



CASGEM Monitoring Plan

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Introduction

The Monterey Peninsula Water Management District (MPWMD or District) is participating in the California Statewide Groundwater Elevation Monitoring Program (CASGEM) which is administered by the Department of Water Resources (DWR). This groundwater monitoring plan lays the foundation for this monitoring effort and provides information on the wells to be sampled, monitoring schedule, and the characteristics of the groundwater basins. This plan contains two parts because MPWMD will be providing monitor well data from the Seaside Groundwater Basin as well as the Carmel Valley Alluvial Aquifer under the CASGEM.

Regional Geologic Setting for the Seaside Groundwater Basin

Water Bearing Formations

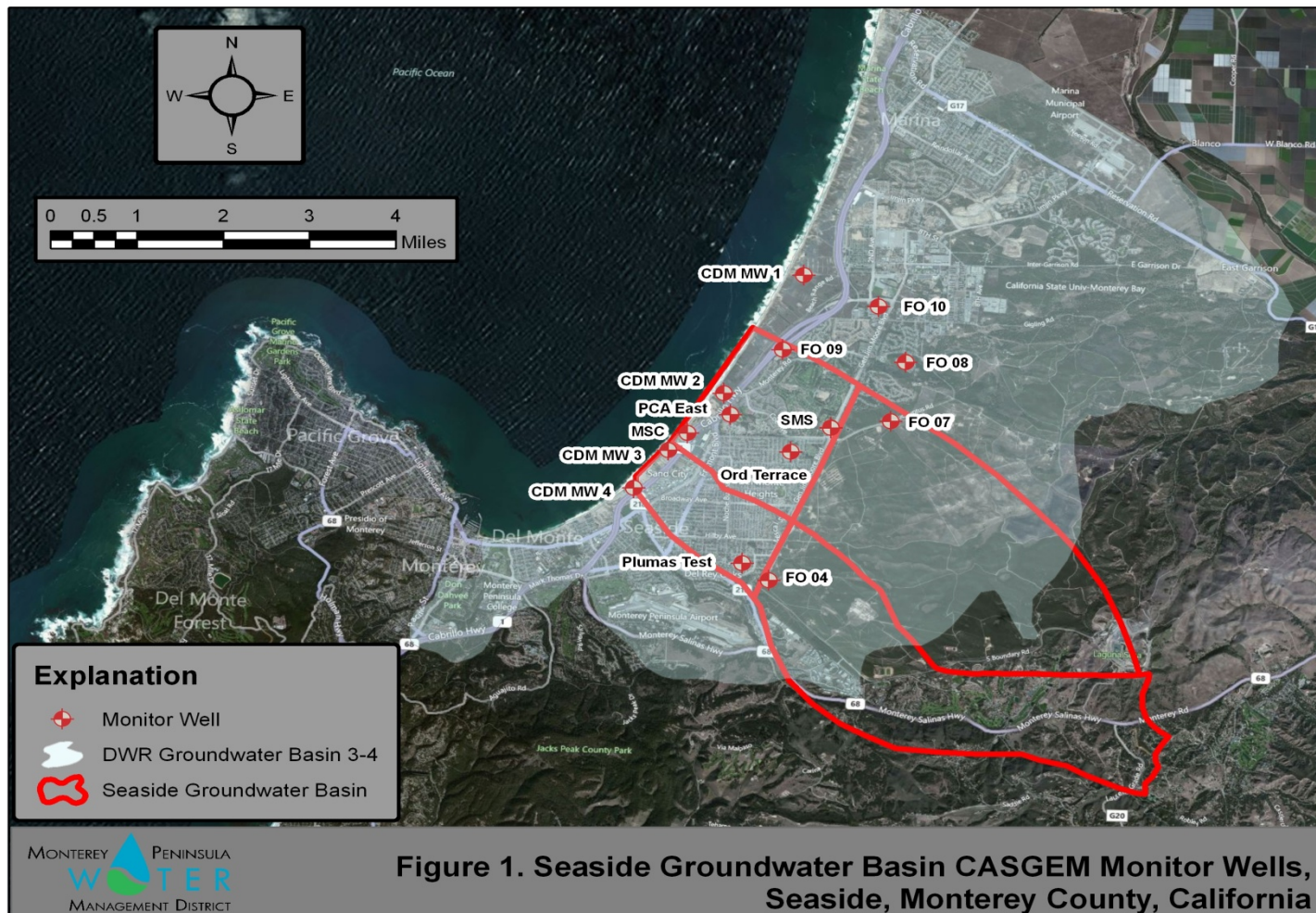
The Seaside Groundwater Basin consists of a sedimentary sequence of water-bearing materials that overlie the relatively impermeable Monterey Formation of Miocene age and older crystalline rocks. From oldest to youngest, the water-bearing units of the Seaside Basin are the Miocene Santa Margarita Sandstone (Tsm), the Tertiary and Quaternary “continental deposits” (QTc), and the Pleistocene and Holocene Aromas Sand and Older Dunes (Qe and Qt) (Yates and others 2005 and GTC 1986).

