San Gabriel Valley Groundwater Basin

- Groundwater Basin Number: 4-13
- County: Los Angeles
- Surface Area: 154,000 acres (255 square miles)

Basin Boundaries and Hydrology

The San Gabriel Valley Groundwater Basin is located in eastern Los Angeles County and includes the water-bearing sediments underlying most of the San Gabriel Valley and includes a portion of the upper Santa Ana Valley that lies in Los Angeles County. This basin is bounded on the north by the Raymond fault and the contact between Quaternary sediments and consolidated basement rocks of the San Gabriel Mountains. Exposed consolidated rocks of the Repetto, Merced, and Puente Hills bound the basin on the south and west, and the Chino fault and the San Jose fault form the eastern boundary (DWR 1966). The Rio Hondo and San Gabriel drainages have their headwaters in the San Gabriel Mountains, then surface water flows southwest across the San Gabriel Valley and exit through the Whittier Narrows, a gap between the Merced and Puente Hills. Precipitation in the basin ranges from 15 to 31 inches, and averages around 19 inches.

Hydrogeologic Information

Water Bearing Formations

The water-bearing materials of this basin are dominated by unconsolidated to semi-consolidated alluvium deposited by streams flowing out of the San Gabriel Mountains. These deposits include Pleistocene and Holocene alluvium and the lower Pleistocene San Pedro Formation.

Alluvium. Holocene alluvium generally forms alluvial fans along the San Gabriel Mountains and stream deposits that follow the course of the major streams and rivers across the valley. This young alluvium reaches 100 feet in thickness and although is typically above the water table, allows effective percolation of surface water in the basin. Specific yields average 8 percent in the east, 9 to 10 percent in the west and 14 percent in the center of the basin (DWR 1966). Upper Pleistocene alluvium deposits form most of the productive water-bearing deposits in this basin. They consist of unsorted, angular to sub-rounded sedimentary deposits ranging from boulder-bearing gravels near the San Gabriel Mountains to sands and silts in the central and western parts of the basin. Thickness varies from 40 feet in the north to about 4,100 feet in the central portion of the basin (DWR 1966).

San Pedro Formation. The lower Pleistocene San Pedro Formation consists of interbedded marine sand, gravel, and silt (DWR 1966). This formation bears fresh water and reaches a maximum thickness of about 2,000 feet and may grade eastward into continental deposits indistinguishable from the overlying Pleistocene age alluvium (DWR 1966).

Restrictive Structures

The exposed consolidated rocks in the Merced, Repetto, and Puente Hills form barriers to groundwater flow to the south and southwest. South Hill, in the northeastern portion of the basin, is emergent basement that diverts groundwater flow around it. The Raymond fault is an east-northeast trending structure forming the boundary between the Raymond Groundwater Basin and this basin. This fault is a complete barrier along its western end and becomes less effective east of Santa Anita Wash allowing groundwater flow into the San Gabriel Valley Groundwater Basin (DWR 1966). The Lone Hill – Way Hill fault system trends northeast and displaces the water table about 150 feet down to the south (DWR 1966). The Sierra Madre fault system trends east along the front of the San Gabriel Mountains and displaces the water table about 250 feet down to the south. Along the eastern boundary of the basin, the Chino and San Jose faults also are partial water barriers, separating groundwater flow within the San Gabriel Valley Groundwater Basin and the Chino subbasin of the Upper Santa Ana River Valley Groundwater Basin.

Recharge Areas

Recharge of the basin is mainly from direct percolation of precipitation and percolation of stream flow. Stream flow is a combination of runoff from the surrounding mountains, imported water conveyed in the San Gabriel River channel to spreading grounds in the Central subbasin of the Coastal Plain of Los Angeles Groundwater Basin, and treated sewage effluent (DWR 1966). Subsurface flow enters from the Raymond Basin, from the Chino subbasin and from fracture systems along the San Gabriel Mountain front (DWR 1966; DWR 1971).

Groundwater Level Trends

The groundwater level in the Baldwin Park Key Well is used by the Main San Gabriel Basin Watermaster to monitor changes in groundwater supply for the basin. The water level in this well has fluctuated over 95 feet in elevation over the last 20 years from a high in 1983 to a low in 1991 (MSGBW 1999). Since 1993, the water level in this well has only varied over a range of about 30 feet and in 1999 was within about 10 feet of its 200-year mean (MSGBW 1999).

Groundwater levels generally follow topographic slope, with groundwater flow from the edges of the basin toward the center of the basin, then southwestward to exit through the Whittier Narrows (DWR 1966) which is a structural and topographic low. Extraction patterns of groundwater can alter this general flow pattern by creating local depressions in the water table.

