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FINAL DRAFT

MARINA COAST WATER DISTRICT

2010 URBAN WATER MANAGEMENT PLAN

Prepared by

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

June 14, 2011

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MARINA COAST WATER DISTRICT

2010 URBAN WATER MANAGEMENT PLAN

Board of Directors

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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
CAW, CalAm	California American Water Company
CDPH	California Department of Public Health
CSUMB	California State University – Monterey Bay
DMM	Demand management measure
DWR	California Department of Water Resources
FORA	Fort Ord Reuse Authority
LAFCO	Local Agency Formation Commission
~~MCRDH~~	~~Monterey County Redevelopment and Housing Office~~
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
SB	California Senate Bill
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

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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.

~~Each supplier is required to submit its plan to the State Department of Water Resources.~~ 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 2010 Urban Water Management Plan (UWMP), the Marina Coast Water District (MCWD) reviewed its 2005 and 2000 UWMPs and schedule of water conservation best management practices actions and other supply development actions. The economic downturn that occurred in late ~~2006~~2007 and continues through today greatly delayed the projected redevelopment of the former Fort Ord, as is 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 February 2011. MCWD's Water Conservation Commission, a public advisory group which helps shape MCWD's conservation programs, was also notified. MCWD also updated its water shortage contingency plan, which was reviewed in a public meeting of the Commission. Following Commission review, the water shortage contingency plan was reviewed in a public meeting of the MCWD Board of Directors and adopted (see Appendix F).

On ~~[date to be inserted]~~April 27, 2011 the draft UWMP was made available for public inspection at MCWD's offices and at local libraries. Copies were sent to each affected land use jurisdiction and the Monterey County Water Resources Agency (MCWRA). A public hearing was held for the plan on ~~[date to be inserted]~~May 10, 2011 as noted in the resolution reproduced in Appendix A. ~~Over [# to be inserted] people attended the public hearing.~~

1.3 Agency Coordination

~~MCWD has coordinated with all the jurisdictions in which it serves including the cities of Marina, Monterey, Seaside, and Del Rey Oaks, UCMBEST, CSUMB and Monterey County in accordance with the modifications to the~~The Urban Water Management Planning Act ~~made~~modified under SB 1518, effective January 1, 2003. ~~SB 1518~~ requires MCWD to notify affected land use jurisdictions of plan development and provide an opportunity to review the draft plan. A notice of hearing for the draft UWMP was sent to all applicable land use jurisdictions it serves including the cities of Marina, Monterey, Seaside, and Del Rey Oaks, UCMBEST, CSUMB and Monterey County. MCWD has also coordinated with the MCWRA, through which MCWD jointly holds trust responsibility for groundwater resources MCWD uses to serve customer demands. Additionally, MCWD notified the Fort Ord Reuse Authority of the plan's development and availability. Copies of these notices are in Appendix D.

MCWD will provide each of the land use jurisdictions 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	Participated in developing the plan	Commented on the draft	Attended public meetings	Was contacted for assistance	Was sent a copy of the draft plan	Was sent a notice of intention to adopt	Not involved/ No information
MCWRA					X	X	
City of Marina	X	X			X	X	
City of Seaside					X	X	
City of Del Rey Oaks	X				X	X	
City of Monterey	X				X	X	
County of Monterey (RDH)	X				X	X	
U.S. Army	X				X	X	
CSUMB	X				X	X	
UCMBEST	X				X	X	
State Parks	X				X	X	
FORA	X			X	X	X	
CalAm					X	X	
MRWPCA					X	X	
MPWMD		X			X	X	
General Public			X				

1.4 Plan Adoption

The 2010 Urban Water Management Plan ~~was~~ is planned to be adopted by the Marina Coast Water District Board of Directors on June 14, 2011. A copy of the resolution approving the plan is included ~~at~~in Appendix A.

1.5 Plan Implementation

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

- MCWD Code of Ordinances includes mandatory prohibitions on water waste, water shortage contingency actions, and enforcement provisions. ~~The District requires the various land use jurisdictions to allocate water supply to new developments based on the~~
- MCWD prepares Water Supply Assessments~~. If a development exceeds the allocated supply,~~ and Written Verifications of Supply for proposed projects and provides them to the land use jurisdiction.
- MCWD monitors new developments to ensure the average water demand does not exceed the water allocation made by the ~~District~~land use jurisdiction, and works with project owners and the affected jurisdiction when water uses habitually exceeds the allocation. 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.
- New water supply projects as reflected in this plan are in the approved Capital Improvements Program. ~~The District~~MCWD has entered into formal agreements with Monterey County Water Resources Agency, Monterey Regional Water Pollution Control Agency and California American Water for the regional desalination project and the urban recycled water project, as discussed in Section 4. ~~The District~~
- MCWD has a full-time water conservation staff that provides customer assistance and manages the rebate programs discussed in Section 6.

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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~~ MCWD 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, ~~the District~~MCWD constructed a wastewater treatment plant and installed a wastewater collection system to serve the community. The City of Marina incorporated in 1975, but ~~the District~~MCWD remained separate. In 1991, ~~the District~~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 ~~the District~~MCWD now provides wastewater collection services only, with treatment performed at the regional plant. In 1996, ~~the District~~MCWD constructed a seawater desalination facility to explore the feasibility of extracting seawater through shallow wells along the beach. ~~The District's~~MCWD's current Local Area Formation Commission (LAFCO) service area encompasses 3.2 square miles, and its sphere of influence encompasses an addition 2.4 square miles.

The MCWD 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 current District boundaries (see Figure 2.2). The Ord ~~community~~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 ~~facilities~~three institutions of ~~two state universities,~~ higher learning:

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

FORA has the statutory authority to provide for public capital facilities, including but not limited to, water and wastewater facilities on the former Fort Ord. However, FORA has a limited statutory life and needed a reliable, long-term entity to provide public services to the area.[1] 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 FORA. The Water and Wastewater Oversight Committee of the FORA Board oversees the operation of these facilities by MCWD. Title for these systems was transferred 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.

The FORA Board retains the authority to allocate Salinas Valley groundwater supplies as provided for under an agreement between the federal government and the Monterey County Water Resources Agency (MCWRA) dated September 1993. This agreement provides for groundwater extraction rights of 6,600 afy, an amount consistent with the former average groundwater use at Fort Ord while under military operation. Consistent with this agreement,

[1] Pursuant to Government Code 67700, FORA will sunset on June 30, 2014. To the extent water allocation functions of FORA need to be contributed, additional legal arrangements among the land use jurisdictions on the former Fort Ord and the MCWD will be necessary.

MCWD operates the Ord Community service area under a separate water allocation and cost center.

Figure 2.1 MCWD Vicinity Map

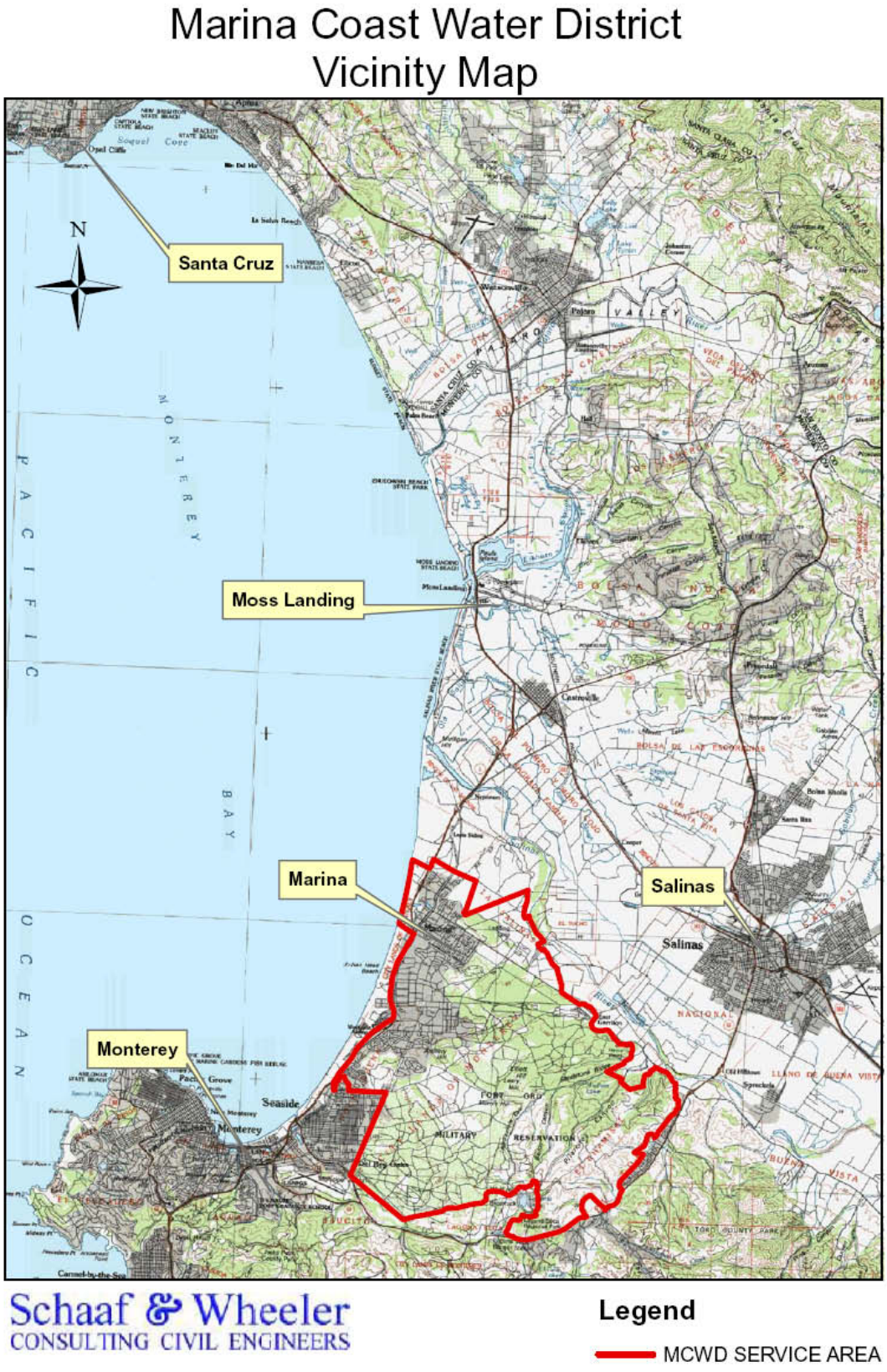
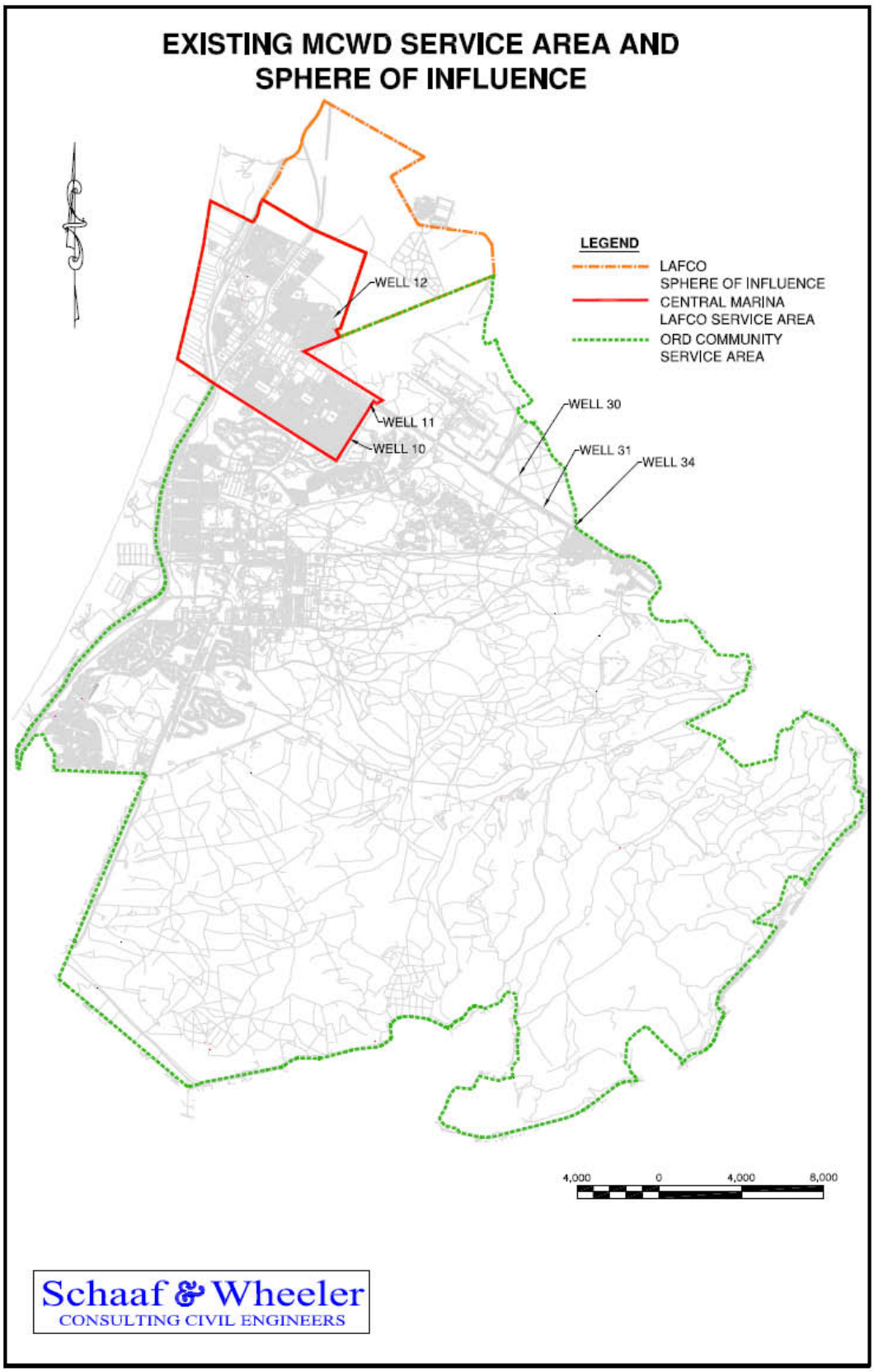