The Santa Margarita Sandstone corresponds to the “Santa Margarita Aquifer” and is a loose to weakly-cemented, marine sandstone with stratigraphic thickness up to approximately 300 feet. The upper portion of this deposit is medium-grained clean sand. With increasing depth and proximity to the underlying Monterey Formation, the clay content of the unit increases (Yates and others 2005).

The continental deposits correspond to the “Paso Robles Aquifer” and consist of a complex sequence of interbedded sand, gravel, and clay deposits. These deposits are more than 600 feet thick in some portions of the basin. The water-bearing portions of the continental deposits are thick lenses of sand and gravel of limited areal extent (Yates and others 2005).

The Aromas Sand and Older Dunes are surficial deposits that are of minor importance in the basin. The deposits are unconfined, in direct hydraulic communication with the ocean, and are only saturated in the extreme coastal portion of the basin (Yates and others 2005).

Surface outcrops within the area are limited primarily to alluvial sands and terrace deposits. Small areas of the Paso Robles and Santa Margarita Aquifers outcrop in the eastern portion of the Seaside Basin.



Restrictive Structures

Structural deformation of the basin has resulted in varying thickness and depths of all of the geologic units across the basin (Yates and others 2005, GTC 1986, and DWR 1974). Basin structure is relatively well understood in the Laguna Seca and coastal subareas where production wells are numerous. Subsurface information in those areas reveals a complex arrangement of faults, anticlines, and synclines. Prominent among them is the Laguna Seca Anticline that uplifts the Monterey Formation and forms the boundary between the northern and southern subbasins. The Paso Robles and the Santa Margarita Aquifers thicken toward the eastern end of the southern subbasin as a result of a syncline. The Seaside and Ord Terrace faults create abrupt increases in basin thickness within the coastal parts of the southern and northern subbasins.

In the Seaside Basin, faults are associated with abrupt changes in basin thickness but appear to have little effect on groundwater flow where permeable units are present on both sides of the fault. All of the faults are steep normal or reverse faults, and most of them exhibit a combination of horizontal displacement (right-lateral) and vertical displacement (downthrown block on the north). All of them trend southeast-northwest. The Chupines fault forms the southern boundary of the basin where it juxtaposes relatively impermeable units of the Monterey Formation against the Santa Margarita Sandstone and continental deposits. The next fault to the north – the Seaside fault – passes obliquely through the southern subbasin. It is associated with as much as 500 feet of vertical displacement of the top of the Monterey Formation and it truncates the southern extent of the Santa Margarita Sandstone and continental deposits. Groundwater appears to flow freely across the Seaside fault in shallow aquifer horizons. Farther north, the Ord Terrace fault is similar to the Seaside fault, with as much as 450 feet of displacement of the top of the Monterey Formation. Neither the Seaside nor Ord Terrace faults are a significant barrier to groundwater flow.

The Seaside Basin does not appear to have a regional confining layer equivalent to the Salinas Valley Aquiclude that overlies the 180-Foot Aquifer throughout most of the coastal part of the Salinas Valley. The first clay layers encountered in the boreholes for four monitoring wells installed by MPWMD between Seaside and the Main Garrison area on the former Fort Ord are thin (less than 20 feet) and of inconsistent elevation.

Based on calibration of a groundwater flow model of the Laguna Seca area (the eastern part of the southern subbasin), the hydraulic conductivities for the Paso Robles and Santa Margarita Aquifers were estimated to be 2 ft/day and 3-5 ft/day, respectively. Similarly, calibrated storativity values were estimated to be 0.08 in unconfined aquifers and 0.0006 in confined aquifers.

