MCWD retains the ability to modify rates to meet all legitimate District needs. Revenue impacts from water sales losses are estimated as follows, based upon Tier 2 rates of $2.79/hundred cubic feet (hcf) in Central Marina and $3.27/hcf in the Ord Community, and recognizing approximately 10% of MCWD's customers are not metered as of 2013.

Table 5.5 Potential Revenue Impacts of Implementation of WSCP

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Assumed Reduction	10 percent	20 percent	30 percent	40 percent	50 percent
Water Sales Loss	$579,804	$1,159,607	$1,739,411	$2,319,215	$2,899,018
Revenue Source: Pumping savings at $135/af	$57,807	$115,614	$173,421	$231,228	$289,035
Net Revenue Reduction	$521,997	$1,043,993	$1,565,990	$2,087,987	$2,609,983
Percent of Total Annual Water System Revenue	6%	12%	18%	24%	30%

* Table based on FY2012-2013 water sales, $8,839,268 for 4,282 acre-feet

5.5.5 Mechanism to Determine Actual Water Use Reductions

Implementing the WSCP is intended to reduce water use to levels specified by stage. Crucial to the implementation is determining how effective any enacted measures are in actually reducing water use.

The WSCP includes increasingly frequent reporting of water usage, based on daily O&M recording of production figures, to the MCWD Board per increasingly severe stages. The monitoring, reporting, and subsequent analyses are meant to determine the extent of water use reductions. Furthermore, the WSCP includes provisions for the MCWD Board to alter WSCP actions at each stage (i.e., tighten restrictions) if usage reduction targets are not being met. Essentially, a feedback loop of monitoring, reporting, and action will be used to effectively implement the WSCP.

5.6 Drought Planning

As discussed in Section 5.1, the Salinas Valley Groundwater Basin is managed by MCWRA so as not to be susceptible to drought. However, the District is pursuing two sources of new water supply that are not drought susceptible: desalination of seawater-intruded groundwater and urban use of recycled water. Both of these projects are discussed in Section 4.

5.7 Minimum Supply Next Three Years

Water Code §10632(a)(2) requires water suppliers to report the minimum available water supply for the next three years. As discussed in Section 5.1, the Salinas Valley Groundwater Basin has a large storage volume which provides a buffer during periods of drought. The District could therefore reliably supply their full groundwater allocation of 9,620 afy in each of the following three years, which is more than twice the current water demand rate within the District.

Section 6 - Conservation and Demand Management Measures

6.1 Introduction

Water conservation is defined as any action taken to reduce water consumption or loss of available supply for use, such as leaks in the production and delivery system prior to the customer's meter. Demand management refers to a subset of conservation methods a water supplier may undertake to reduce demand on the water system. The Urban Water Management Planning Act was modified in 2014 based on recommendations from the Independent Technical Panel (ITP). Previously, UWMP were required to report on 14 specified conservation and demand management measures. The new Act requires that Retail Agencies report on six more general requirements plus an "other" category.

6.2 Demand Management Measures Implementation

The Urban Water Management Planning Act under California Water Code Section 10631 (f)(1) requires a description of a water supplier's water demand management measures that are being implemented or are scheduled for implementation. MCWD is continually seeking to improve its conservation program and features that are cost-effective or otherwise are a wise investment in resource management. The District completed its Urban Water Conservation Feasibility Study in 2004, and has been implementing the recommendations by phases. In 2015, The District added an additional Water Conservation Specialist position to the staff, which greatly increased their capacity for customer assistance.

MCWD signed the California Urban Water Conservation Council (CUWCC) MOU in 1991 and began implementing water conservation and demand management practices as part of its overall integrated water management program. Due to staffing changes, the District is behind on submitting CUWCC BMP Reports, with the last report submission made in 2010. Table 6.1 summarizes MCWD's water conservation program over the past 5 years and highlights the 2015 activities. Figure 6.1 shows the conservation program spending over the past five fiscal years and the indoor water usage during those years. Figure 6.2 shows spending and outdoor water usage over that same time period. Note that most residential irrigation is through domestic meters and therefore reflected in Figure 6.1. Also, conservation education spending appears in both graphs.