Figure 2.2 MCWD Service Areas

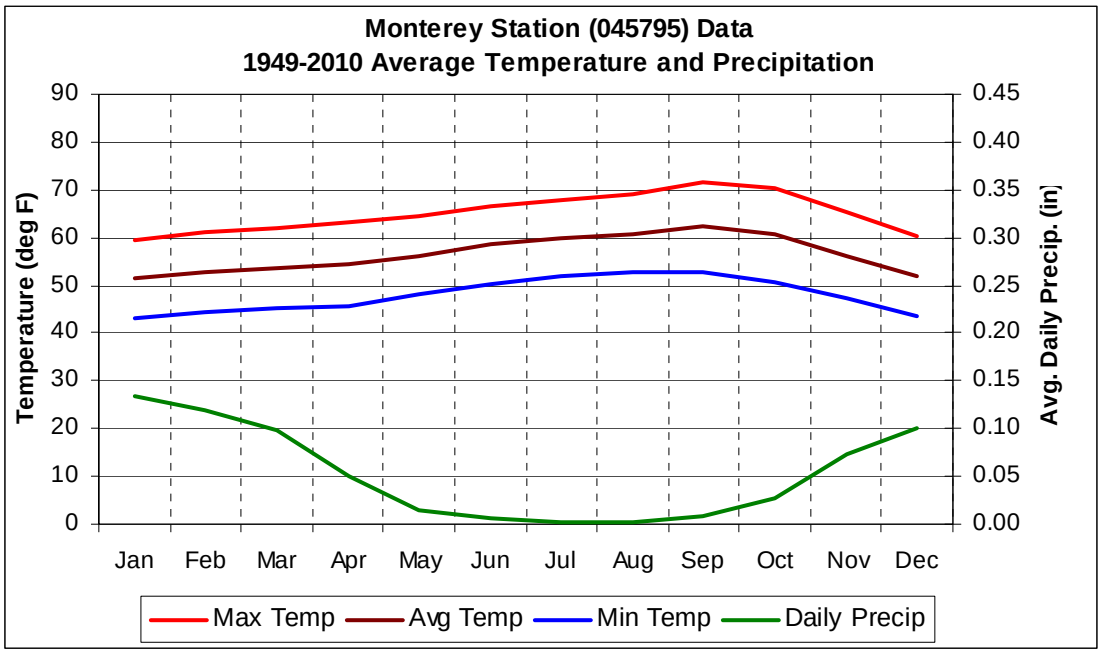


~~At some indeterminate date, MCWD, FORA and~~ Service to the Ord Community is provided exclusively under the 1998 agreement with FORA. In 2006, the Local Agency Formation Commission (LAFCO) of Monterey County published the Municipal Services Review of the Monterey Peninsula Area, and stated that MCWD may pursue annexation of the Ord Community. At some indeterminate date, MCWD, FORA and LAFCO may consider a formal annexation of all or ~~a portion~~portions of the former Fort Ord ~~lands~~ into ~~MCWD. Until such time, service is provided exclusively under the 1998 agreement with FORA.~~ the District. No formal decisions have yet been made.

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 1949-2010 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

City	CIMIS Station ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ETo
Castroville	19	1.4	1.7	3.0	4.2	4.6	4.8	4.0	3.8	3.0	2.6	1.6	1.4	36.2
Monterey	89	1.7	1.8	2.7	3.5	4.0	4.1	4.3	4.2	3.5	2.8	1.9	1.5	36.0
Salinas North	116	1.2	1.5	2.9	4.1	4.6	5.2	4.5	4.3	3.2	2.8	1.5	1.2	36.9

2.3 Population

MCWD historically served only the City of Marina, which incorporated in 1975. In 1997, ~~the District~~ MCWD began providing service to the Ord Community under agreement with FORA. Table 2.2 depicts ~~the District's~~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. 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 ~~systems~~, 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	Existing*	2010	2015	2020	2025	2030
Ord Community	13,646	15,350	24,888	33,995	39,028	43,438
Central Marina	16,834	16,834	18,483	23,723	25,333	26,449
Total	30,480	32,184	43,371	57,718	64,361	69,887

* 2010 ~~Decennial~~ Census, actual service area populations.

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 ~~Appendix~~Appendices C and E. The projected totals are significantly lower than those in the 2005 Urban Water Management Plan (e.g., the ~~previous projection~~2005 Plan total projected population for 2025 was 98,700 persons versus 64,361 with this 2010 Plan) due to the economic downturn that dramatically slowed the pace of redevelopment in the Ord Community. Some of that development has been deferred beyond the 20-year planning horizon of this report.

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 ~~Post Graduate~~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, and there are also 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 Airport. Brandman University and Golden Gate University also operate satellite campuses in the local area.

Tourism and recreation are major portions of ~~the District's~~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. 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 ~~in~~ to their portion of the Ord Community.

Within ~~the District's~~MCWD'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. ~~This results in a low per capita water demand.~~

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 ~~not~~ anticipated to be constrained due to the limited water supply available to the jurisdictions.

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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 outside the former Fort Ord, and the Ord Community. ~~The Central Marina~~ All water service connections in the Central Marina area ~~is fully~~ are metered. Fort Ord ~~was~~did not ~~metered~~have individual service meters while it was an active military base, and portions of the housing areas within the Ord Community remain ~~un-metered. These~~ without meters. Water meters continue to be installed in areas ~~are being addressed in~~ of the Ord Community in phases by the various property owners. Water use by customer type for calendar year 2005 is shown in Table 3.1, and year 2010 is shown in Table 3.2. The ~~un-metered~~water use in the Ord Community without meters is estimated at 0.33 acre-feet/year per residential connection.

Table 3.1 Water Deliveries in 2005

	Central Marina		Ord Community		Ord Non-metered		Total
Water use sectors	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**# Cust.**	**Ac-Ft**	**Ac-Ft**
Single family	3,243	898.8	378	126.6	1,230	410.0	1,435.4
Multi-family	239	575.4	973	362.8	1,425	475.0	1,413.2
Commercial	210	235.5	43	49.3			284.9
Industrial	0	0.0	3	4.1			4.1
Institutional/governmental	25	88.0	96	242.6			330.6
Landscape	63	119.5	63	283.0			402.5
Agriculture	0	0.0	0	0.0			0.0
Other	0	0.0	0	0.0			0.0
Total	3,780	1,917.2	1,556	1,068.3	2,655.0	885.0	3,870.5

Table 3.2 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	0.0	0	0.0			0.0
Other	0	0.0	0	0.0			0.0
Total	3,887	1,743.2	2,710	1,815.5	1,201.0	410.0	3,968.6

Two significant undeveloped areas north of Central Marina ~~exist within Marina's sphere of influence~~: Armstrong Ranch and the CEMEX (formerly RMC Lonestar) Property. A portion of the Armstrong Ranch has been annexed into the District and the City of Marina and is currently slated for predominantly residential urban development. No development plans currently exist for the CEMEX 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. Present agricultural demands are met via private wells.

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.

3.2 Projected Water Demands

3.2.1 Central Marina Service Area

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[2]. This includes increases in both Central Marina and the City's portion of the Ord Community. The economic downturn that began in 2007 has 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.

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 density of housing use 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. The City is currently working on their Downtown Vitalization Specific Plan. 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. The draft specific plan is reflected in this UWMP.

[2] 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

The Fort Ord Reuse Authority developed the Draft Fort Ord Reuse Plan in 1996, and released ~~a~~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.

In 2010 and 2011, 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 2030. 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
Whispering Oaks Business Park	Monterey County	2010

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 provided projections from their approved master plans. The City of Marina provided information on the proposed Downtown Vitalization Specific Plan. 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. ~~For non-residential uses, an additional 15 percent has been added to account for landscape 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.

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 the 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 the MCWD's ability to plan for future demands as they are identified.

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
Multi family (> 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

3.2.4 Summary Demand Projections

The projected water demands in this Urban Water Management Plan are lower than those in the 2005 UWMP. This reduction 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. The other developments are not expected to resume construction until 2012 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 2030 or later, ~~vice~~versus the previous prediction of full reuse before 2020. Deferred projects include removal of the golf resort near the Marina Airport, removal of the Seaside east housing developments, and removal of 2 million square-feet of projected office/research and development space within UCMBEST. ~~Second, the 2005 UWMP was primarily based upon land development forecasts and~~

The second factor responsible for the lower water demand is the change from using broad demand factors applied to land development forecasts, upon which the 2005 UWMP was based. Many of the specific plans have since been completed, and this forecast is based upon the more detailed water supply assessments. ~~Finally,~~

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 is lower than previously estimated. The remaining non-metered accounts are being addressed as part of the phased upgrading of family housing within the Ord Military Community.

Table 3.5 depicts the total expected growth in demands from all currently expected development and population growth through 2030. Demand values reflect current demands plus the projected development within each jurisdiction. Included for comparison are the existing allocations of groundwater supply by jurisdiction, which are explained in Section 4.

Table 3.5 Water Demand by Jurisdiction (afy)

	Jurisdiction	2009*	2010	2015	2020	2025	2030	Allocation
Ord	CSUMB	621	403[1]	441	631	754	778	1,035
	Del Rey Oaks	0	0	326	527	527	527	243
	City of Monterey	0	0	0	92	92	92	65
	County of Monterey	4	4	627	1,087	1,087	1,087	710
	UCMBEST	2	2	93	276	474	474	230
	City of Seaside	430	792[2]	1,130	1,351	1,664	2,093	1,012
	U.S. Army	658	752	792	838	997	997	1,577
	State Parks and Rec.	0	0	12	18	20	25	45
	Marina Ord Comm.	280	281	812	1,537	1,738	1,739	1,625[3]
	Marina Sphere	10	10	10	10	10	10	10
	FORA Strategic Res.	0	0	0	0	0	0	0
	Assumed Line Loss	71	348	348	348	348	348	348
Marina	Armstrong Ranch	0	0	0	550	680	680	920
	RMC Lonestar	0	0	0	0	0	500	500
	Marina Central	1,962	1,962	2,324	2,630	2,746	2,864	3,020
	Subtotal - Ord	2,076	2,592	4,591	6,715	7,712	8,172	6,~~600~~900
	Subtotal - Marina	1,962	1,962	2,324	3,181	3,426	4,044	4,~~740~~440
	Total	4,038	4,554	6,915	9,896	11,137	12,216	11,340

*Actual demands from calendar year 2009

1. 2010 demands for CSUMB reflect 100% metered use
2. Demands for Seaside include Seaside Resort Golf Course starting in 2010
3. Allocation includes 1325 afy groundwater and 300 afy existing desalination plant

It should be noted that in 2010, ~~the District~~ MCWD began providing Salinas Valley groundwater for 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. As discussed in Section 4, ~~the District~~MCWD 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 Aquifer, as part of that basin's management plan. When the recycled water system is completed and delivering recycled water to Seaside Resort, the City may reallocate that potable supply to another project.

Table 3.5 shows that the current groundwater allocation for Central Marina is sufficient to meet projected demands through 2030. The City's Downtown Vitalization Specific Plan is projected for build-out by the year 2040, and will require the development of additional water supply for that service area by 2035. The Ord Community is projected to exceed its current Salinas Valley groundwater allocation by the year 2020, with some jurisdictions exceeding their sub-allocations by 2015. This is discussed in detail in Section 4, Water Supply.

3.3 Predicted Water Demand by Sector

Table 3.6 shows the projected water consumption by use sector in the period 2010-2030.

