Raymond Groundwater Basin

- Groundwater Basin Number: 4-23
- County: Los Angeles
- Surface Area: 26,200 acres (40.9 square miles)

Basin Boundaries and Hydrology

The Raymond Basin is located in the northwest part of the San Gabriel Valley, in eastern Los Angeles County, and was considered a part of the San Gabriel Valley Groundwater Basin (4-13) in Bulletin 118-75 and Bulletin 118-80. The Raymond Basin includes the water-bearing sediments bounded by the contact with consolidated basement rocks of the San Gabriel Mountains on the north and the San Rafael Hills on the southwest. The west boundary is delineated by a drainage divide at Pickens Canyon Wash and the southeast boundary is the Raymond fault. Precipitation averages in the basin range from about 19 inches in valley to 25 inches in upland areas. The average precipitation over the basin is about 21 inches.

Hydrogeologic Information

Water Bearing Formations

The water-bearing materials of Raymond Basin are dominated by unconsolidated Quaternary alluvial gravel, sand, and silt deposited by streams flowing out of the San Gabriel Mountains. Younger alluvium typically follows active streambeds and reaches a maximum thickness of about 150 feet. Older alluvium generally thickens southward from the mountain front, reaching a maximum of about 1,140 feet near Pasadena, then thins to about 200 feet near the Raymond fault (RBMB 1985). Water in the older alluvium is typically unconfined and clast sizes grade from coarser to finer moving away from the San Gabriel Mountains (DPW 1954; DWR 1971). However, confined groundwater conditions have existed locally in the basin, particularly along the Raymond fault near Raymond Hill where layers of finer grained sediments become more abundant (DWR 1971).

Restrictive Structures

The Raymond fault trends east-northeast and acts as a groundwater barrier along the southern boundary of the Raymond Basin. This fault acts as a complete barrier along its western end and becomes a less effective barrier eastward. East of Santa Anita Wash, this fault ceases to be an effective barrier and the flow of groundwater southward into the San Gabriel Valley Groundwater Basin becomes essentially unrestricted (DWR 1966). A north-trending divide paralleling the Eaton Wash separates both surface and subsurface water flow in the eastern portion of the basin (DWR 1971). The water level is higher on the eastern side of this divide, ranging from 300 feet higher in the north to about 50 feet higher in the south (DWR 1971). Monk Hill, an emergent mound of consolidated bedrock within the basin, causes groundwater to flow around it, but does not appreciably change the regional flow pattern (DWR 1971).

Recharge Areas

Natural recharge to the basin is mainly from direct percolation of precipitation and percolation of ephemeral streamflow from the San Gabriel Mountains in the north. The principal streams bringing surface inflow are the Arroyo Seco, Eaton Creek and Santa Anita Creek. Some stream runoff is diverted into spreading grounds and some is impounded behind small dams allowing the water to infiltrate and contribute to groundwater recharge of the basin. An unknown amount of underflow enters the basin from the San Gabriel Mountains through fracture systems.

Groundwater Level Trends

Water levels in the Raymond Basin have varied through time but are managed to stay within limits of a long-time mean elevation. Hydrographs show the range of fluctuation in water level over the last 20 years to be about 50 to 60 feet in the northwest, 80 feet in the central, 30 feet in the south, and 140 feet in the northeast portions of the basin (RBMB 1999). Most hydrographs show 1999 water levels within about 30 feet of their long-time mean elevations (RBMB 1999).

Groundwater Storage

Groundwater Storage Capacity. The total storage capacity of the basin was calculated at 1,450,000 acre-feet applying specific yield values ranging from 3 to 35 percent to all aquifer material from 20 feet below the surface to the base of sediments (DWR 1971). This value is consistent with an area of 26,200 acres, an average thickness of about 550 feet, and an average specific yield of about 10 percent.

Groundwater in Storage. No estimates of available storage have been made recently in the basin. The Department of Water Resources (1971) study estimated the available stored water to be 1,000,000 af in 1970, leaving about 450,000 af of storage space avaliable. Because the basin is managed, the present amount of stored water and storage space available should be similar to the amount available in 1970.

Groundwater Budget (Type A)

Not enough data exist to compile a detailed groundwater budget for this basin. However, the Raymond Basin Management Board measures actual groundwater extraction. Groundwater extraction measured in 1998 was 40,900 af for urban uses and 14 af for other uses (RBMB 1999). In addition to extraction data, several other components of the water budget have been published. The RBMB (1999) report artificial recharge of 8,850 af in 1998 and natural recharge of about 6,500 af. The Department of Water Resources (1971) estimated applied water recharge of 7,500 af. Average subsurface inflow is estimated to be 7,900 af, and the average outflow is estimated to be 6,400 af (DWR 1971). California Department of Public Works (1939; 1954) conducted the studies that determined the "safe yield" basis for managing the basin.

Groundwater Quality

Characterization. Groundwater in this basin is typically calcium bicarbonate in character. The average total dissolved solids content in the

Pasadena portion of the basin is about 400 mg/L, with a high of 600 mg/L (PWP 2000). The Electrical Conductivity of groundwater ranges from 436 to 895 μmhos/cm (PWP 2000). Data for 70 public supply wells indicate an average TDS content of 346 mg/L with a range from 138 to 780 mg/L.

Impairments. Fluoride content occasionally exceeds recommended levels of 1.6 mg/L, near the San Gabriel Mountain front (maximum of 3.1 mg/L; average of 1.0 mg/L; [DWR 1978]). High nitrate concentrations are found in water from some wells near Pasadena (RBMB 1999). Volatile organic compounds are detected in wells near Arroyo Seco (RBMB 1999). Radiation is occasionally detected near the San Gabriel Mountains (DWR 1978). A Superfund site exists near the Jet Propulsion Laboratories because of Perchlorate contamination (RBMB 1999).

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	66	9
Radiological	55	8
Nitrates	78	23
Pesticides	57	0
VOCs and SVOCs	60	19
Inorganics – Secondary	66	9

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Production characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range:10 – 3,620	Average:1,880 (27 Well Completion Reports).
	Total depths (ft)	
Domestic		
Municipal/Irrigation		

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Department of Water Resources	Groundwater levels	88/ Annually
U.S. Geological Survey	Quality	
Department of Health Services	Title 22	70/ Annually

Basin Management

Groundwater management:	The Raymond Basin was adjudicated in 1944. This adjudication established a management that utilizes a fixed safe-yield operation. Appointed Watermaster is the Raymond Basin Management Board (RBMB 1999).
Water agencies	
Public	La Canada Irrigation District, Kinneloa Irrigation District, San Gabriel County Water District, City of Pasadena, City of Alhambra, City of Arcadia (RBMB 1999).
Private	Las Flores Water Company, Lincoln Avenue Water Company, Rubio Canyon Land & Water Assn., Valley Water Company, California-

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Additional References

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Errata

Changes made to the basin description will be noted here.