Mandatory restrictions on water use were implemented in 2014 in response to the state-wide drought. MCWD focused on education and outreach as it pertains to drought restrictions and was able to reduce outdoor water usage to below pre-drought levels. The primary programs contributing to this were landscape watering restrictions, the state requirement to let roadway medians to go fallow, and increased toilet and fixture retrofits. When the drought restrictions are removed, it is likely that outdoor water use will increase, but indoor use will remain low due to the infrastructure changes and the community's learned behavioral changes.

Table 6.1 Summary of DMM Implementation

Demand Management Measure	5-Year Program	2015 Activity
Water Waste Prohibition	On-going monitoring for violations	10 water wasters identified
Metering with Commodity Rates	Maintenance of existing AMR meters/ Working with final jurisdiction to meter older housing areas.	66 un-metered accounts converted
Conservation Pricing	Tiered commodity rates adopted annually as part of annual budget process.	Conservation staff responded to increased requests for on-site surveys due to drought and higher water bills.
Public Information	Water conservation commission meets monthly. E-flyers are distributed monthly. Brochures are included with monthly billing	Printing budget increased for education materials. Increased usage of E-flyers due to drought restrictions.
School Education	Funded in-school program for K-3 students through MPUSD	Provided $25,800 in funding, plus classroom materials
System Water Audits, Leak Detection, Repair	Annual prescreening system audit. Staff contacts customers when alerted by AMR loss detectors.	FY 2014/15 loss at 2%.
Conservation Staffing	Two positions funded in FY10/11 and FY11/12. Reduced to one position in FY11/12 to FY14/15	Increased staffing to 2 positions in FY15/16
Water Survey Programs for Residential Water Customers	On-site surveys performed by request. Compliance inspections are required upon transfer of property.	132 residential surveys completed, a 20% increase over 2014. 142 compliance inspections completed.
Residential Plumbing Retrofits	Residential plumbing retrofits program included in annual budget (shower heads, leak detector kits, rebate budgets).	Program revised to reduce toilets down to 1.28 gallons and showers heads down to 2.0gpm.
Residential Ultra Low Flow Toilet Replacement	MCWD continues to increase the budget to meet increasing demand for rebates.	288 rebates approved
High-Efficiency Washing Machine Financial Incentives	MCWD continues to increase the budget to meet increasing demand for rebates.	163 rebates approved
Commercial Industrial and Institutional Water Conservation	On-site surveys performed by request. All rebate programs available to CII customers.	2 hotels surveys completed.
Large Landscape Conservation	On-site surveys performed by request. Rebate programs for controllers, drip systems, and turf replacement.	12 school sites retrofitted. 42 site surveys completed.