Recharge Areas

The largest native sources of recharge to the basin are deep percolation of rainfall, irrigation water, and pipe leaks (Yates and others 2005, GTC 1986, and Muir 1982). This recharge occurs throughout the basin and is facilitated by the generally sandy soils. Septic system leach fields also contribute small amounts of groundwater recharge. The

largest non-native source of recharge to the basin is by groundwater recharge via injection wells. Since 1998, MPWMD has injected over 4,300 acre-feet into specialized Aquifer Storage and Recovery (ASR) wells the northern subbasin.

A significant percentage of groundwater yield near the coast consists of groundwater inflow from inland areas. In addition, groundwater can flow to or from offshore areas depending on the elevation of groundwater levels near the coast. If coastal water levels are below sea level, groundwater flows onshore (landward). Initially, this onshore flow may not be salty if offshore parts of the aquifer still contain residual freshwater from previous decades when groundwater flow was greater or past periods when sea levels were lower. It is estimated that approximately 1,100 acre-feet of onshore flow from the offshore part of the Santa Margarita Aquifer occurred in 2002 (Yates and others 2005).

Groundwater Level Trends

Groundwater level monitoring in production and monitoring wells within the basin has generally shown declines in the period from the 1960's to the present. Most groundwater extraction in the Seaside Basin is from the coastal part of the northern subbasin. Hydrographs for that area show a significant decline in water levels in almost all wells in the Santa Margarita Aquifer since 1995. In many of these wells, water levels were consistently above sea level prior to 1995 and are now consistently below sea level. The net decline in spring water levels between 1995 and 2002 was 10-15 feet in many wells, and the amount of seasonal drawdown from spring to fall each year has also increased from less than 5 feet to 15 feet (Yates and others 2005). The hydrographs for some wells in the Paso Robles Aquifer have also been declining, while others have been rising. These patterns are more strongly related to groundwater extraction than to climatic conditions.

Groundwater Storage

The storage capacity of the Seaside Groundwater Basin was estimated to be 564,700 acre-feet in 1990 (SGD 1990). This estimate included a component for offshore storage and assumed a weighted average specific yield value of 12%. Of this total, the estimated storage for the onshore parts of the coastal subareas was 162,300 acre-feet, with 9,000 acre-feet estimated to be above sea level. More recent storage capacity estimates based on a specific yield value of 8% suggest that the amount of usable groundwater storage capacity in the coastal area of the basin is 6,200 acre-feet (Yates and others 2005).

Monitoring Plan Rationale

Monitor wells selected for CASGEM monitoring are distributed to give a good representation of groundwater conditions of the Seaside Groundwater Basin. However, it should be noted that large areas of the basin do not have adequate monitor well coverage due to the lack of historical development and land-use restrictions (i.e., inland firing ranges of the former Fort Ord).

Well Network

The well network consists of 22 wells located primarily in and near the coastal subareas of the Seaside Groundwater Basin. Many of these wells are paired and labeled deep and shallow to represent where they are screened in the aquifer. The list of monitoring wells for the Seaside Ground Water Basin is provided in Table 1. It is our understanding that Monterey County Water Resources Agency will be reporting on monitor wells that are located in and near the inland portions of the basin.

Monitoring Schedule

Wells for the CASGEM program will be monitored twice a year, once at the end of September and once at the end of March.

Description of Field Methods

Depth to the water table is measured directly with electric measuring tape to the nearest hundredth of a foot.

Table 1.