Table 3.6 Water Demand by Sector (afy)

Water use sectors	Existing*	2010	2015	2020	2025	2030
Single family	1,479	1,572	2,398	3,456	3,784	4,088
Multi-family	1,353	1,353	1,714	2,196	2,532	2,769
Commercial	347	348	1,262	2,010	2,290	2,319
Industrial	6	6	113	297	387	887
Institutional/Governmental	300	303	374	435	609	614
Landscape	422	814	896	1,308	1,326	1,329
Agriculture	0	0	0	0	0	0
Other	0					
Total	3,907	4,397	6,757	9,702	10,928	12,006

* Actual demands for 2009

Note: table does not include the 348 afy provision for loss included in Table 3.5

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 542 affordable housing units, of which 409 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, 108 apartments and 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 41 affordable multi-family units in the Ord Community, of which 36 are designated for lower income households. An additional 10 existing units will be restricted to low and moderate income housing in 2012, of which 5 are assumed to be low income. 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.

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. The proposed Monterey Horse Park has not reached the point of having a draft specific plan or EIR, so we have assumed that 14% of the proposed 482 housing units, or 67 units, will be lower income. Please note that the County may opt to consider the Ord Redevelopment Area collectively, which will reduce the actual Horse Park 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 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~~, below~~.

Table 3.7 Lower Income Housing Demands (afy)

	Jurisdiction	Existing*	2010	2015	2020	2025	2030
Ord	CSUMB		0	0	0	0	0
	Del Rey Oaks		0	24	24	24	24
	City of Monterey		0	0	0	0	0
	County of Monterey		0	43	80	80	80
	UCMBEST		0	3	14	26	26
	City of Seaside	9	9	27	30	74	134
	U.S. Army		0	0	0	0	0
	State Parks and Rec.		0	0	0	0	0
	Marina Ord Comm.	102	102	285	415	559	699
	Marina Sphere		0	0	0	0	0
Marina	Armstrong Ranch		0	0	48	55	55
	RMC Lonestar		0	0	0	0	0
	Marina Central	65	65	85	105	119	133
	Subtotal - Ord	111	111	383	563	763	963
	Subtotal - Marina	65	65	85	153	174	188
	Total	176	176	469	716	937	1,151

*Existing demands estimated at 0.25 AFY/EDU

3.4 Water Conservation Baseline and Targets

The Water Conservation Act of 2009 (SBx7-7) 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~~, below~~. Annual population values were estimated using estimates from the California Department of Finance, as detailed in Appendix E. As can be seen, ~~the District's~~MCWD's average water demand has been at or below the regional 2020 target of 123 gpcd since 2009. The ~~District has~~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 due to the closure of Fort Ord. Of the remaining periods, MCWD selected the period ending December 31, 2008, for calculating the baseline water demand, which is 133.3 gpcd. This period includes ~~periods~~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: An approach developed by DWR and reported to the Legislature by December 31, 2010. The proposed method uses 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	16,239	772.7	130	123		
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	145.8	
2005	17,672	715.1	111	11,805	649.6	151	127	138.6	
2006	17,509	582.1	91	11,645	817.5	192	132	134.8	
2007	17,493	528.6	83	11,572	958.3	227	140	133.3	134.0
2008	17,706	597.4	92	11,827	739.3	171	124	133.3	132.7
2009	17,852	639.2	98	11,891	676.5	156	121	130.9	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. ~~The District~~MCWD selected the period ending December 31, 2008, for its 5-year baseline period, as reflected in Table 3.9~~, below~~.

Water demands within ~~the District~~MCWD are already significantly below the state and regional averages due to aggressive water conservation practices. Therefore, ~~the District~~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 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	133 gpcd
Maximum Target (95% of 5-year baseline)	2020	~~127~~126 gpcd
Method 3 Target (95% of Regional Target)	**2020**	**117 gpcd**
Interim Target	**2015**	**125 gpcd**

3.5 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

	2010	2015	2020	2025	2030
Projected Demand (AFY)	4,553	6,913	9,895	11,136	12,214
Projected Recycled Water (AFY)*	0	780	1,359	2,514	2,960
Net Potable Demand (AFY)	4,553	6,133	8,536	8,622	9,254
Projected Population	32,184	43,371	57,718	64,361	69,887
Projected demand per person (gpcd)	126.3	126.2	132.0	119.6	118.2
Water Use Targets (gpcd)	0	125	117	117	117
~~Remainder to address (gpcd)~~Projected Target Exceedance (gpcd)	0	1.2	15.0	2.6	1.2

*Based on 2006 Basis of Design Report, includes Project Phase 2

To reduce per capita demands below the compliance targets, ~~the District~~ MCWD 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 the table ~~(Remainder to address)~~, Projected Target Exceedance, these measures will come close to achieving the conservation targets, but additional effort will be required. A portion of ~~that~~the Projected Target Exceedance may be realized through pipeline loss reduction (the demand projections include a provision for 348 afy of loss, while the actual loss in 2009 was

under 100 afy. The). Also, the projection of predominantly non-residential development in the 2015-2020 time period causes per capita demands to peak in 2020 spike, but the actual development schedules may differ. The DistrictMCWD will monitor annual water demand, and adjust incentive programs as needed to meet the conservation targets.

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, and has only deferred implementation due to the economic slow-down which has deferreddelayed redevelopment of the Ord Community. As shown in Table 3.10, the project is expected to provide 1,359780 afy in 2015, and increase by phases to 2,960 afy in 2030.

The DistrictMCWD has adopted design guidelines and standards that exceed the state plumbing code requirements for water conserving fixtures, codified in Section 3.36 of the DistrictMCWD 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.

In 2010, CSUMB installed water meters in the final section of their faculty and student housing area. The District such that there are no unmetered water accounts remaining within CSUMB's jurisdiction. MCWD has already seen a reduction in water demand in this area, now that the occupants are billed directly for their water use.

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 POM garrison staff is investigating the cost benefit of installing meters in some existing areas, due to the cost savings they would realize.

Section 4 - Water Supplies

4.1 Water Sources

The primary 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~~MCWD owns and operates its production wells, and does not purchase wholesale water supply.

Table 4.1 depicts recent groundwater production for the Central Marina and Ord Community service areas. Note that well capacity is not included in the table. ~~The District~~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)
2001	2,285	2,228	4,513
2002	2,306	2,137	4,443
2003	2,185	2,144	4,330
2004	2,262	2,423	4,685
2005	2,195	1,994	4,188
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

~~Additionally, the District 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.~~

~~The District 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. The City and District planned to transition the golf course to recycled water in 2008, but the project was delayed by the economic downturn. The City and District agreed to transition the golf course to Salinas Valley groundwater in advance of the recycled water project, which helped the City meet its pumping reduction target for the Seaside groundwater basin.~~

The three water production wells in the Central Marina service area are in the Deep Aquifer, as described in Section 4.2.1. MCWD is currently the only significant user of the Deep Aquifer. The three wells in the Ord Community service area are in the 400-foot Aquifer. MCWD is currently adding a new well in the Deep Aquifer in the Ord Community.

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.

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.[3] This groundwater basin underlies the Salinas Valley from San Ardo to the coast of Monterey Bay and is divided into four hydrologically linked subareas: Pressure, East Side, Forebay and Upper Valley (Figure 4.1). MCWD's wells for both its Marina and Ord Community service areas are located within the Pressure Subarea of the Salinas Valley Groundwater Basin. (See Figure 2.2 for well locations and Figure 4.1 for basin subareas).

The basin ~~is further divided~~ in the Pressure subarea ~~by~~ is further divided into three distinct aquifers, consisting of aerially extensive, 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~~Foot, 400-~~foot~~Foot and ~~deep aquifer. Historically, the deep aquifer was thought to be geologically confined in the Marina area, meaning that groundwater did not move between the deep aquifer and the 400-foot and 180-foot aquifers. However, recent stratigraphic analyses have indicated that these~~ Deep aquifers ~~are connected hydraulically, with water from the 180-foot and 400-foot aquifers recharging the deep aquifer.[4] Additionally, the deep, or 900-foot, aquifer is a series of 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 the Aromas Sand, the Paso Robles Formation and the Purisima Formation, not all of which are hydraulically connected.

~~MCWD's wells for both its Marina and Ord Community service areas are located within the Pressure Subarea of the Salinas Valley Groundwater Basin (see Figure 2.2 for well locations and Figure 4.1 for basin subareas). Studies and investigations have allowed the delineation of three aquifer systems within the Pressure Subarea. These aquifers consist of aerially extensive, horizontally continuous, deposits of sand and gravel that exist at various depths below ground surface in the subarea. These aquifer systems have been designated as the 180-Foot, the 400-Foot and the Deep Aquifer systems. The 180-Foot and 400-Foot aquifers derive their names from the average depth at which the water bearing sand and gravel deposits are encountered. The Deep~~

[3] See Figure 2.2 for well locations.

[4] ~~Deep Aquifer Investigation Study, WRIME, 2003.~~

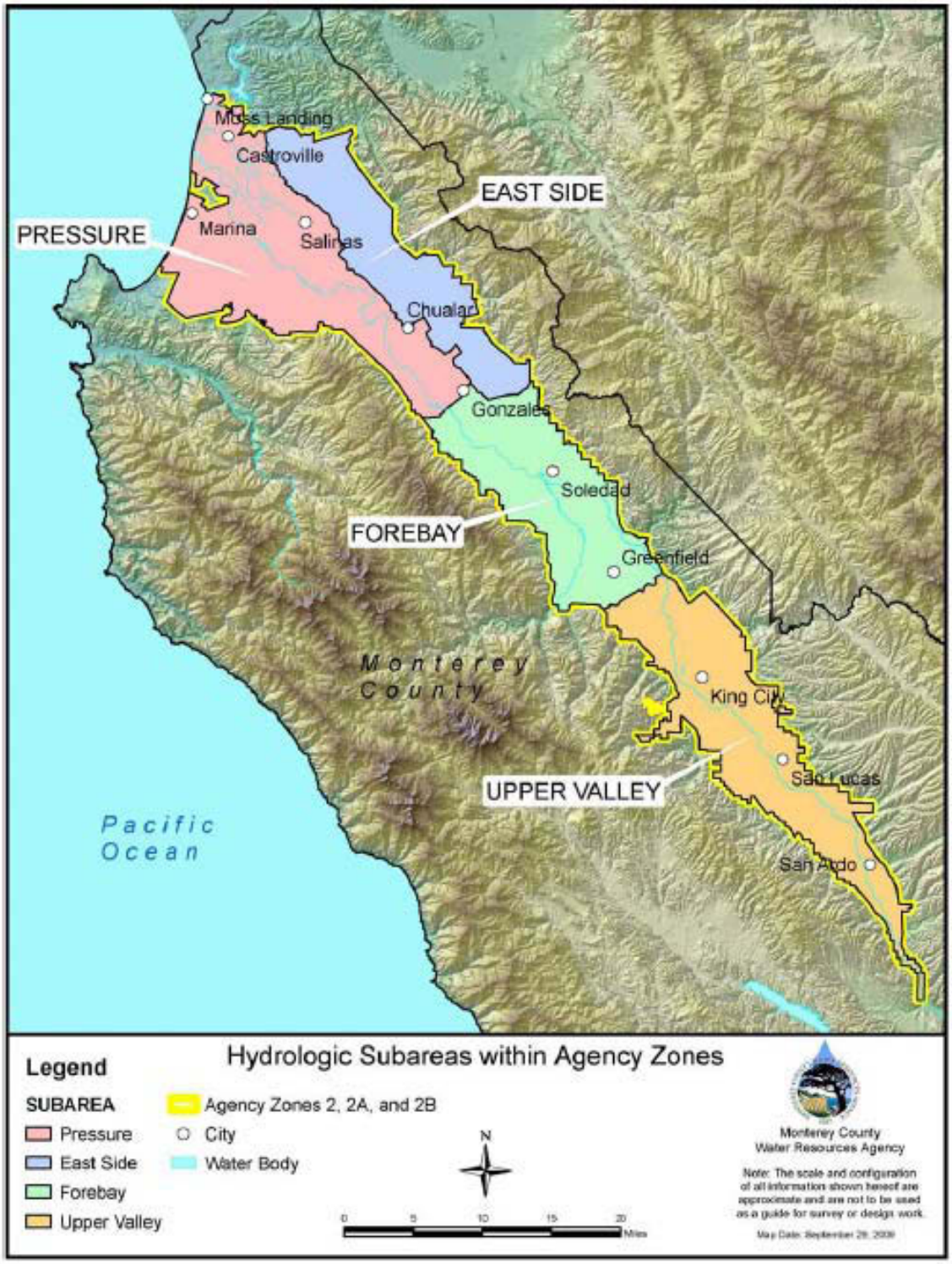
~~Aquifer consists of an aggregation of all sand and gravel deposits that exist below the 400-Foot Aquifer.~~

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

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 locally blends with the 180-Foot Aquifer receiving recharge from the Salinas River through the overlying deposits.

The Deep Aquifer System consists of two geologic formations – the Paso Robles and the underlying Purisma Formations. These formations are aerially extensive, stretching throughout the Salinas Basin and to the north and south. The lowermost unit extends to the north outcropping in Soquel 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 2,000 or more feet in some locations. Non-water bearing Monterey Shale that constitutes the bottom of the Salinas Groundwater Basin underlies the Deep Aquifer system.