Figure 6.1 Conservation Spending and Indoor Water Demand

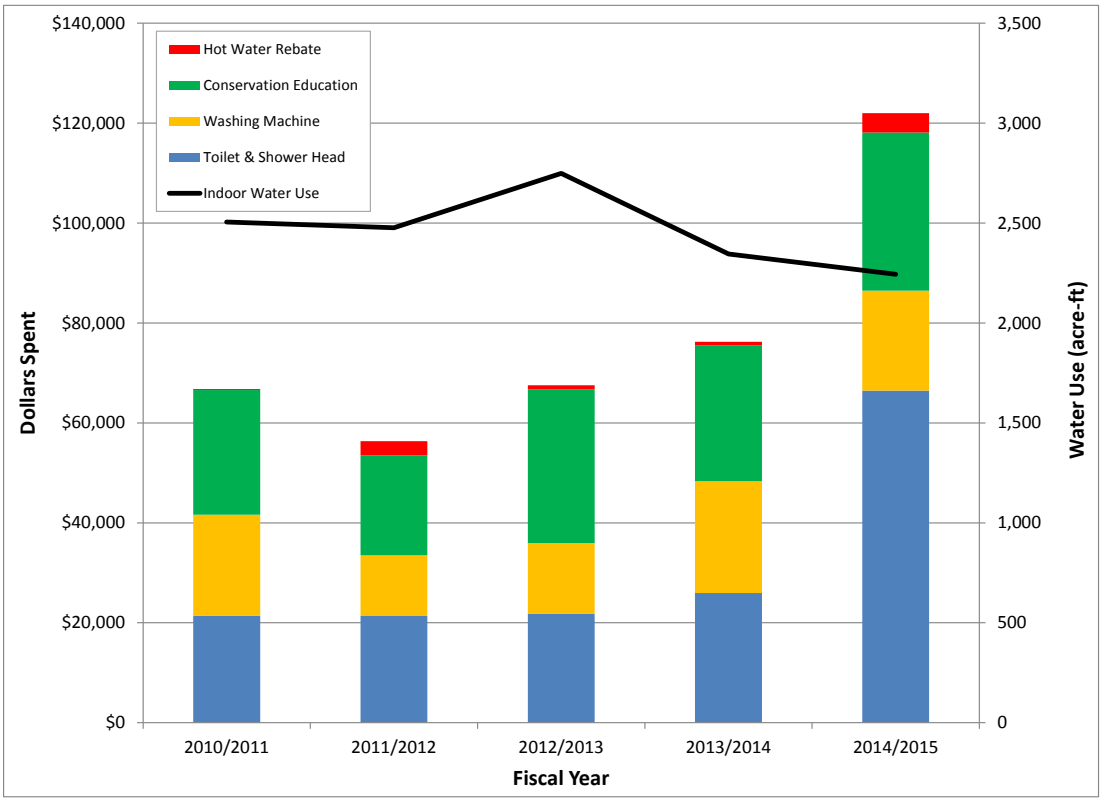
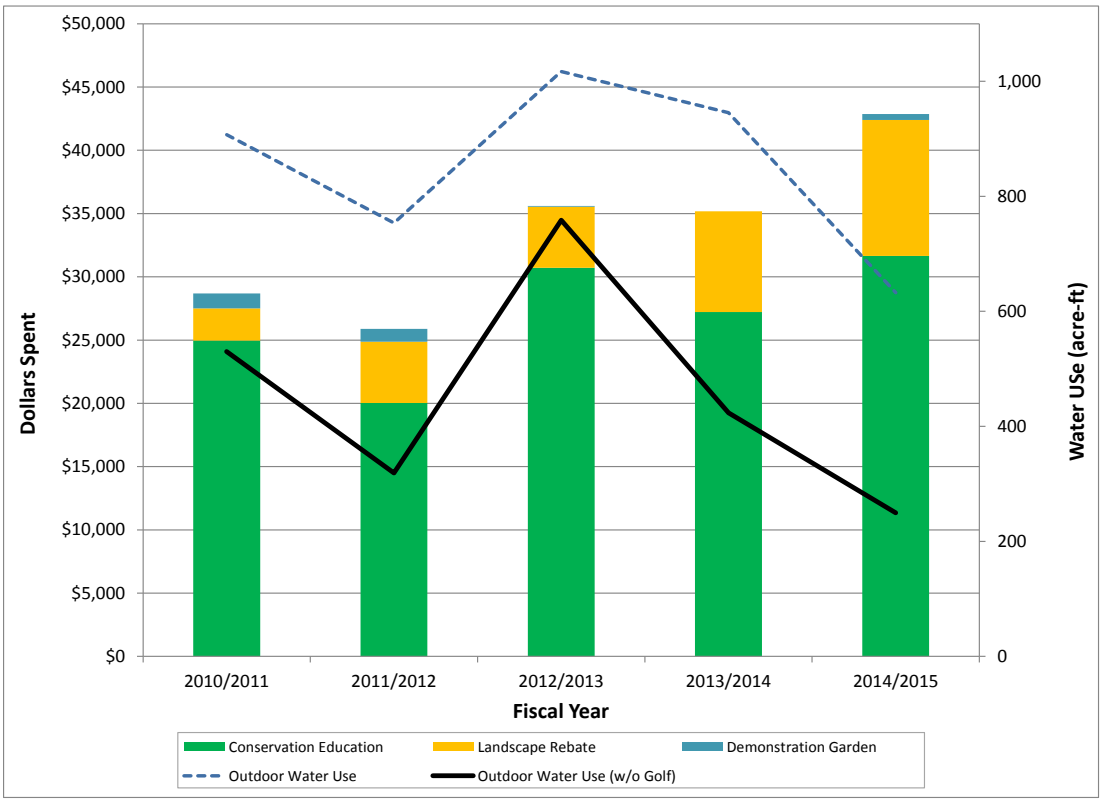