Well Name	State Well No.	Well Owner's Name	Date Drilled	DWR Well Drillers Report	MCHD Permit	Data Type	Hole Depth (feet)	Well Depth (feet)	Screened Interval (feet)	Strata Seal (feet)	Casing Type	Geologic Unit	Elevation (feet AMSL) (pre-2008)	Reference Point Elevation (feet AMSL)	Ground Level Elevation (feet AMSL)
Northern Coastal Subarea (and vicinity)															
MSC-Shallow	IS/IE-15N3	MPWMD	5/25/1990	338413		wl,wq	720	695	490 - 680	95 - 275	2" pvc	QTc	80.58 (s1)	80.10	77.23
MSC-Deep	IS/IE-15N2	MPWMD	5/25/1990	338425		wl,wq	920	865	810 - 850	725 - 775	2" pvc	Tsm	80.78 (s1)	80.29	77.25
PCA-E (Multiple) Shallow	IS/IE-15K5	MPWMD	4/16/1990	338402	W5748	wl,wq	863	410	350 - 400	110 - 150	2" pvc	QTc	69.31(s1)	68.51	68.8
PCA-E (Multiple) Deep	IS/IE-15K4	MPWMD	4/16/1990	338402	W5748	wl,wq	863	710	650 - 700	580 - 620	2" pvc	Tsm	69.31(s1)	68.54	68.8
Ord Terrace-Shallow	IS/IE-23Ca	MPWMD	8/5/1999	--		wl,wq	530	340	280 - 330	--	2" pvc	Tsm (upper)	230 (e1)	228.65	228.74
MPWMD #FO-09-Shallow	IS/IE-11Pa	MPWMD	8/16/1994	--		wl,wq	1110	660	610 - 650	500 - 540	2" pvc	QTc/Tp	119.11(s3)	118.89	118.61
MPWMD #FO-09-Deep	IS/IE-11Pb	MPWMD	8/16/1994	--		wl,wq	1110	840	790 - 830	700 - 765	2" pvc	Tsm	119.15 (s3)	118.85	118.61
MPWMD #FO-10-Shallow	IS/IE-12Fa	MPWMD	9/3/1996	442738	WSAL 96-118	wl,wq	1500	650	620 - 640	480 - 500	2" pvc	QTc	201.19 (s3)	200.85	200.45
MPWMD #FO-10-Deep	IS/IE-12Fc	MPWMD	9/3/1996	442738	WSAL 96-118	wl,wq	1500	1420	1380 - 1410	1280 - 1300	2" pvc	Tp	201.10 (s3)	201.03	200.45
Seaside Middle School-Shallow		MPWMD		EO100046		wl		670	570-650		2" pvc	QTc		333.35	333.35
Seaside Middle School-Deep		MPWMD		EO100047		wl		1080	730-950		4" pvc	Tsm		332.62	332.62
CDM MW-1(Beach Range 8)	IS/IE-02Pa	MPWMD	11/12/2003			wl		140	130-140		2" pvc	Qod/Qar		93.15	93.81
CDM MW-2 (Ord Village Lift Sta.)	IS/IE-15Ga	MPWMD	11/17/2003			wl		91	81-91		2" pvc	Qod/Qar		63.51	63.82
Northern Inland Subarea (and vicinity)															
MPWMD #FO-07-Shallow	IS/IE-13La	MPWMD	7/12/1994	--		wl	940	650	600 - 640	520 - 540	2" pvc	QTc	473.94 (s3)	470.19	473.95
MPWMD #FO-07-Deep	IS/IE-13Lb	MPWMD	7/12/1994	--		wl	940	850	800 - 840	700 - 750	2" pvc	Tsm	473.97 (s3)	470.15	473.95
MPWMD #FO-08-Shallow	IS/IE-12Qa	MPWMD	7/25/1994	--		wl	1110	790	740 - 780	640 - 690	2" pvc	QTc	378.53 (s3)	378.04	379.13
MPWMD #FO-08-Deep	IS/IE-12Qb	MPWMD	7/25/1994	--		wl	1110	950	900 - 940	830 - 850	2" pvc	Tsm	378.54 (s3)	378.10	379.13
Southern Coastal Subarea (and vicinity)															
Plumas '90 Test	IS/IE-27J6	MPWMD	4/25/1990	338414		wl	550	485	430 - 470	--	2" pvc	Tsm	158.41(s2)	157.83	157.83
CDM MW-3 (End Tioga Rd.)	IS/IE-22De	MPWMD				wl		59	49-59			Qod/Qar		33.81	34.44
CDM MW-4 (Seaside Beach lot)	IS/IE-21Ka	MPWMD				wl		53	43-53			Qod/Qar		18.69	19.24
Laguna Seca Subarea (and vicinity)															
MPWMD #FO-04-Shallow (E)	IS/IE-26Na	MPWMD	10/26/1988	192669		wl	320	320	260 - 300	--	2" pvc	QTc	168.95 (s4)	168.23	168.43
MPWMD #FO-04-Deep (W)	IS/IE-26Nb	MPWMD	10/24/1988	192670		wl	640	580	500 - 560	340 - 345	2" pvc	Tsm	168.27 (s4)	167.44	167.79