Figure 4.1 Salinas Valley Groundwater Basin[5]



[5] Source: MCWRA 2009 Groundwater Summary Report

~~Regionally, the Deep Aquifer is not used as extensively as the 180-Foot and 400-Foot Aquifers. The MCWD is the only current significant user of the Deep Aquifer system. MCWD utilizes three wells that extract water solely from the Deep Aquifer to supply the Central Marina distribution system. The Deep Aquifer System consists of two geologic formations – the Paso Robles and the underlying Purisma Formations. These formations are aerially extensive, stretching throughout the Salinas Basin and to the north and south. The lowermost unit extends to the north outcropping in Soquel 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 2,000 or more feet 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 deep aquifer may be insufficient to sustain current pumping, but monitoring well data at the Marina Airport[6] indicates the aquifer is subject to seasonal variations similar to the upper aquifers.~~

~~The wells currently serving the Ord Community do not extract water from the Deep Aquifer System, but the District is adding a new well (FO-34) which will be in the Deep Aquifer. The selection of this source of supply was based upon data from new Deep Aquifer monitoring wells constructed in the last decade, water production and quality data from the District's Marina wells, and water quality data for the upper aquifers from the District's Fort Ord wells.[7]~~

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 deep aquifer may be insufficient to sustain current pumping, but monitoring well data at the Marina Airport[8] indicates the aquifer is subject to seasonal variations similar to the upper aquifers. Recent stratigraphic analyses have indicated that these aquifers are connected hydraulically, with water from the 180-foot and 400-foot aquifers recharging the Deep Aquifer.[9]

~~[6] MCWD Well 34 Basis of Design Report, Martin B. Feeney, PG, September 2009~~

~~[7] MCWD Well 34 Basis of Design Report, Martin B. Feeney, PG, September 2009~~

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

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

Because of the overlying clay layers that isolate the aquifer systems in the Pressure Subarea from potential surface water recharge, most importantly the Salinas River, the primary mechanism for recharge is from lateral flow that comes from the adjacent subareas. This means that most recharge for the aquifer systems in the Pressure Subarea comes from lateral flow from either the Eastside or Forebay Subareas. 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 180-Ft Aquifer partially recharges the 400-Ft Aquifer that in turn partially recharges the Deep Aquifer). Most of the recharge for the Pressure Subarea derives from the Forebay Subarea due to the presence of the Salinas River and the active management of Nacimiento and San Antonio reservoirs to maximize river recharge releases by MCWRA.

In a healthy condition, Salinas Basin groundwater would move through the basin and into the Monterey Bay through subsurface freshwater outcrops. As a result of basin-wide pumping, water levels in the Pressure and East Side subareas have declined over time, contributing to a decrease in the amount of groundwater moving toward and into Monterey Bay. 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 basin currently experiences a landward gradient of seawater (intrusion), where the seawater has contaminated coastal aquifers and wells. While historic groundwater pumping throughout the basin created 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 4.2.4.

The Salinas Valley Groundwater Basin has been in an overdraft condition with seawater intrusion of about 8,900 afy at its coastal margins.[10] MCWD's groundwater withdrawals are about 4,600 afy, or less than 1.0 percent of total annual basin withdrawals of about 511,000 afy[11]. 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, there were agricultural lands in the Castroville area that 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 the Monterey County Water Resources Agency (MCWRA). Delivery of recycled water to this area has contributed to a recovery in groundwater levels in this area, and completion of the Salinas Valley Water Project in 2010 should further reduce groundwater pumping to sustainable levels.

4.2.2 Basin Management

~~The Salinas Valley Groundwater Basin has not been adjudicated.~~ Two regional water management agencies have jurisdiction over groundwater production in the vicinity of ~~the~~

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

[11] 2009 Groundwater Summary Report, MCWRA, 2010

MCWD. The MCWRA is responsible for regulation and supply of water from the Salinas groundwater basin~~.~~, which is MCWD's source of water supply. The Salinas Valley Groundwater Basin has not been adjudicated. The Monterey Peninsula Water Management District (MPWMD) is responsible for regulation and supply of water from the Seaside groundwater basin, which was formally adjudicated in 2006. These two basins are adjacent to each other under Ord Community lands. MCWD recognizes the jurisdiction of the two regional groundwater management entities, and so has not independently developed a groundwater management plan pursuant to Water Code § 10750.

Where groundwater basins are in or are projected to be in overdraft, the Water Code requires UWMPs to provide detailed descriptions of efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. In the Salinas Basin, an urban water supplier like MCWD that accounts for less than 1 percent of total basin pumping, cannot by itself eliminate or remedy a condition that results from basin-wide activities. MCWD can and does work cooperatively with MCWRA, and is taking actions to protect and preserve its ability and right to access groundwater, and to augment groundwater supplies with new sources of supply. ~~The District~~ MCWD is developing a Seawater Desalination Project and a Recycled Water Project, as discussed in Section 4.4.

MCWRA ~~is implementing a program to eliminate overdraft~~has been and ~~intrusion known as the Salinas Valley Water Project (SVWP), discussed in Section 4.2.6.~~ is currently working to eliminate basin overdraft and seawater intrusion. The current program builds upon action taken in the 1940's 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 which augmented water resources within the County. From the time it was formed, MCWD has cooperated with the MCWRA in 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 1997, reducing basin overdraft and seawater intrusion.

To fully eliminate ~~these problems~~basin overdraft and seawater intrusion, MCWRA's Salinas Valley Water Project (SVWP) was ~~then~~ 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 Project 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 are in their first full year of operation. MCWRA modeling concludes that this component will eliminate basin overdraft and intrusion. ~~A second phase of the SVWP, examined at a program level in the SVWP EIR, calls for surface water to be made available to coastal urban water agencies in the future.~~

MCWD is within MCWRA Zones 2/2A, zones of benefit and assessment for the Nacimiento and San Antonio Reservoirs. Both the Army and MCWD entered agreements with MCWRA, which allows MCWD to participate in and benefit from MCWRA's regional basin management planning process. Under the terms of the Army's Agreement (assumed by ~~the District~~MCWD in 2001), ~~the District~~MCWD may provide up to 6,600 afy of Salinas Valley Groundwater to the Ord Community. This amount is about equal to the historic demand from Army uses at 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 Fort Ord closed, the Army retained 1,577 afy of this allocation to meet the needs of the Ord Military Community. The Fort Ord Reuse Authority sub-allocated the remaining groundwater supply among the land use or land owning jurisdictions on the Ord Community as shown in Table 4.2. This table also includes groundwater supply available to MCWD under its agreement with MCWRA. ~~The District~~MCWD may provide up to 3,020 afy of Salinas Valley Groundwater to customers in the City of Marina, outside of the Ord Community. Additionally, two adjacent major private properties within the City of Marina's LAFCO sphere of influence, the Armstrong Ranch and the Lonestar property, were included in the agreement and are approved for annexation to MCRWA's Zones 2 and 2A. The groundwater available for those properties is included in Table 4.2.

Table 4.2 Groundwater Allocations

	Jurisdiction	Allocation
Ord	CSUMB	1,035
	Del Rey Oaks	243
	City of Monterey	65
	County of Monterey	710
	UCMBEST	230
	City of Seaside	1,012
	U.S. Army	1,577
	State Parks and Rec.	45
	Marina Ord Comm.	1,325
	Marina Sphere	10
	FORA Strategic Res.	0
	Assumed Line Loss	348
Marina	Armstrong Ranch	920
	RMC Lonestar	500
	Marina Central	3,020
	Subtotal - Ord	6,600
	Subtotal - Marina	4,440
	Total	11,040

4.2.3 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. The Salinas Valley Water project addresses basin overdraft, and is discussed in Section 4.2.6 of this report. The MCWD Eastern Distribution System is a long-term plan to relocate District wells further inland, outside the areas affected by seawater intrusion. This project does not add additional groundwater supply. The City of Soledad Water Recycling Project would add tertiary treatment to the City's wastewater plant, producing Title 22 recycled water for agricultural and urban irrigation. Additional projects were considered in the Functionally Equivalent Plan for future implementation.

4.2.4 Seawater Intrusion

While sufficient production capacity (versus water availability) to meet the projected ultimate demand within MCWD's service area can be provided, there is concern that seawater intrusion

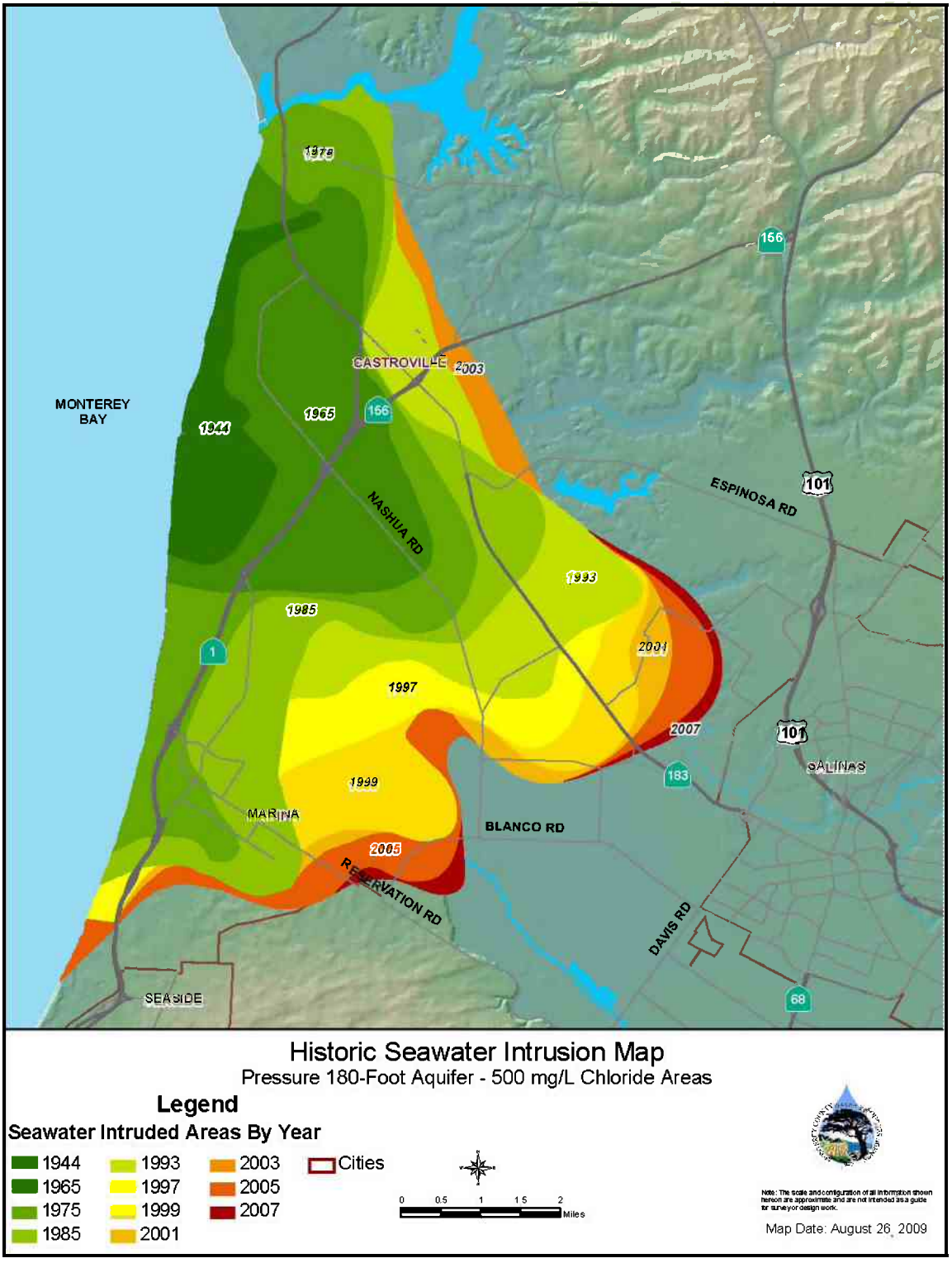
may eventually degrade water quality in the MCWD's Marina and Ord Community service areas and render it unfit for domestic water supplies without further treatment, such as desalination. Similarly, there has been concern that hazardous substance contamination detected at the former Fort Ord might adversely affect the quality of water MCWD is serving within its Marina and Ord Community service areas. As discussed below, both concerns are being actively managed to ensure ongoing protection of the quality of MCWD's groundwater sources of supply.

Seawater intrusion in the 180-foot and 400-foot aquifers is tracked using chloride concentration. 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 is used as a measure of impairment of water. 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 4.2 and Figure 4.3. As can be seen in the figures, seawater intrusion has been recorded for over 50-years. Wells within the intruded areas were progressively moved further inland or into deeper aquifers.