Figure 6.2 Conservation Spending and Outdoor Water Demand



6.2.1 Water Waste Prevention Ordinances

In 1993 MCWD enacted an ordinance addressing water waste and establishing limitations on how and when watering/irrigation can occur, and how water can be used outside (Section 3.36.030 of the District Code of Ordinances). This section of District Code was updated in 2004 and 2005 to add additional restrictions and incorporate the Model Water Efficient Landscape Ordinance. The 2015 update to the Model Water Efficient Landscape Ordinance adopted by the Legislature is incorporated by reference into the District Code.

Sections 3.36.040 through 3.36.060 of the District Code address enforcement of the waste prevention ordinances.

6.2.2 Metering

Meters are required as a matter of state law and urban water providers such as the MCWD have until January of 2025 to be fully metered. Meters with automatic meter reading (AMR) are being installed throughout MCWD in a phased program, and required for all new customers. A feature of the AMR equipment is that each meter will identify if water is used for continuous periods in excess of two hours. Once alerted, District staff contacts the customer, informs them of the possible leak and schedules a follow-up assistance visit, if requested. This has reduced the cost of water losses on the customer's side of the meter. Currently, the Central Marina service area is fully metered, but the Ord Community is not. All metered accounts are billed on a fixed cost plus volume usage basis.

The remaining units are within the Ord Military Community, which is replacing housing units in phases, and installing meters in all new units. 1,012 units of Army housing are still unmetered. Of this, approximately 735 are occupied and on flat-rate billing. MCWD is coordinating with the Housing Manager to identify opportunities to install meters in the existing housing areas. In 2015, 66 un-metered accounts were converted to metered accounts. The District will need to install up to 100 meters per year to meet the 2025 target.

6.2.3 Conservation Pricing

Water conservation is encouraged through a pricing system that rewards customers who use less water with financial incentives, while high water users are charged a higher rate. MCWD charges customers a fixed monthly fee (meter or ready-to-serve fee) and a commodity charge for water used. The commodity rates are on a tiered scale, as shown in Table 6.2. The Central Marina and Ord Community service areas are operated as separate cost centers, and have different customer fee schedules. The water rate tiers and prices are reviewed annually during the budget review and approval process.

Table 6.2 Conservation Pricing Tiers (2016)

Tier	Consumption (hcf)	Ord Rate (per hcf)	Marina (per hcf)
First Tier	0-8	2.97	2.62
Second Tier	8-16	4.56	3.01
Third Tier	16+	6.14	5.31

Hcf = hundred cubic feet

Conservation pricing is often cited as a way to use market mechanisms to provide incentives for conservation. Water consumption, however, has a relatively inelastic demand relative to price, meaning as unit prices go up, unit demand does not correspond in a 1:1 linear fashion. This is due to a variety of factors. Only a portion of water use for a residence can be considered discretionary, generally a portion of landscape irrigation, excess showering periods and the like. At the point discretionary use has been wrung out of the system due to marginal costs of water, another rate tier is unlikely to reap much conservation savings. Additionally, California's Proposition 218 requires water rates to be developed on a cost of service basis. In other words, the top tier of the water rate must have a reasonable relationship to the avoided cost of service for marginal supply. Since MCWD is contemplating relatively expensive marginal supplies to meet new demands, meeting this test is not a concern at this point.