NOTES: 1. Well Numbers are unofficial designations; not verified with DWR-assigned well numbers. 2. Geologic Unit refers to the unit adjacent to the screened interval: Qod/Qar = Quaternary "Older Dunes and Aromas Sand" (Dune aquifer); QTc = Tertiary and Quaternary "continental deposits" (Paso Robles aquifer); Tsm = Tertiary "Santa Margarita Sandstone" (Santa Margarita aquifer); Tp = "Purissima Formation"; and Tm = "Monterey Formation". 3. Elevation = reference point elevation at the wellhead: (e1) = estimated with Paulin altimeter; (e2) = estimated from topo map; (s1) = surveyed by Land Data Services (LDS) (Jul 20, 1990); (s2) = surveyed by LDS (Aug 27, 1992); (s3) = surveyed by Sandis Humber Jones (1995 and 1997); (s4) = surveyed, source uncertain; (s5) = surveyed by MPWMD (Jun 6, 1997). 4. "--" in a blank cell means not applicable or not available. "-" in a Screened Interval cell indicates multiple screen intervals. 5. Data Type refers to MPWMD data collected: wl = water level; wq = water quality. 6. Well completion data at sites MPWMD #FO-01, 2, and 3 are documented in "Fort Ord Ground Water Monitoring Well Project", Staal, Gardner & Dunne, Inc. (SGD), Jan 1987. 7. Well completion data at site MPWMD #FO-04 are documented in "Supplemental Hydrogeologic Assessment, Monterey Research Park, Laguna Seca Subarea", SGD, Nov 1988. 8. Well completion data at site MPWMD #FO-05 and 6 are documented in "Laguna Seca Ranch, Supplemental Hydrogeologic Assessment", SGD, Jul 12, 1991. 9. Well completion data for MSC, PCA-W, PCA-E, Plumas '90 Test and Paralta Test sites are documented in individual reports for each of these sites, SGD, Jul 1990. 10. Well completion data for Justin Court site are documented in "Additional Investigations of Ryan Ranch's Water Supply", John Logan, Jun 27, 1981. 11. Well completion data for LS Pistol Range, York Rd-West, Seca Place, and Robley Rd sites are documented in "Phase II Hydrogeologic Investigation, Laguna Seca Subarea", SGD, Sep 1988. 12. Well completion data for LS Driving Range (SCS Deep) and LS No. 1 Subdivision sites are listed in Appendix B of "Phase II Hydrogeologic Investigation, Laguna Seca Subarea", SGD, Sep 1988. 13. Well completion data for LS Driving Range (SCS Deep) and LS No. 1 Subdivision sites are listed in Appendix B of "Phase II Hydrogeologic Investigation, Laguna Seca Subarea", SGD, Sep 1988. 14. Geologic unit picks for MPWMD FO-09 and FO-10 sites from Feeney and Rosenberg, Mar 31, 2003 (Figure 4). 15. The well at the location of "Blue Larkspur-East End" has been described in LSS Phase II and III reports as "LSR '59 Pond Test". However, based on information and notes from DWR Log #43668, it appears that "LSR '59 Pond Test" well has been misinterpreted to be located at the east end of Blue Larkspur Lane. Accordingly, well completion data for "Blue Larkspur-East End" are not known. 16. In addition to the wells shown in this table, the MPWMD utilizes water level data from selected CAW production wells as part of its monthly groundwater storage tracking program in the coastal subareas of the basin. 17. It should be noted that the Seaside Basin Watermaster conducted a wellhead elevation survey of monitor and production wells in 2008. Please see MPWMD Seaside Basin Watermaster Memorandum 2008-05 for updated wellhead reference elevation data.															