Historically, MCWD served its Marina service area from eleven 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~~MCWD currently has three wells in the Deep Aquifer, MCWD-10, MCWD-11 and MCWD-12, constructed in 1982, 1985 and 1989 respectively. These wells are depicted in Figure 2.2.

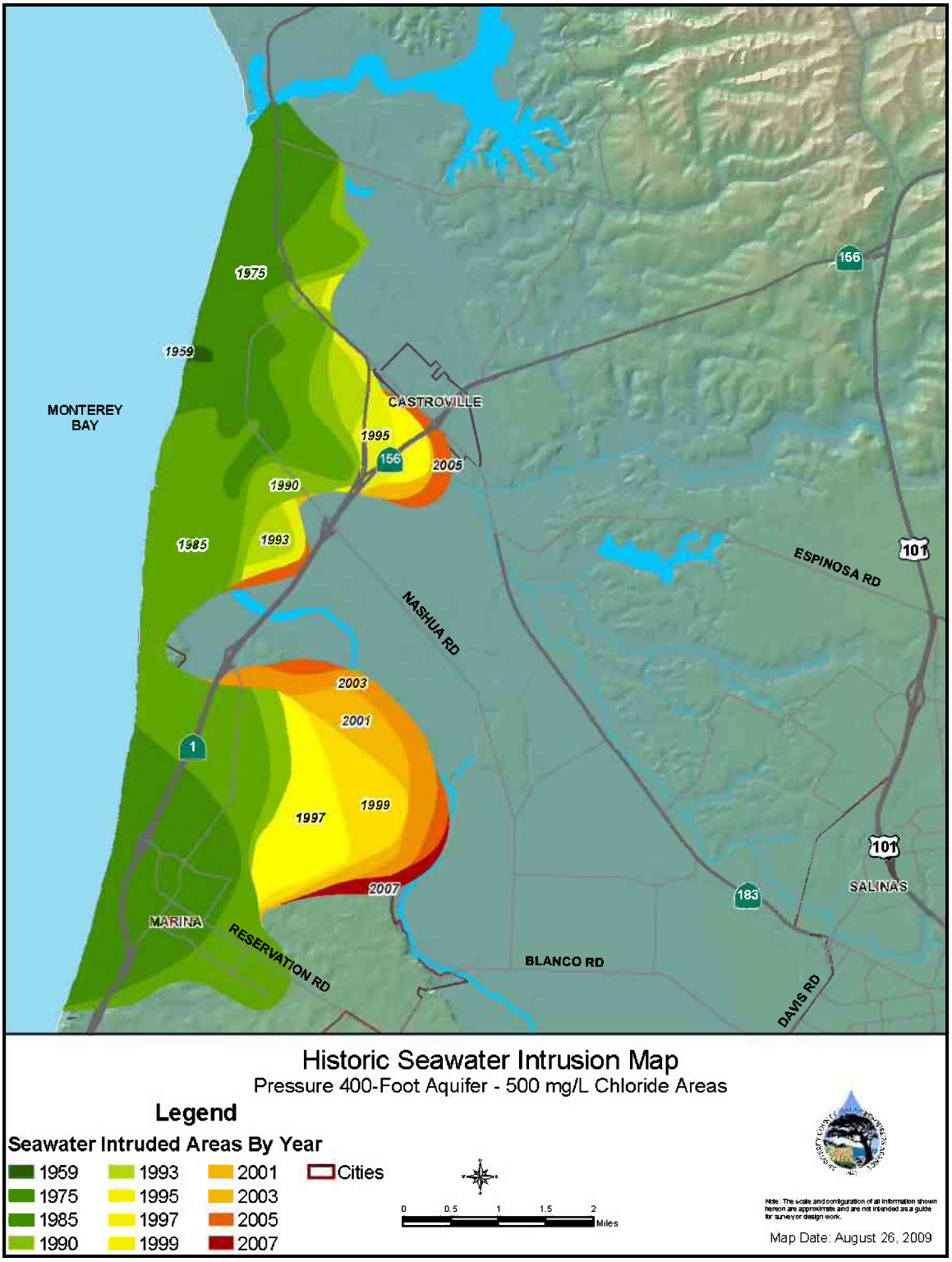
The U.S. Army's original wells serving the former Fort Ord were located in the Main Garrison area near Marina. When wells indicated varying degrees of seawater intrusion, the Army in 1985 installed four wells further inland. Located near the intersection of Reservation and Blanco Roads in Marina (Figure 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 remaining three wells are currently supplying MCWD's Ord Community service area.

Figure 4.2 Historic Seawater Intrusion by Year[12]



[12] Source: MCWRA website

Figure 4.3 Historic Seawater Intrusion by Year[13]



[13] Source: MCWRA website

Recent studies for MCWRA indicate that the seawater intrusion front continues to migrate inland in the vicinity of Marina and the Ord Community. Continued pumping from the 180-foot aquifer threatens the wells currently supplying the Ord Community. ~~The District's~~ MCWD's Water System Master Plan identifies the need for a phased replacement of these wells. 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.

There is some concern that the Deep Aquifer may be affected by seawater intrusion. MCWD operates a monitoring well installed between Monterey Bay and the Marina production wells. That monitoring well serves as an early warning system to identify any future seawater intrusion that might later affect MCWD's production wells, located further inland. That early warning would provide advance notice to 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 79 mg/L) and total dissolved solids (average 380 mg/L) have not increased in the 25-years MCWD has operated the deep wells.

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 too 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[14], and WRIME[15] to analyze the Regional Desalination Project (discussed in section 4.4.2). 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

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

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

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.

MCWD is adding a new well (FO-34) which will be in the Deep Aquifer. The ~~District~~selection of this source of supply was based upon data from new Deep Aquifer monitoring wells constructed in the last decade, water production and quality data from MCWD's Marina wells, and water quality data for the upper aquifers from MCWD's Fort Ord wells.[16] As indicated in the above studies, the use of this aquifer would have less impact on regional seawater intrusion than completing a well in the upper aquifers.

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 4.2.6 below, those activities also include the MCWRA's development, approval and implementation of the Salinas Valley Water Project to permanently end seawater intrusion.

4.2.5 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," 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.[17]

In ~~June 2002~~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) ~~above which water may not be served~~ for potable use~~s~~. The contamination is coming from an abandoned landfill and a fire

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

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

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.

The amount of TCE in one well was 0.53 to 0.81 µg/L (parts per billion)[18]. State and federal safe drinking water MCL standards for TCE are set at 5.0 parts per billion, or approximately one full magnitude 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 ~~Services (DHS~~(DPH). No additional action was deemed necessary by ~~DHS~~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 2009~~,~~ TCE detections in the Ord ~~community~~Community wells ranged from non-detect to 1.3 parts per billion. ~~Detections are~~TCE detections have been intermittent~~, rarely occurring in two consecutive tests~~ since the initial detection in 2001.

MCWD is continuing to monitor the affected well, and all other wells, for TCE and/or any other contaminants on a regular basis. Any changes in contaminant plume migration due to increased pumping levels in other parts of the aquifers from which ~~the District~~MCWD draws its water will be monitored and appropriate actions taken. ~~The District~~MCWD maintains close coordination with the U.S. Army Corps of Engineers, who manages groundwater cleanup efforts on the former Fort Ord. The Corps of Engineers recently published an update to their mitigation program, depicted in Figure 4.4.

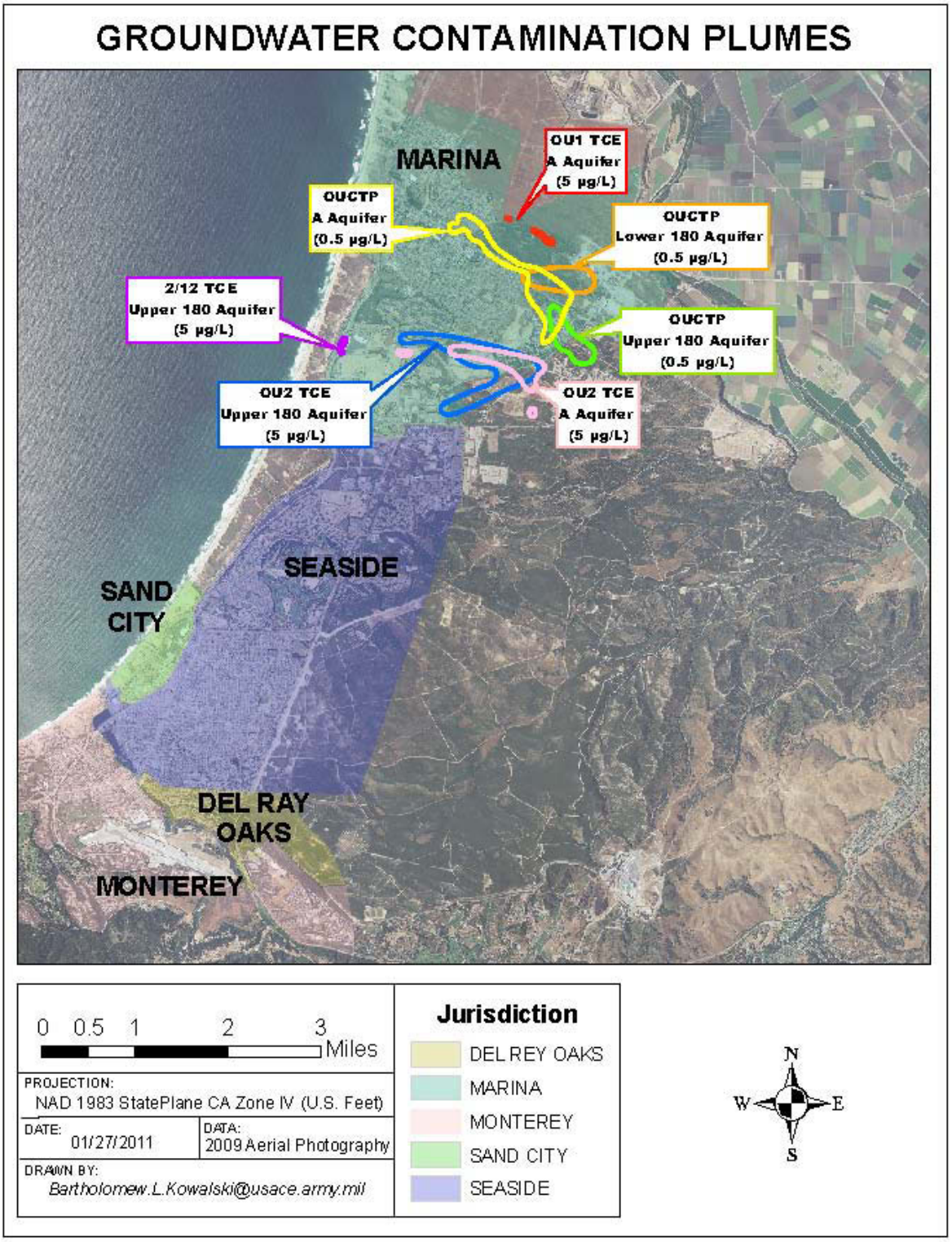
The Defense Department is required by law to clean up the contamination to below allowable contaminant levels designed to protect public health set by the State Department of Public Health ~~Services~~. Groundwater samples are taken quarterly and compiled in annual status reports. Additionally, all data is summarized in documents known as five-year reviews. It is expected that final cleanup of groundwater may take as much as another ~~thirty~~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

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

health by contaminating drinking water wells serving Marina and Ord Community. ATSDR's final health assessment concludes as follows:

Figure 4.4 Groundwater Contamination Plumes[19]



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

- 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.

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

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~~ Foot aquifer are low due to intervening clay layers between the 180-Foot and 400-~~foot~~Foot aquifers.

No nitrate problems are 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.

4.2.6 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., storage and regulated release of runoff for Salinas Valley groundwater recharge through 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 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/welcome_svwp_n.htm.

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 diversion;
- 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 capture of about 10,000 acre-feet (ac-ft) of dry weather flows to be made available for in lieu of groundwater pumping for irrigation.

The Salinas Valley Project anticipates that current demands on the basin will decline by about 20,000 afy by 2030 due to urban and agricultural conservation efforts, conversion of agricultural lands and some crop shifting.[20] This overall decline is expected to occur despite a near doubling of the population served by the Salinas Valley groundwater basin, from 188,949 in 1995 to 355,829 in 2030. This population growth will increase urban demands by about 40,000 afy.

[20] Salinas Valley Plan 1998, p. 3-15

Additional water to balance basin recharge with withdrawals will be provided through capture and diversion of reservoir releases down the Salinas River, otherwise lost to the ocean; additional recycled water from the Monterey County Recycled Water Projects; and modification of the spillway at Nacimiento Reservoir, which will allow reoperation of this reservoir and the San Antonio Reservoir, producing the additional system yield. In total, by 2030 an additional yield of 37,000 afy is expected.

Funding for the Salinas Valley Water Project under a special property assessment was subject to a vote of property owners by mail-in ballot in accordance with Proposition 218. Results of the vote were announced on April 8, 2003. Parcel ballots were returned with an 85 percent weighted voting of assessed valuation voting yes, far greater than the majority plus 1 percent required for approval.