Groundwater Storage

Groundwater Storage Capacity. The storage capacity of the San Gabriel Valley Groundwater Basin was estimated to be 10,438,000 af by DWR (1975). Changes to this report from the DWR (1975) report include removal of the Raymond Groundwater Basin (new basin 4-23) and addition of the Upper Santa Ana Valley (old basin 4-14). The storage capacity of the Raymond Basin is about 450,000 af and the storage capacity of the Upper Santa Ana Valley Basin is about 750,000 af (DWR 1975). Taking these changes into account suggests that the storage capacity of the San Gabriel Valley Basin is about 10,740,000 af.

Groundwater in Storage.

Groundwater Budget (Type A)

There is not enough data available to put together a complete water budget for this basin. The basin is occupied by four major water agencies, which monitor four different regions of the basin. The Main San Gabriel Basin Watermaster monitors the largest portion in the northwest, central and northeast region of the basin. The Puente Basin Watermaster monitors the southern portion of the basin. In the southeast part of the basin, groundwater is not monitored by any agency, and very little data is collected. The Six Basins Watermaster monitors the eastern portion of the basin. From these agencies, it was determined that for water year 1998-99 inflow due to precipitation was 164,000 af (Smead 2000) for the main portion of the basin, 21,372 af (SBWM 2000) for the eastern portion and 896 af (SBWM 2000) for the southern portion. The value for the southeast region was unable to be determined. Artificial recharge for the regions of the basin are as follows; the main portion recharged 82,300 af (Smead 2000), the eastern region recharged 503 AF (SBWM 2000), the rest of the basin makes no contribution to artificial recharge. It was not determined whether or not the basin received water from either applied water recharge, or subsurface inflow from neighboring basins. Urban extractions put the greatest demand on the basin. In the main portion of the basin, 245,000 af (MSGBW 1999) were extracted for urban use. In the south and southeast regions, the extractions were 619 af (PBWM 1999) and 520 af (Smith 2000) respectively. The eastern region of the basin extracted 21,849 af (SBWM 2000). The only extractions in the basin for agricultural use were in the main portion of the basin, and account for 1,500 af (MSGBW 1999). In eastern portion of the basin 26 af (SBWM 2000) of water was extracted from the basin as part of a "Special Projects" operation. In the southern region of the basin 267.5 af (PBWM 1999) of water was extracted for the purpose of basin cleanup. Subsurface flow from the basin accounts for over 27,000 af (SGRW, 2000). This water flows through the Whittier Narrows and into Central Basin.

Groundwater Quality

Characterization. Water within the basin is primarily calcium bicarbonate in character. In the north, west and central regions of the basin, TDS ranges from 90 to 4,288 mg/l and averages around 367 mg/l (DWR unpublished data). In the southern portion of the basin the TDS averages around 1,222 mg/l (PBWM 1999). TDS content ranges from 500 to 1,500 mg/l in the eastern part of the basin (Smith 2000), and from 200 to 500 mg/L in the northeast part (JMM 1985). Data from 259 public supply wells shows an average TDS content of 318 mg/L and a range of 172 to 914 mg/L.

Impairments. Four areas of the San Gabriel Valley Groundwater Basin are Superfund Sites. Trichloroethylene, Perchloroethylene, and Carbon Tetrachloride contaminate the Whittier Narrows, Puente basin, Baldwin Park and El Monte areas (DWR 1998).

Within the Six Basins Area there exists high levels of nitrates in the northeastern part of the Pomona Basin, and a plume of volatile organic compounds occupies the southern portion of Pomona Basin. (SBWM 2000).

The Puente Basin has numerous sites where clean-up operations are in affect. There is an EPA assigned Superfund Site, the Puente Valley Operable Unit, which is cleaning up plumes of TCE and PCE. (EPA 1998).

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	287	3
Radiological	278	4
Nitrates	300	73
Pesticides	292	1
VOCs and SVOCs	301	85
Inorganics – Secondary	287	20

[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	Max: – 4,580	Average: 1,000 (MSGBW 2000).
Total depths (ft)		
Domestic	Range: 70 – 150 (Garcia 2000).	
Municipal/Irrigation		

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	60
USGS	Miscellaneous water quality	1
Department of Health Services and cooperators	Title 22 water quality	259
Los Angeles County Department of Public Works	Water quality	88 wells
Main San Gabriel Basin Watermaster	Water levels	1 well/ monthly
Main San Gabriel Basin Watermaster	Water quality	200 wells/ quarterly to once every 4 years (Williams 1995; MSGBW 2000).
Rowland Water District	Water quality	1 well/ yearly (PBWM 1999)