Regional Geologic Setting for the Carmel Valley Alluvial Aquifer

The 36-mile-long Carmel River drains 255 square miles of the central coast of California (Figure 2). The watershed includes the Santa Lucia Mountains to the south and the Sierra del Salinas to the north. Bedrock in the basin is mainly Sur Series crystalline rock (granite, gneiss, schist) or Monterey Shale with significant outcrops of sandstone and volcanics (Page and Mathews, 1984). Mean annual rainfall varies from about 14 inches along the northeast perimeter of the basin to over 40 inches in the high peaks (up to approximately 5,000 feet in elevation) of the southern portion (James, 1999). Upper reaches on the Carmel River flow through steep-sided canyons, while the lower 16 miles is a relatively flat alluvial valley to the ocean that ranges in width from 300 to 4,500 feet. The average annual runoff at the San Clemente Dam site is 69,200 acre-feet (James, 1999). Bankfull flow is 2,200 cubic feet per second (cfs) near the mouth. On March 10, 1995, the river peaked at 16,000 cfs, which is the largest recorded (gaged) event on the Carmel River.

The unconsolidated sediments of the younger alluvium is the most significant water bearing unit in the Carmel Valley Alluvial Aquifer (Figure 2). The valley floor is composed of Holocene age poorly consolidated boulders, gravel, sand, and silt deposited by the Carmel River. Clay layers are thin and uncommon. However, silt becomes more common in the lower part of the valley. Aquifer thickness ranges from 30 feet at the drainage basin narrows to about 180 feet 1 mile upstream from the Carmel River lagoon (Kapple, 1984).

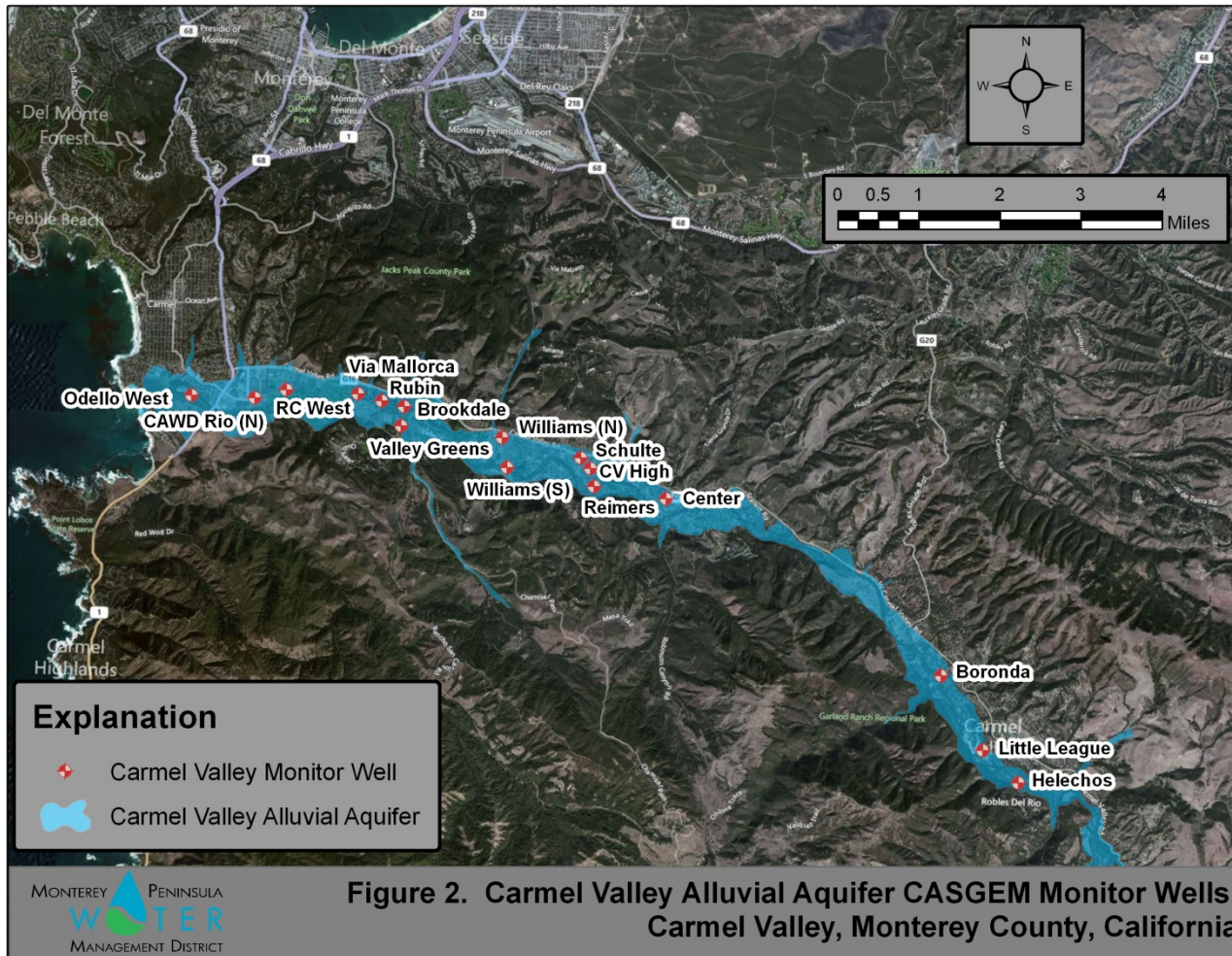
Recharge to the aquifer comes primarily through river infiltration which is about 85 percent of the net recharge. During normal to above normal rainfall years the water table recovers completely from the dry seasonal lows.