6.2.4 Public Education and Outreach

MCWD provides water conservation information to the public through a wide variety of public outreach tools: information booths at conferences, fairs and community events; flyers, newsletters and billing inserts; e-mailed announcements; video; website; and printed material to the media. In 2015-2016 the printing budget was increased for conservation outreach materials. MCWD has also partnered with the Water Awareness Committee of Monterey, California American Water Company and the Monterey Peninsula Water Management District to develop and distribute outreach material. More details can be viewed on the MCWD's webpage:

http://www.mcwd.org/conserve.html

The District Board appoints a standing Water Conservation Commission, made up of six members of the public, one Board member and one member of Marina City Council. The commission meets monthly to review water conservation ordinances and policies, refinements/adjustments to the water conservation program, specifically conservation Best Management Practice implementation, outreach and educational programs, the conservation budget, and overall District conservation resources; equipment and technologies that promote water conservation; periodic newsletters, Consumer Confidence Reports, and other conservation outreach activities. Recommendations by the commission are presented to the Board of Directors for implementation and action. The commission plays a key role in informing the public about the District's conservation activities.

In addition, MCWD promotes water conservation within the local schools. The Water Conservation Educator position within the Monterey Peninsula Unified School District has been funded by MCWD, CAW and other water providers within the school district for the past 13 years. The program covered all students in grades K-3. That teacher retired in the past year, and the School District is working to hire a replacement. In the interim, MCWD still provides educators with handouts, Internet links and classroom activities when requested. Current staff has visited science classes upon invitation from teachers.

In 2015, much of the education and outreach was geared towards educating the public on State mandated drought restrictions. MCWD worked closely with commercial clients on drought restriction actions such as serving water at restaurants and offering reduced linen washing.

6.2.5 Programs to Assess and Manage Distribution System Real Loss

MCWD performs an annual prescreening system audit and responds to leaks or known trouble spots to make repairs and replacements as needed. A detailed audit for FY 2014/15 (Appendix J) showed that system losses are about 2%. This is primarily due to the District policy of tracking unmetered water use within the work order management system, so that activities such as line flushing, hydrant testing and fire department training are accounted for. There are three fire jurisdictions within the District's water service area (City of Marina, City of Seaside, and Presidio of Monterey) so accounting for hydrant use is an on-going effort.

MCWD also uses its Supervisory Control and Data Acquisition (SCADA) system to identify main breaks and system leaks in real time. The District's service area is predominantly coastal dune with sandy soils. Small water leaks percolate easily and can go unnoticed for long periods of time. Alarms alert the staff to overflowing water tanks and/or failing equipment. System operators monitor the operational patterns of wells, booster pumps and water tanks, and investigate when water use exceeds typical norms.

6.2.6 Water Conservation Program Coordination and Staffing Support

The MCWD water conservation staff consisted of two positions until 2011, a water conservation coordinator and a water conservation specialist. When the coordinator retired in 2012, that position was left unfilled. In 2015, the District added an additional full-time water conservation specialist, increasing dedicated staff from one to two people. The two staff are responsible for oversight and implementation of water conservation practices. MCWD's water conservation specialists work closely with local, regional and state boards as well as the neighboring water districts to implement the DMMs that are effective for the community and to foster an effective working relationship and provide continuity among the programs.