A final Environmental Impact Report/Environmental Impact Statement for the Project was certified in June of 2002. The Project ~~is proceeding through~~ was constructed in 2008 to 2010, and the ~~permit and final design process with projections for completion of permitting by the end of 2005. Litigation of the project is pending relative to the impacts upon recreational use of Nacimiento and San Antonio reservoirs and the appropriateness of fee assessments.[21]~~ Salinas River Diversion Facility was placed in operation in April 2010.

The Salinas Valley Water Project is projected to halt seawater intrusion in the Pressure subarea of the Salinas Basin based on the 1995 pumping baseline.[22] However, given the lack of full understanding of the relationship between the Salinas Basin as a whole, and the Pressure subarea in the vicinity of the former Fort Ord, it is uncertain whether this outcome will be borne out at currently expected levels of pumping increases in the coastal margins of the Pressure subarea. MCWRA has also acknowledged that the Project as currently constituted may not halt intrusion in the long run and that additional surface water deliveries into the coastal region through a third phase of the Plan might be needed. MCWRA intends to monitor the effects of the implementation of the Plan and pursue additional remedies as needed if seawater intrusion is not arrested. The MCWD will participate in this monitoring and evaluation process to assure SVWP modifications are made as necessary to assure that its water supplies are protected from seawater intrusion.

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

~~[21] Water World Resorts, Inc. v. MCWRA and County of Monterey; Lake San Antonio Resorts v. MCWRA and County of Monterey; and Salinas Valley Property Owners for Lawful Assessments v. MCWRA.~~

[22] Salinas Valley Water Project Draft EIR/EIS, Section 5.3.2.

Salinas Valley Water Project on seawater intrusion, the SWRCB concluded "that seawater intrusion can be stopped."[23]

4.3 Water Transfer Opportunities

MCWD ~~interconnected its two service areas in 2005 to improve system reliability. The District~~ 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 ~~the District's~~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".

In 2006, ~~the District~~ MCWD investigated the possibility of interconnecting with the Seaside Municipal Water System at a point near Seaside High School. What was proposed was an emergency-only connection, for use in the events 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~~ MCWD 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 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 ~~at the end of each year~~(volume added must equal volume withdrawn), in accord with current law.

Additional transfer opportunities exist within Zone 2/2A of the Salinas Valley Groundwater Basin. MCWD could ~~utilize~~ purchase the rights to existing water groundwater supplies currently used elsewhere in the Salinas Valley and transfer the water to ~~the District~~MCWD 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 ~~demand of 8,172 afy in 2030 exceeds the available~~ groundwater supply of 6,600 afy falls short of the total 2030 Ord

[23] Salinas Valley Water Project Final EIR at page 2-129

Community demand of 8,172 afy by 1,572 afy. ~~Adjusting for~~Considering only at those jurisdictions ~~that are not projected to fully utilize their sub-allocations of SVGB groundwater~~with shortfalls, the Ord Community shortfall becomes 2,428 afy (calculated as the sum of the jurisdictional shortfalls). In the 2005 UWMP, the 20-year projected demand for the Ord Community exceeded the available groundwater supply by 5,304 afy (= 11,904 - 6,600). The 2010 reduction in the projected shortfall is due to redevelopment ~~projections moving~~projects pushed out beyond the 20-year planning horizon, ~~caused by~~ due to the economic downturn. As in the 2005 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	2030 Demand	Allocation	Shortage
CSUMB	778	1,035	0
Del Rey Oaks	527	243	284
City of Monterey	92	65	27
County of Monterey	1,087	710	377
UCMBEST	474	230	244
City of Seaside (Ord Portion)	2,093	1,012	1081
U.S. Army	997	1,577	0
State Parks and Rec.	25	45	0
City of Marina (Ord Portion)	1,739	1,325	414
Marina Sphere	10	10	0
FORA Strategic Res.	0	0	0
Assumed Line Loss	348	348	0
Total	**8,172**	**6,600**	**2,428**

As discussed in the following subsections, ~~the District~~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. ~~Construction of a recycled water distribution system was estimated to cost $34 million in the 2006 Basis of Design Report. Therefore, the system should serve the maximum number of urban irrigation customers to minimize the per customer costs.~~

Two future scenarios are shown in the ~~tables below~~Table 4.4 and Table 4.5. Table 4.4 shows the minimum use of recycled water, as described in the Environmental Impact Report for the Regional Urban Water Augmentation Project. The total amount of new supply projected in the year 2030 is 2,515 afy~~. Table 4.4 shows the maximum use of recycled water by customers. The total amount of new supply projected is 3,306 afy, which reduces groundwater pumping from the SVGB. In both tables, the desalination supply is the net potable shortfall after recycled water is supplied. Expanded tables showing demands by jurisdiction are in Appendix C.~~ (= 1,359 + 1,156).

Table 4.4 Projected Demand by Source, Minimum Recycled Use (afy)

	2010	2015	2020	2025	2030
Groundwater	4,554	6,134	8,262	9,053	9,701
Recycled Water	0	780	1,359	1,359	1,359
Desalinated Water	0	0	275	725	1,156

Table 4.5 shows the maximum use of recycled water by customers. The total amount of new supply projected in the year 2030 is 3,306 afy (= 2,960 + 346), which reduces groundwater pumping from the SVGB. In both tables, the desalination supply is the net potable shortfall after recycled water is supplied. Expanded tables showing demands by jurisdiction are in Appendix C.

Table 4.5 Projected Demand by Source, Maximum Recycled Use (afy)

	2010	2015	2020	2025	2030
Groundwater	4,554	6,134	8,262	8,260	8,909
Recycled Water	0	780	1,359	2,514	2,960
Desalinated Water	0	0	275	363	346

4.4.1 Water Augmentation for Ord Community Supplies

MCWD's water supply plans include utilizing a combination of recycled water and desalination to meet its 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 and February 2007. The RUWAP proposes to provide an additional water supply of 2,400 acre-feet per year (AFY) for the Ord Community area (also known as the former Fort Ord military base) as identified in the Fort Ord Reuse Plan.

The Water Augmentation Project as evaluated in the EIR consists of two distinct alternatives and one hybrid alternative. One alternative considers wastewater recycling becoming the augmentation supply, another where desalination forms the supply, and a third alternative where equal amounts of recycled and desalinated water are produced (1,500 afy desalination, including incorporation of the currently idle desalination plant producing 300 afy and 1,500 afy recycled supply). These alternatives are discussed in further detail below.

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 4.6.

Table 4.6 Recycled Water Allocations (afy)

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

4.4.2 Regional Desalination Project

The Water for Monterey County Coalition (formerly called the Monterey Regional Plenary Oversight Group (REPOG) or the Monterey Regional Water Supply Reliability Collaboration), was formed in 2007 with the goal of developing a comprehensive water resource plan for the Monterey Region. To accomplish this goal, the UCSC Center for Integrated Water Research (CIWR), and later the Strategic Economic Applications Company, facilitated a series of meetings with all interested parties. The objective was to collaborate among the various interested parties on a solution, or perhaps several complementary solutions, to supplying the water needs of the Monterey Region in a cost-effective and sustainable way. Representatives from government entities, water agencies, non governmental organizations, citizen groups, and private firms attended the regional dialgoue meetings, which were open to the public. Residents from different areas in Monterey County also attend regularly. These meetings were initially funded by MCWD as part of the public outreach effort for the RUWAP. The funding based expanded to include MCWRA and MRWPCA as partners in the project, and ultimately included the California Public Utilities Commission – Division of Ratepayer Advocates (CPUC-DRA). Information on the meetings can be found at http://ciwr.ucsc.edu/monterey/index.html. This working group continued to meet on a regular basis until 2010, when the EIR for the Coastal Water Project was completed.

Early in this process, it became apparent to the participants that while the initial capital costs of water supply projects such as urban recycled water use or seawater desalination are very high, the marginal costs of adding capacity are significantly lower. The working group investigated the possibilities of expanding the proposed RUWAP facilities to include customers in other

jurisdictions. Areas considered included the Monterey Peninsula for recycled water supply and the North Monterey County – Granite Ridge area for potable supply. The Seaside Groundwater Basin aquifer storage and recovery (ASR) project being developed by MPWMD was also discussed.

Concurrent with the REPOG effort, California American Water Company (CAW) was completing the initial planning and environmental assessment of the Coastal Water Project (CWP). This project was intended to supply 12,500 afy to meet the needs of the Monterey Peninsula, as a replacement for water supply from the Carmel River. CAW had been ordered to reduce pumping from the river in State Water Resources Control Board Order 95-10. The project included a 10 mgd seawater desalination plant to be located north of Marina along the Monterey Bay. Because CAW is a private company, the CPUC-DRA was the CEQA lead agency for the project EIR.

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. As discussed later under desalination, the regional alternative became the preferred project in the final EIR, which was published in October 2009 and certified in 2010. ~~The District~~MCWD has entered into agreements with MCWRA, CAW and MRWPCA to facilitate the construction of this facility. In the final EIR for the Coastal Water Project, projected demands for the Marina Coast Water District reflected the 2,400 afy of new water supply and 300 afy of replacement desalinated seawater supply identified in the earlier RUWAP EIR.

4.4.3 Surface Water Supplies

The District is located along the Salinas River, and ~~the proposed regional desalination facility will be located on land overlooking the MCWRA Salinas River Diversion Project. The District~~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~~, and has~~. MCWD previously has been in negotiations with a senior (pre-1914) water right holder. ~~-~~No decisions have been made as to the purchase of surface water supplies, but ~~the~~ that option potentially is available to meet additional demands beyond the 20-year planning horizon. Also, a second phase of the SVWP, examined at a program level in the SVWP EIR, calls for surface water to be made available to coastal urban water agencies in the future.

4.4.4 Future Water Supply Assessments and Written Verifications of Supply

In the Ord Community the approved FORA Base Reuse Plan limits the amount of planned development by the land use jurisdictions. If that limitation were lifted, and the long-term development that is projected by the land use jurisdictions beyond the current limits now imposed by the Base Reuse Plan were permitted and constructed in the future, additional water supplies beyond the planned 2,400 afy Regional Urban Water Augmentation Project would be

required. 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. The 2030 net supply imbalance is 2,428 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. While Phase 2 recycled water supply was projected in Table 4.4 for illustrative purposes, formal allocation by FORA or its successor agency would be required before such water could be provided. 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 supply is expected to be on-line by 2016. ~~The District~~ 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 Desalinated Water

~~The District~~MCWD owns a small seawater desalination plant located at its 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[24]. The plant is scheduled to be replaced when a larger desalination facility is

[24] 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.

constructed, as described below. The supply is currently allocated to the Ord Community under an agreement with three developers in the Marina portion of the Ord Community.

Under its Regional Urban Water Augmentation Project, MCWD evaluated replacing this 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 for 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.

In 2006, California American Water Company (CAW) began the preliminary design of their Coastal Water Project, which would provide up to 11 million gallons per day (12,320 afy) for their Monterey Service Area, in order to reduce withdrawals from the Carmel River and the Seaside groundwater basin. Two 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 (MRWPCA) regional wastewater treatment plant. The MRWPCA site was preferred because of the existing deep ocean outfall that may be used for brine disposal. MCWD had a pre-existing purchase option for land on the Armstrong Ranch adjacent to the MRWPCA plant, which facilitated an agreement between the two agencies. ~~The District~~ MCWD subsequently purchased the land.

~~The District~~ MCWD has entered into an agreement with the MCWRA and CAW to jointly develop a Regional Desalination Facility, to be located adjacent to the MRWPCA treatment plant, with an initial capacity of 10 million gallons per day (mgd). The source water for the plant will 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 intruded portion of the 180-foot aquifer will both capture seawater that is entering the aquifer, and mitigate the existing intrusion. MCWRA will construct and operate the well-field, which will extend beyond MCWD's LAFCO Boundary. Because a portion of this supply is Salinas Valley groundwater which cannot be provided to customers outside MCWRA Zones 2/2A, MCWD will be required to take that portion of the plant yield. Initially, CAW will 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. This project is in the preliminary design phase, and is expected to be let as a design-build contract in early 2012.

4.6 Recycled Water

MCWD collects wastewater in its two wastewater collection systems serving the City of Marina and the Ord Community ~~operated by MCWD. Wastewater is conveyed~~, and conveys it to an

interceptor operated by the Monterey Regional Water Pollution Control Agency (MRWPCA). The wastewater is then conveyed to the MRWPCA regional treatment plant (RTP) northeast 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 currently conveyed to the adjacent Salinas Valley Reclamation Plant (SVRP) that produces about 14,000 ac-ft 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. 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.[25]

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 1,300 afy in 2010. The Ord Community connects via a gravity pipeline with a metering flume. The total flow at the flume was just under 1,000 afy in 2010. As redevelopment occurs and water ~~demands increase~~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 million gallons of recycled water per day or about 33,000 afy. However, as agricultural demands are seasonal~~ and until additional storage for recycled water is constructed~~, this capacity cannot be fully utilized year round. To increase 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. The SVRP currently produces 14,000 afy.