Historical Water Levels for the Carmel Valley Alluvial Aquifer

In general, the water table of the Carmel Valley Alluvial Aquifer recovers fairly rapidly with the onset of the rainy season and an increase in stream flow. For example, after the two year drought of 1976-1977, precipitation that began in January of 1978 caused water levels to recover by February 1978 (Kapple, 1984).

Monitoring Plan Rationale

Monitor wells selected for CASGEM monitoring are distributed to give a good representation of groundwater conditions of Carmel Valley Alluvial Aquifer.



Well Network

The well network in the Carmel Valley Alluvial Aquifer consists of 16 wells. These wells are spread throughout the alluvial aquifer to establish groundwater elevation trends. Monitor well information for the Carmel Valley Alluvial Aquifer is provided in Table 2.

Monitoring Schedule

Wells for the CASGEM program will be monitored twice a year, once at the end of September and once at the end of March.

Description of Field Methods

Depth to the water table is measured directly with electric measuring tape to the nearest hundredth of a foot.

Table 2. Attribute Data for Carmel Valley Alluvial Aquifer Monitor Wells

River Mile ¹	Distance from River (feet)	Well Common Name	State Well No. ²	Well Owner's Name	Aquifer Subunit ³	Date Drilled	DWR Drillers Log	Well Type	Data Collection ⁵	Well Depth (feet)	Screened Interval (feet)	Reference Point Elevation (feet AMSL) ⁶	Ground Level Elevation (feet AMSL) ⁶	Other Name Designations or Notes
0.72	250	Odello West - near CAWD (W)	T16S/R1W-13Lc	MPWMD	4	3/10/1989	Y	DMW	WL, WQ	130	120-129	15.10 (e)	15.74	MW3(D), CSD_Deep, CSD_TURN_WEST
1.65	790	CAWD-Rio North (D)	T16S/R1E-18Mc	MPWMD	4	8/27/1993	492664	DMW	WL	159	54-154	25.88 (s)	25.88	
2.13	1350	RC West Monitor	T16S/R1E-18Ka	MPWMD	4	9/10/1993	492668	DMW	WL	100	40-90	38.00 (a)	38.00	5th Hole West Course
3.25	280	Via Mallorca	T16S/R1E-17Lc	MPWMD	4	7(?) /84	N	DMW	WL	115	5-115	47.38 (s)	47.75	see DM A Phase III, 1/85 report
3.56	80	Rubin	T16S/R1E-17Jd	MPWMD	3	7(?) /84	N	DMW	WL	95	5-95	48.59 (s)	50.14	see DM A Phase III (1/85), Suppl Data, Vol. 1
3.85	350	Brookdale Drive	T16S/R1E-17J4	MPWMD	3	5/27/1981	Y	DMW	WL, WQ	39	29-34	57.58 (s)	57.96	
3.86	900	Valley Greens Drive	T16S/R1E-17R2	MPWMD	3	5/22/1981	Y	DMW	WL, WQ	50	40-45	68.18 (s)	68.44	VG&SC
5.44	2400	Williams North Monitor	T16S/R1E-22Da	MPWMD	3	9/15/1993	492670	DMW	WL	77	32-72	100.00 (e)	99.43	east side of Williams Ranch Road right-of-way
5.57	50	Williams South Monitor	T16S/R1E-22Fc	MPWMD	3	7/84?	N	DMW	WL	100	5-100	87.08 (s)	87.33	see DM A Phase III (1/85), Suppl Data, Vol. 1
6.53	2300	Schulte Road	T16S/R1E-23E4	MPWMD	3	5/28/1981	Y	DMW	WL, WQ	58	43-53	110.31 (s)	110.56	
6.70	1300	Carmel Valley High School #1	T16S/R1E-23Fb	MPWMD	3	11/16/1988	Y	DMW	WL, WQ	160	60-160	112.42 (s)	112.94	16S/1E-23F(CVH)
6.72	150	Reimers #1	T16S/R1E-23La	MPWMD	3	11/9/1988	Y	DMW	WL, WQ	122	50-122	102.10 (s)	102.25	16S/1E-23L(R-1)
8.02	1390	Center Street	T16S/R1E-24N5	MPWMD	3	5/29/1981	Y	DMW	WL, WQ	57	47-52	135.04 (s)	135.54	
12.52	260	Boronda Road	T16S/R2E-33Q1	MPWMD	2	5/31/1981	137408	DMW	WL, WQ	32	22-27	220.42 (s)	218.07	
13.65	380	Little League #1	T17S/R2E-03La	MPWMD	2	9/24/1988	192663	DMW	WL, WQ	50	30-50	25100 (s)	25160	LL# 1
14.28	250	De Los Helechos	T17S/R2E-10B1	MPWMD	2	5/15/1981	137402	DMW	WL, WQ	28	18-23	272.62 (s)	273.00	Via Helechos