6.2.7 Water Survey Programs for Residential Customers

MCWD sends a qualified water auditor to single-family and multi-family customer locations to audit water use. The survey includes both indoor and outdoor components. The indoor

component includes checks for leaks, including toilets, faucets and meters; checking showerhead, toilet, aerator flow rates and offering/suggesting replacement of high-flow devices. The outdoor survey includes checks of the irrigation system and control timers, and review or development of a customer's irrigation schedule. MCWD requires a survey to be conducted upon transfer of property ownership. MCWD also provides residential customer surveys on an "as-requested" basis, in addition to directly contacting the highest residential users and offering a survey. Any customer who is concerned about high water bills can request an on-site survey. Demand for surveys has increased in the past years due to the drought and increased water rates. Staff completed 132 customer surveys in 2015.

6.2.8 Residential Plumbing Retrofits

MCWD requires single and multi-family residences constructed prior to 1992 to be retrofitted with high-efficiency water fixtures, such as showerheads, faucets and toilets, if needed, upon resale (Article 3.36 of the Code of Ordinance)s. MCWD also requires low-flow fixtures in new construction and renovations. A walk-through inspection and conservation certification is required before occupancy by the new owner. In 2015, staff performed 142 such walk-throughs. In that year, Preston Park housing area within the former Fort Ord changed ownership from the Fort Ord Reuse Authority to the City of Marina, triggering neighborhood-wide retrofits.

MCWD currently provides low-flow showerheads free of charge, and offers installation assistance. Article 3.36 of MCWD Code of Ordinances requires the installation of hot-water recirculation systems or point-of-use water heaters for new construction and renovation, which is an additional water saving measure not required in the State Plumbing Code. The District offers rebates for those adding a hot-water recirculation pump as part of a renovation.

6.2.9 Residential Ultra-Low Flow Toilet Replacement Programs

MCWD's toilet replacement program offers a $125 rebate for each toilet replaced with a high efficiency (1.28 gallon/flush) toilet. Over 3,000 toilets have been replaced under the program. Under the MCWD water waste ordinance, a residence must be completely retrofitted with ultra-low flow toilets (ULFTs) at the time of sale, and all new construction must install high efficiency toilets (HET) (1.28 gpf or dual flush). This program includes CII customers.

Toilet replacement programs have generally been the most successful of demand management measures statewide. Savings for these programs have been shown to be 35-45 gallon per replacement per day, when retrofitting with 1.6 gal/flush units. Higher savings are found in higher density housing and commercial/industrial settings. Savings also persist as toilet life is generally about 25 years. The updated plumbing code allows for only 1.28 gal/flush toilet models to be purchased, which will result in further savings over the 1.6 gal/flush retrofits of the last two decades.

In 2015, MCWD approved 288 HET rebates. Many of these were in Preston Park, as discussed in the previous section.

6.2.10 High-Efficiency Washing Machine Rebate Programs

MCWD provides a $125 rebate to customers who purchase high-efficiency (HE) clothes washers. The program is very successful, averaging 120 conversions each year. MCWD requires all new residential construction to include high efficiency washing machines in each unit, when washers are provided. The incremental cost of high efficiency washers (front loading, horizontal axis) has been about $400 per unit over that of traditional, top load models. Typical customers can save from $50 to $100 per year in energy, water and waste water costs. Water savings range from 14 gallons per day in small single-family households up to over 100 gallons per day per unit in multi-family housing applications.[44] In 2015, MCWD approved 163 HE washing machine rebates.

6.2.11 Commercial, Industrial, and Institutional Accounts

MCWD conducts water use surveys for Commercial, Industrial, and Institutional (CII) customers' indoor and outdoor water uses and the customer is provided with an evaluation of water using apparatus and processes and recommended efficiency measures, expected payback period and available agency incentives. CII customers are contacted within a year of the survey to discuss water use and water saving improvements based on the recommendations of the survey. All of MCWD rebate programs (toilet, landscape, clothes washer) are available to commercial as well as residential customers.

MCWD has seen an increased demand for these surveys from hotels, schools, restaurants, and the courthouse due to drought awareness.