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. As a result, both Central Marina and the Ord Community have a right to the recycled water return flow. 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-

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

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.

MCWD and MRWPCA have been jointly pursuing an urban recycled water project,[26] 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. About 1,485 afy of recycled water demands would be met within MCWD. However, this level of recycled water supply would only be available under terms and conditions of Amendment No. 3 to the 1992 MRWPCA/MCWRA Agreement. The balance of the Phase 1 supply could be used in other jurisdictions on the Monterey Peninsula. 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~~MCWD began design of the recycled water system. In the Basis of Design Report, the projected ~~recycled~~non-potable water demands were recalculated, as shown in Table 4.7~~.~~. Potential Phase 1 uses were generally planned or existing landscapes along the recycled trunk main alignment. This included 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 exceeds the size of the Phase 1 project (see Table 4.6), which targets customers along the main pipeline route. Potential Phase 2 uses were generally planned or existing landscapes that required the construction of lateral pipelines from the trunk main. Any 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, the system should serve the maximum number of urban irrigation customers to minimize the per customer costs.

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

Table 4.7 ~~Recycled~~ Non-Potable Water Demand Projections (ac-ft/yr)

Jurisdiction	Phase 1	Phase 2	Total
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	806	140	946
U.S. Army		38	38
State Parks and Rec.		5	5
Marina Ord Comm.	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 ~~is coordinating its recycled water plans with MCWRA. The District~~, in coordination with the MRWPCA and MCWRA as part of its Water Augmentation Project, is currently planning a transmission line through Marina, the Ord Community, and into the City of Monterey. ~~The District~~ 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. ~~The District~~MCWD has designed the remainder of the recycled water distribution system, and is awaiting funding and redevelopment water demands before proceeding with the construction. MRWPCA is working with MPWMD and CAW regarding recycled water deliveries for the Monterey Peninsula.

Subject to Monterey County Department of Environmental Health and State Department of Public Health ~~Services~~ approval, ~~the District~~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.

Section 5 - Water Supply Reliability and Water Shortage Contingency Planning

5.1 Water Supply Reliability - Single and Multiple Dry Year and Demand Comparison

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 is from desalinated supply, short and medium-term hydrologic events over a period of less than five years usually have little bearing on water availability. Groundwater systems tend to have large recharge areas. 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 is expected to increase the average level of groundwater storage, moving the basin from a situation where average storage is declining to a net increase in storage of about 6,000 ~~AF~~ac-ft annually. Provided groundwater is protected from contamination and long-term safe yields in the basin are respected, water is available annually without regard to short-term droughts. This is due to the large storage volume of the basin that can be utilized to offset annual variations in surface runoff. Therefore, MCWD's groundwater supply is fully available in annual average, single dry year and multiple dry years.

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 4.2.4. Water quality and contamination monitoring programs are discussed in Section 4.2.5. 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.[27] The quality of MCWD's

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

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 the 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.

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. ~~This~~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 are in the 180-~~ft~~Foot and 400-~~ft~~Foot aquifers. The connection added system redundancy, a basic emergency-response feature of many water systems. In 2007, ~~the District~~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. ~~Those~~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, ~~the District~~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, ~~the District~~MCWD replaced the D-Zone water tank with a larger reservoir, and replaced the E-~~zone~~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.

~~The District~~MCWD is currently destroying Well 32 in the Ord Community, and constructing a replacement well (Well 34) on the same site into the Deep Aquifer. This maintains redundant capacity and reduces the risk of contamination at the well. Well 32 had been constructed in the 180-~~ft~~Foot and 400-~~ft~~Foot aquifers, which are experiencing seawater intrusion closer to the

coast. Preliminary planning has begun on an additional well further inland along Reservation 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~~MCWD Board of Directors adopted a Water Shortage Contingency Plan in Resolution No. 2005-31, which enables implementation of the 2005 WSCP upon advice of staff, based, in part, on the triggering mechanisms discussed in the WSCP. The Resolution and WSCP are included in Appendix F. Article 3.36.050 of ~~the District~~MCWD Code of Ordinances allows for enforcement of the WSCP. [Note – an updated WSCP will be considered at the June 14, 2011 Board meeting.]

5.5.1 Actions in the Event of a Catastrophic Interruption

~~The District~~ 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~~MCWD Code of Ordinances details the

procedure for declaring an emergency and the procedures authorized for immediate response. ~~The District~~MCWD conducts periodic table-top exercises with the emergency response offices of the jurisdictions it serves, and annual reviews of ~~it's~~its emergency response plan.

5.5.2 Stages of Action, Mandatory Provisions, Reduction Methods

~~The District's~~MCWD'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 5.1~~, below,~~ reflect mechanical failures and/or water quality concerns, which are more likely to impact ~~the District~~MCWD. The mandatory provisions and consumption reduction methods for each stage are detailed in the Water Shortage Contingency Plan at Appendix F.

Table 5.1 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

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 5.2 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 5.2 Water Shortage Contingency – ~~penalties~~Penalties and ~~charges~~Charges

Penalties or Charges	Stage When Penalty Takes Effect
Penalty for excess use: Written notice, date for correction	
Charge for excess use: $100 administrative fee for 1st notice; $200 for 2nd notice; $500 for each additional violation within one (1) year.	Applicable to all stages
Other: Costs of abatement	(i.e., not stage-specific)
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 $2.35/hcf in Central Marina and $2.86/hcf in the Ord Community, and recognizing approximately 10% of MCWD's customers are not metered as of 2010.

Table 5.3 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	$ 454,664	$ 909,329	$1,363,993	$ 1,818,658	$ 2,273,322
Revenue Source: Pumping savings at $135/af	$ 53,569	$ 107,138	$ 160,707	$ 214,276	$ 267,845
Net Revenue Reduction	$ 401,095	$ 802,191	$1,203,286	$ 1,604,382	$ 2,005,477
Percent of Total Annual Water System Revenue	5%	11%	16%	21%	27%

* Table based on FY2009-2010 water sales, $7,501,854 for 3,970 acre-feet

5.5.5 Mechanism to Determine Actual Water Use Reductions – Monitoring Procedures

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~~MCWD 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.

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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 requires a description of 14 specified conservation and demand management measures that are described in the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU), known as the Best Management Practices or BMPs. For those measures not being currently implemented or planned for implementation, an evaluation of those measures and a comparison against expanded or additional water supplies must be made. Preference in the act is given to those measures offering lower incremental costs than expanded or additional supplies. The act also requires that economic and non-economic factors, including environmental, social, health, customer impact and technological, be considered in the evaluation. However no specific guidance on evaluation methodology is given.

6.2 Summary of Measures Currently Under Implementation

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. Table 6.1 summarizes MCWD's water conservation program and the status of implementation of each ~~BMP. The District's~~demand management measure (DMM). MCWD's 2009-2010 CUWCC BMP Report is currently being prepared and will be available at the CUWCC website, www.cuwcc.org, once the on-line reporting system is updated.

6.3 Description and Status of Demand Management Measures

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. It also requires an evaluation of water demand management measures specified in the act that are not currently being implemented or scheduled for implementation. As noted above, preference is given to implementing measures that offer lower incremental costs than expanded or additional water supplies.

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~~MCWD completed its Urban Water Conservation Feasibility Study in 2004, and has been implementing the recommendations by phases. In 2005, ~~the District~~MCWD added a Water Conservation Specialist position to the staff, which greatly increased the capacity for customer assistance.

Table 6.1 Summary of ~~BMP~~DMM Implementation

Demand Management Measure	Implementation Status: Currently Implemented	Implementation Status: Planned Actions	Implementation Status: Recommendation
~~BMP~~DMM 1 – Water Survey Programs for Residential Water Customers	Yes	MCWD will contact highest users	
~~BMP~~DMM 2 – Residential Plumbing Retrofits	Yes		Link to ~~BMPs~~DMMs 1, 3, 13 & 14; expand public awareness
~~BMP~~DMM 3 – System Water Audits, Leak Detection, Repair	Yes	Automatic meter reading adds real-time leak monitoring	Continue annual audits.
~~BMP~~DMM 4 – Metering with Commodity Rates	Yes		Review annually
~~BMP~~DMM 5 – Large Landscape Conservation	Yes	Advertise ET controller program	Review annually
~~BMP~~DMM 6- High-Efficiency Washing Machine Financial Incentives	Yes		Review annually
~~BMP~~DMM 7 – Public Information	Yes		Address under-represented communities
~~BMP~~DMM 8 – School Education	Yes		
~~BMP~~DMM 9 – Commercial Industrial and Institutional Water Conservation	Yes	Increased outreach	Setting up water use budgets for customers
~~BMP~~DMM 10 – Wholesale Agency Assistance (*not applicable to District*)	N/A		
~~BMP~~DMM 11 – Conservation Pricing	Yes		Review annually
~~BMP~~DMM 12 – Conservation Staff	Yes		
~~BMP~~DMM 13 – Water Waste Prohibition	Yes		Expand public information
~~BMP~~DMM 14 – Residential Ultra Low Flow Toilet Replacement	Yes		Set up database to track HET/ULFT replacements

6.3.1 ~~BMP~~DMM 1 - Water Survey Programs for Single-Family and Multi-Family Residential Customers.

Program Description: These programs generally involve sending a qualified water auditor to 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.

Economic and Non-economic Factors: Surveys of this type have become common among agencies with demand management programs. Research on cost-effectiveness has shown that the

long-term savings from these programs is lower than originally anticipated. Savings achieved through these measures decay over time due to equipment failure, failure of the customer to consistently follow recommendations, and customer turnover. Savings decay rates average about 15 percent per year. Single-family surveys can be expected to initially save 15 gallons per day (gpd) per survey and multi-family about 6.5 gpd. Surveys are estimated to cost $125 for a single-family residence and $330 per multi-family residences covering an average of 10 units per survey ($33/unit).[28] Agencies generally target high use accounts for surveys and, while customers who feel their water use is unexplainably high often opt for surveys, many customers are reluctant to avail themselves of a survey.

Cost-Benefit Analysis Results: A cost-benefit analysis is not required for the ~~BMPs~~DMMs MCWD is implementing.

Recommendation, Implementation and Schedule: This program is operating at steady-state, and will continue with current staffing levels. MCWD will continue contacting residences with above average water use, as identified. When redevelopment resumes and the number of customer accounts increases, ~~the District~~MCWD should reevaluate its conservation staffing levels.

~~BMP~~*Measures of Performance*: In 2010, MCWD conducted 404 surveys for single-family residential customers and 40 surveys for multi-family residential customers.

6.3.2 DMM 2 - Residential Plumbing Retrofit

Program Description: Single and multi-family residences constructed prior to 1992 are to be identified and retrofitted with high-efficiency water fixtures, such as showerheads, faucets and toilets, if needed. The ~~BMP~~DMM also recommends an ordinance requiring low-flow fixtures in new construction and retrofits, which ~~the District~~MCWD has included in Article 3.36 of their Code of Ordinances.

MCWD currently provides low-flow showerheads and installation assistance. An ordinance that requires low-flow showerheads in both new and retrofit construction was enacted in 1993. MCWD requires all residences to be retrofitted upon resale, with MCWD providing inspection for this requirement.

Article 3.36 of ~~the District~~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.

Economic and Non-economic Factors: Offering or installing retrofit kits to pre-1992 homes has been a common program among water agencies with active conservation programs. Issues that

[28] California Urban Water Agencies Annual Report, 2000.

must be considered are relatively high natural replacement levels for fixtures such as showerheads, and recognition that replacements heads already meet the federal 2.5 gpm standard. All other factors being equal, retrofit programs, which reduce demands, are environmentally preferable over development of additional supplies or delivery of more water.

Cost-Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: MCWD will continue to implement ~~of~~ this ~~BMP~~DMM by associating it with other ~~BMPs~~DMMs, particularly ~~BMPs~~DMMs 1, 3, 13 and 14. This would reduce costs and increase participation. Increased outreach to expand public awareness of the program is also recommended.

~~BMP~~*Measures of Performance*: In 2010, MCWD distributed 116 low-flow shower heads and 100 faucet aerators to single-family residential customers, and distributed 30 low-flow shower heads and 50 faucet aerators to multi-family residential customers.

6.3.3 DMM 3 - System Water Audits, Leak Detection and Repair

Program Description: The ~~BMP~~DMM requires conducting annual audits of the water distribution system to detect and correct any abnormalities, including leaks, faulty meters and unauthorized water users. A prescreening audit that covers metered water sales, other verifiable uses and total supply to the distribution system is used to determine the need for a full-scale audit. A full-scale audit is indicated if the uses divided by the supply is less than 0.9 (indicating a greater than 10 percent loss rate). In addition to the audits, water suppliers should notify the customer when it is believed that the leak may exist on the customer's side of the meter, and help the customer find and fix the leak. MCWD performs an annual prescreening system audit and responds to leaks or known trouble spots to make repairs and replacements as needed. A feature of the recently installed Automatic Meter Reading (AMR) equipment is that each AMR meter will identify is water is used for continuous periods in excess of two hours. Once alerted, District staff contact the customer and inform them of the possible leak.