Walnut Valley WD	Water quality	1 well/ quarterly (PBWM 1999)
DWR	Water levels	3 wells/ monthly (Smith 2000)
Department of Health Services and cooperators	Water Levels	3 wells/ monthly (Smith 2000)
DWR	Water Quality	3 wells/ quarterly (Smith 2000)
Department of Health Services and cooperators	Water Quality	3 wells/ quarterly (Smith 2000)

Basin Management

Groundwater management:	The San Gabriel Valley Basin was adjudicated in January 1973 as the "Main San Gabriel Basin" which does not include the Puente Narrows portion of the basin. Management is based on an operating safe yield, which is redefined on a yearly basis by the Main San Gabriel Basin Watermaster. In 1998 the Six Basins Watermaster was formed in an effort to control groundwater levels in the Six Basins area. The Six Basins area is comprised of the Ganesha, Live Oak, Pomona, Upper Claremont Heights, Lower Claremont Heights and Canyon Groundwater Basins. The watermaster manages the basins based on an operating safe yield. The Puente Basin was adjudicated in 1986. With the Judgment a safe yield was established, that was divided up and assigned to each of the Principle Parties. The Judgment also laid out a physical solution for the management of the basin. Currently there is no management of the Spadra Basin.
Water agencies	
Public	City of Alhambra, City of Arcadia, City of Azusa, City of El Monte, City of Glendora, City of Industry Waterworks System, La Puente Valley County Water District, County of Los Angeles, City of Monrovia, City of Montery Park, San Gabriel CWD, City of South Pasadena, City of Whittier, City of La Vern, City of Pomona, Pomona College, City of Upland, City of Industry, Rowland WD, Walnut Valley WD.
Private	Adams Ranch MWC, Amarillo MWC, Azusa Valley WC, California-American WC, California Domestic WC, Champion MWC, Del Rio MWC, East Pasadena WC, Limited, Hemlock MWC, Rurban Homes MWC, San Gabriel Valley WC, Southern California WC, Sterling MWC, Suburban Water Systems, Sunny Slope WC Valencia Heights WC, Valley View MWC, San Antonio WC, Southern California WC, West End Consolidated WC.

References Cited

California Department of Water Resources (DWR). 1966 *Planned utilization of groundwater basins, San Gabriel Valley; Appendix A: Geohydrology*. Bulletin 104-2. 203 pages., 23 plates.

________. 1971. *Meeting Water Demands in the Chino-Riverside Area.* Bulletin 104-3. 27 p.

________. 1975. *California's Ground Water.* Bulletin 118.

________. 1998, *California Water Plan.* Bulletin 160-98.

Environmental Protection Agency (EPA), Region IX – San Francisco, California. 1998. *Interim Record of Decision. San Gabriel Valley Superfund Site Puente Valley Operable Unit - City of Industry, California, Vol. I.*

Garcia, Mario. 2000. Three Valleys Municipal Water District – Six Basins Area Watermaster. Written communication to B.C. Moniz, September 2000.

James M. Montgomery Consulting Engineers Inc. (JMM). 1985. *Pomona Valley Protective Association, Ground Water Management Study.* March 1985.

Main San Gabriel Basin Watermaster (MSGBW). 1999. *Annual Report 1998-99.* Azusa California.

________. 2000. Written communication to B.C. Moniz. 2000.

Puente Basin Watermaster (PBWM). 1999. *Thirteenth Annual Report – Puente Basin Watermaster, Fiscal Year 1998 – 99.*

San Gabriel River Watermaster (SGRW). 2000. *Thirty-sixth Annual Report of the San Gabriel River Watermaster for 1998-99.* Glendale California.

Six Basins Watermaster (SBWM). 2000. *Annual report for Calendar Year 1999.*

Smead, Kevin. 2000. Stetson Engineers Inc. for Main San Gabriel Basin Watermaster. Oral communication to B.C. Moniz. August 2000.

Smith, Phillip. 2000. City of Pomona. Oral communication to B.C. Moniz.

Williams, Carol. 1995. Main San Gabriel Basin Watermaster. Written communication. 1995.

Additional References

Blomquist, W. 1990. *The Performance of Institutions for Groundwater Management, Volume 4, San Gabriel Valley*. Workshop in Political Theory and Policy Analysis. Indiana University, Bloomington, Indiana.

California Department of Public Works, Division of Water Resources. 1934. *South Coastal Basin Investigation, Geology and Groundwater Storage Capacity of Valley Fill.* Bulletin 45. 273 p.

Landes, Jon. 2000. City of Pomona, Oral communication to B.C. Moniz, September 2000.

Main San Gabriel Basin Watermaster (MSGBW). 1997. *Annual Report 1996-97.* Azusa California.

San Gabriel River Watermaster (SGRW). 1998. *Thirty-Forth Annual Report of the San Gabriel River Watermaster for 1996-97.* Glendale California.

Errata

Changes made to the basin description will be noted here.