6.2.12 Landscape Conservation Programs and Incentives

The purpose of this DMM is to provide customers with a determination of how much water should be used to irrigate the land appropriately while maintaining conservation practices. The program is oriented toward three groups of customers who irrigate landscapes: those with dedicated irrigation meters, those with meters who serve a mix of irrigation and non-landscape uses, and new accounts with irrigation use. Conservation staff conducts site reviews and assistance visits with property owners/property managers. MCWD has adopted the Model Water Efficient Landscape Ordinance, and requires formal review and approval of all landscapes 500 square-feet or larger.

MCWD has several programs for landscapes, including rebates for evapo-transpiration controllers, turf removal, moisture sensors, rain shut-off switches and drip irrigation systems. MCWD has two demonstration gardens with native drought-tolerant species, one in each service area.

[44] California Urban Water Conservation Council, 2003.

The general public often views large landscapes as water conservation targets. Generally, however, and especially where dedicated irrigation meters exist, large landscapes are more efficiently managed than landscapes that are part of a mixed use setting. Large landscapes usually benefit from professional management and the owner's recognition of a direct correlation between the water bill and irrigation practices, which creates a financial incentive for conservation. Opportunity still exists to improve irrigation efficiency. The California Irrigation Management Information System (CIMIS) operated by the California Department of Water Resources provides real-time evapo-transpiration (ET) and other climatic data available on the Internet to help manage irrigation demands. CIMIS data can be combined with water budgets for each landscape to allow irrigation managers to apply only the amount of water needed. Newer irrigation controllers can either be programmed to modify irrigation schedules based on programmable ET factors, or query CIMIS stations for real-time data and be linked to soil moisture sensors and rain shut-off devices that can precisely provide only the amount of irrigation needed. These devices are now required per MCWD's design guidelines, and have been shown to produce from 25-45 percent in landscape water savings over traditional irrigation timers, which are often not reset to follow seasonal climate changes. Savings also accrue from the system's ability to automatically shut off irrigation zones when lines or sprinkler heads break or when there is significant rain. Such systems can also provide commercial or institutional customers with tremendous labor savings as they do not require human intervention to reset irrigation schedules to follow climate patterns or adjust for variations in precipitation. Savings can also accrue from lower fertilizer cost as off-site runoff can be eliminated.

Due to the state-wide drought restrictions, the District has limited landscape watering to two days per week, and the municipalities within the District have shut off all the median irrigation. In FY 2015/16, MCWD conducted 42 site surveys and provided rebates for the retrofit of 12 school sites. Many of the site surveys are being requested in the newer residential developments.

6.3 Planned Implementation to Achieve Water Use Targets

MCWD has been active in promoting conservation and taking action to assure its implementation. Review of per capita demands for water indicates these efforts and resulting behavior of MCWD customers is having an effect. Per capita demand rates have been on a nearly consistent decline from an average of 144 gpcd in 1999 to 115 gpcd in 2014, which meets the District's 2020 water conservation target. As discussed in Section 3.4.1, per capita demand is projected to increase as commercial uses increase in the Ord Community. However, the planned addition of recycled water for urban landscape irrigation will address a portion of that increase.

The District will continue to track per capita demand rates to assess overall savings, in addition to comparing water consumption of new residential development against older households and households which have been retrofitted with conservation devices. The District will continually reassess rebate programs to address saturation rates and emerging technologies.

Conservation reductions have come primarily from improvements in water use technologies (low flow devices, irrigation controllers, etc.) and some from behavioral changes driven by increasing water rates, drought awareness, and public education programs. These long-term savings reduce the ability of the MCWD to call upon water use reductions if necessary due to curtailment of supply from groundwater. This is known as demand hardening. As demonstrated over the past two years, mandatory reductions in landscape irrigation will remain as the primary means of achieving short-term usage reductions during shortages.

Section 7 - Completed UWMP Checklist

As a verification of plan completeness, the DWR Urban Water Management Plan checklist has been completed and included at Appendix G.