Economic and Non-economic Factors: Prescreening audits comparing gross system production vs. sales is an accepted industry practice generally done on an annual basis. If results from this prescreening note excessive unaccounted water then a more detailed audit focusing on loss possibilities (system leakage, under-metering, illegal connections, fire flow water, and system flushing, etc.) is conducted. No significant social, environmental or technological factors are relevant for this activity.

Cost-Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: ~~The District~~ MCWD audits both service areas annually. AMR meters are being installed throughout ~~the District~~MCWD in a phased program, and required for all new customers.

~~BMP~~*Measures of Performance*: In 2010, MCWD identified and repaired ten leaks in the distribution system.

6.3.4 DMM 4 - Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

Program Description: This ~~BMP~~DMM requires metering of all water services. Currently, the Marina service area is fully metered. The Ord Community is not yet fully metered. CSUMB completed its metering retrofits in 2009. The Ord Military Community is replacing housing units in phases, and installing meters in all new units. 1,201 units of Army housing are still on flat-rate billing. Water conservation is also promoted through a tiered pricing system. Based on a water use budget, customers know the amount of water use required by their property. MCWD has a three-tiered pricing system in the Central Marina and Ord Community service areas.

Economic and Non-economic Factors: Meters are now required as a matter of state law and urban water providers such as the MCWD have until January of 2025 to be fully metered. Based on the pace of redevelopment and MCWD's capital improvement plans, MCWD expects to have metering completed well prior to this date.

Cost Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: MCWD is coordinating with the Ord Military Community to identify opportunities to install meters in the existing housing areas. The water rate tiers and prices are reviewed annually during the budget review and approval process.

~~BMP~~*Measures of Performance*: Over the past five years, over 1400 non-metered units have been converted to metered accounts. All metered accounts are billed on a volume basis.

6.3.5 DMM 5 - Large Landscape Conservation Programs and Incentives

Program Description: The purpose of this ~~BMP~~DMM is to provide a customer with a determination of how much water should be used to irrigate the land appropriately while maintaining conservation practices. The ~~BMP~~DMM 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. MCWD has a landscape specialist on staff who conducts site reviews and assistance visits with property owners/property managers. ~~The District~~MCWD has adopted the Model Water Efficient Landscape Ordinance, and requires formal review and approval of all landscapes of 2,500 square-feet or larger.

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

Economic and Non-economic Factors: 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 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 ~~the District's~~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 annual climate changes.[29] 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.

Cost-Benefit Analysis Results: Not required as this program is being implemented.

Recommendation, Implementation and Schedule: ~~The District~~ MCWD incentive programs should be reviewed annually as part of the budget review and approval process. As the Ord Community is redeveloped, ~~the District~~MCWD should evaluate the staffing levels for assistance site visit.

~~BMP~~*Measures of Performance*: In 2010, MCWD conducted 14 large landscape surveys, and paid incentive rebates for the installation of 73 irrigation control devices.

6.3.6 DMM 6 - High-Efficiency Washing Machine Rebate Programs

Program Description: Customers are provided with incentives to replace old washing machines with newer, more efficient models. MCWD provides a $125 rebate to customers. The program is very successful, averaging 120 conversions each year. ~~The District~~MCWD requires all new residential construction to include high efficiency washing machines in each unit, when washers are provided.

[29] California Urban Water Conservation Council, July 2003.

Economic and Non-economic Factors: The incremental cost of high efficiency washers (front loading, horizontal axis) has been about $600 per unit over that of traditional, top load models. Cost differentials are coming down over time. 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.[30]

Cost-Benefit Analysis Results: Not required as this ~~BMP~~DMM is under implementation.

Recommendation, Implementation and Schedule: MCWD should review this rebate program annually during the budget review and approval process.

~~BMP~~*Measures of Performance*: In 2010, MCWD paid incentive rebates for 167 high efficiency clothes washer installations.

6.3.7 DMM 7 - Public Information Programs

Program Description: 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; video; website; and printed material to the media. 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.

Economic and Non-economic Factors: This ~~BMP~~DMM cannot be reduced to quantitative terms but is considered an essential complement to other ~~BMP~~DMM measures and developing a water conservation consciousness and ethic among urban water users such that it is considered an essential practice.

Cost-Benefit Analysis Results: Not applicable.

Recommendation, Implementation and Schedule: The public information program could be expanded through outreach to under-represented communities and by providing current program information in the major languages found within MCWD.

~~BMP~~*Measures of Performance*: In 2010, MCWD published 5 newsletters, 3 bill inserts, 6 landscape media items and had 4 media contacts. Additionally, MCWD co-hosted the Water Awareness Committee Training Seminar for smart irrigation controllers and sponsored booths at 3 events.

6.3.8 DMM 8 - School Education Programs

Program Description: This ~~BMP~~DMM is intended to promote water conservation within the local schools. MCWD has a part-time education consultant that assists in the development of the

[30] California Urban Water Conservation Council, 2003.

educational programs. Presentations and information – which include program handouts, Internet links and classroom activities – are provided directly to teachers for their use in the classroom. The program has been fully implemented in Marina and the Ord Community Service area, with 100% coverage of grades K to 3. A water-art program provides instruction in the importance of water conservation to all fourth grade classes in the service areas.

Economic and Non-economic Factors: Like public information programs, school education programs are viewed as a basic element of a comprehensive urban conservation program.

Cost-Benefit Analysis Results: Not applicable.

Recommendation, Implementation and Schedule: Additional activities could be incorporated into the program. An example would be the establishment of an organic garden/outdoor classroom to teach students effective water management strategies as well as environmentally sound horticultural practices. The MCWD is developing water conserving gardens which can provide a venue for such instruction.

~~BMP~~*Measures of Performance*: In 2010, MCWD reached 1,408 students with classroom presentations, 2,100 students through large group assemblies, and 40 students through field trips.

6.3.9 DMM 9 - Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts

Program Description: Under this ~~BMP~~DMM, conservation programs are to be tailored to the needs of CII customers' indoor and outdoor water uses. CII accounts often use water in ways and amounts substantially different than residential users. A water use survey is conducted 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. These 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 ~~the District~~MCWD rebate programs (toilet, landscape, clothes washer) are available to commercial as well as residential customers.

Economic and Non-economic Factors: Commercial and industrial audits in other regions have found most of the savings opportunity in the replacement of high flow toilets, as these toilets receive relatively high usage rates. The literature reveals that surveys for this sector have resulted in about 1.27 AF of savings per year against an average cost of $1,200 per survey.

Cost-Benefit Analysis Results: Based upon the averages above and avoided costs for new supply to MCWD, typical CII surveys would have a benefit cost ratio of just over 5 to 1, assuming savings decay over a five year span.

Recommendation, Implementation and Schedule: MCWD is working to expand this program to its full potential. MCWD is performing site surveys of CII accounts and setting up water use budgets for the customers. CSUMB has used this service for assistance managing many of their

large landscapes and facilities. CII accounts are eligible for District programs/rebates relating to plumbing retrofits and ULFT replacements. However, the low number of CII accounts limits estimates of District water savings.

~~BMP~~*Measures of Performance*: In 2010, MCWD conducted one survey with a commercial customer and paid 7 incentive rebates to commercial customers.

6.3.10 DMM 10 – Wholesale Agency Assistance

Program Description: Assistance relationships between regional wholesale agencies and intermediate wholesale agencies as well as between wholesale agencies and retail agencies. This ~~BMP~~DMM does not currently apply to MCWD. When the Regional Desalination Project is constructed, ~~the District~~ MCWD may be considered a wholesale water supplier to the California American Water Company (CAW), although the project is being constructed jointly among three agencies. California American Water is currently a larger water supplier than MCWD with its own water conservation programs, and publishes an Urban Water Management Plan for its Monterey service area. It is not anticipated that MCWD will need to provide assistance to CAW, although the two agencies will continue to work together as part of the Water Awareness Committee of Monterey.

6.3.11 ~~BMP~~DMM 11 - Conservation Pricing

Program Description: 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 is implementing this ~~BMP~~DMM through its two and three-tiered pricing system.

Economic and Non-economic Factors: 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.

Cost-Benefit Analysis Results: Not required as this ~~BMP~~DMM is under implementation.

Recommendation, Implementation and Schedule: The pricing tiers and rates are reevaluated annually as part of ~~the District~~MCWD budget review and approval process.

6.3.12 ~~BMP~~DMM 12 - Conservation Coordinator

Program Description: A water agency employee is assigned responsibility for oversight and implementation of water conservation practices. MCWD's water conservation coordinator works closely with local, regional and state boards to implement the ~~BMPs~~DMMs that are effective for the community as well as the neighboring water districts to foster an effective working relationship and provide continuity among the programs. ~~The District~~MCWD also has a water conservation specialist, who conducts site surveys and assistance visits.

Economic and Non-economic Factors: Not applicable.

Cost-Benefit Analysis Results: Not required as this ~~BMP~~DMM is under implementation.

Recommendation, Implementation and Schedule: MCWD should review the staffing levels as the Ord community is redeveloped and the number of customers increases.

~~BMP~~*Measures of Performance*: In 2010, MCWD employed a full-time water conservation coordinator and a full-time water conservation specialist.

6.3.13 DMM 13 - Water Waste Prohibition

Program Description: 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. This section of ~~the District~~MCWD Code was updated in 2004 and 2005 to add additional restrictions and incorporate the Model Water Efficient Landscape Ordinance.

Economic and Non-economic Factors: Not applicable.

Cost-Benefit Analysis Results: Not required as this ~~BMP~~DMM is under implementation.

Recommendation, Implementation and Schedule: ~~The~~MCWD should review and update this section of the District Code as new information becomes available from the State and the California Urban Water Conservation Council.

6.3.14 ~~BMP~~DMM 14 - Residential Ultra-Low Flow Toilet Replacement Programs

Program Description: MCWD's toilet replacement program offers a $125 rebate for each toilet replaced with a high efficiency 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.

Economic and Non-economic Factors: Toilet replacement programs have generally been the most successful of demand management measures statewide. A number of issues exist, however. Program cost-effectiveness varies by program design. Retrofits on resale ordinances are very inexpensive from MCWD's perspective as costs are shifted to the home buyers/sellers. This ordinance tends to be very unpopular with the real estate community and home sellers, however, as it can impede a sale due to timing and often requires replacing floor coverings around the

toilet. Direct distribution programs have the highest cost-effectiveness but don't necessarily reach all potential customers. Rebate programs are generally effective but have a higher incidence of "free ridership" where some customers would be replacing a toilet anyway and receive the rebate. Regardless, savings for these programs have been shown to be 35-45 gallon per replacement per day. Higher savings are found in higher density housing and commercial/industrial settings. Savings also persist as toilet life is generally about 25 years.

Given that the revised plumbing code allows for only 1.6 gal/flush toilet models to be purchased, it should be recognized that natural turnover in the range of 3-4 percent per year will eventually replace all of the older, high water use models. HET incentive programs accelerate these savings and can help defer or eliminate other capital investment needs.

Cost-Benefit Analysis Results: Not required as this ~~BMP~~DMM is under implementation.

Recommendation, Implementation and Schedule: ~~The District~~MCWD currently tracks this rebate program in a spreadsheet. If the customer service billing database is upgraded, consider tracking this and other rebate programs by address in that database.

Measures of Performance: In 2010, MCWD paid incentive rebates for 84 high-efficiency toilets to single-family residential customers and for 38 high-efficiency toilets to multi-family residential customers.

6.4 Funding and Legal Authority

MCWD is committed to funding all cost-effective conservation programs. Additionally, MCWD will assess noneconomic issues in addressing its conservation program, such as direct and indirect environmental and economic effects of conservation on entities other than MCWD and its customers. As a county water district, MCWD has the legal authority to implement conservation programs of its choosing.

6.5 Existing Conservation Savings, Savings Measurement, and Effects on Ability to Further Reduce Demand

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 123 gpcd in 2010. Based upon an estimated population of 30,100, annual water savings are about 708 ac-ft.

The MCWD will continue to track per capita demand rates to assess overall savings, in addition to comparing water consumption of new residential development against households which have been retrofitted with conservation devices and unretrofitted households. 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 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. Since long term improvements in efficiency have been effected, additional short-term savings would be harder to produce and would necessarily come from cutbacks in use that could have more pronounced economic and aesthetic effects, especially if shortages were pronounced.

~~The District~~MCWD recognizes this vulnerability and is committed to acquiring additional supplies to insulate the community from such effect. In addition to ensuring that potable supplies remain reliable, ~~the District~~MCWD is pursuing the use of recycled water for urban landscape irrigation. This is a recognized BMP for reducing potable water demand.

Section 7 - Completed UWMP Checklist

As a verification of plan completeness, the DWR Urban Water Management Plan checklist (Table I-2) has been completed and included at Appendix G.