NOTES:

1. River Mile designations are referenced to the mouth of the Carmel River at Carmel Bay (i.e. RM 0.0). Distances are based on the June 1986 aerial photo enlargements (1" = 100').
2. Official State Well Number ends with a numeral, unofficial MPWMD Well Number ends with a small case letter.
3. Aquifer Subunit designations are as follows: AS1 - San Clemente Dam to Esquiline Bridge, AS2 - Esquiline Bridge to the Narrows, AS3 - Narrows to Via Mallorca Bridge, AS4 - Via Mallorca Bridge to Carmel Bay, CVU - Carmel Valley Upland.
4. DMW - Dedicated Monitor Well, PPW - Private Production Well.
5. WL - Water Level data, WQ - Water Quality data.
6. (s) = surveyed elevation, (h) = hand-leveled elevation, (a) = altimeter elevation, (e) = estimated elevation from topo map.
7. It should be noted that not all wells shown in this table are currently being monitored by the MPWMD.

References

California Department of Water Resources, 1974. Zone 11 Investigation, Carmel Valley and Seaside Groundwater Basins, Monterey County, Prepared by the DWR San Joaquin District, Fresno, CA, July 1974.

Geotechnical Consultants, Inc., 1986. Hydrogeologic Update, Fort Ord Military Reservation and Vicinity, Monterey County, California. Prepared for U.S. Department of the Army, Corps of Engineers, Sacramento District, Sacramento, CA.

James, Greg, 1999. Carmel River Basin – Surface Water Resources Data Report, Water Years 1996-1999, Monterey Peninsula Water Management District, December 1999.

Kapple, G., Mitten, H., Durbin, T., and Johnson, M., 1984. Analysis of the Carmel Valley Alluvial Groundwater Basin. U.S. Geological Survey. Water-Resources Investigations Report 83-4280.

Muir, K.S., 1982. Groundwater in the Seaside Area, Monterey County, California. U.S. Geological Survey Water Resources Investigation 82-10. Washington, D. C. September 1982.

Page, G. and G. Mathews, 1984. Carmel River Management Plan, Monterey Peninsula Water Management District, 1984.

Staal, Gardner and Dunne, Inc., 1990. Hydrogeologic Update, Seaside Coastal Groundwater Basins, Monterey County, California. Prepared for MPWMD, Monterey, CA. August 1990.

Yates E.B., Feeney, M.B. and Rosenberg, L.I., 2005. Seaside Groundwater Basin: Update on Water Resource Conditions. Prepared for MPWMD, Monterey, CA. April 2005.