Santa Clara Valley Groundwater Basin, Santa Clara Subbasin

- Groundwater Basin Number: 2-9.02
- County: Santa Clara
- Surface Area: 153,600 acres (240 square miles)

Basin Boundaries and Hydrology

The Santa Clara subbasin occupies a structural trough parallel to the northwest trending Coast Ranges. TheDiablo Range bounds it on the west and the Santa Cruz Mountains form the basin boundary on the east. It extends from the northern border of Santa Clara County to the groundwater divide near the town of Morgan Hill. The dominant geohydrologic feature is a large inland valley (Fio and Leighton 1995). The valley is drained to the north by tributaries to San Francisco Bay including Coyote Creek, the Guadalupe River, and Los Gatos Creek. Annual precipitation for the Santa Clara basin ranges from less than 16 inches in the valley to more than 28 inches in the upland areas.

Hydrogeologic Information

Water Bearing Formations

The water bearing formations of the Santa Clara subbasin include Pliocene to Holocene age continental deposits of unconsolidated to semi-consolidated gravel, sand, silt and clay. Two members form this group, the Santa Clara Formation of Plio-Pleistocene age and the younger alluvium of Pleistocene to Holocene age (DWR 1975). Lithologic similarities make distinction between these two units difficult based on available well data. The combined thickness of these two units probably exceeds 1500 feet (DWR 1967).

Santa Clara Formation. The Santa Clara Formation is of Plio-Pleistocene age and rests unconformably on impermeable rocks that mark the bottom of the groundwater subbasin (DWR 1975). The Santa Clara Formation is exposed only on the west and east sides of the Santa Clara Valley. Where exposed, it is composed of poorly sorted deposits ranging in grain size from boulders to silt (DWR 1975). Well logs indicate that permeability increases from west to east and that in the central part of the valley permeability and grain size decrease with depth (DWR 1975).

Pleistocene-Holocene Alluvium. The Pleistocene to Holocene alluvium is the most important water bearing unit in the Santa Clara subbasin. The permeability of the valley alluvium is generally high and principally all large production wells derive their water from it (DWR 1975). Comprised generally of unconsolidated gravel, sand, silt, and clay it is deposited principally as series of convergent alluvial fans. It becomes progressively finer-grained at the central portions of the valley. A confined zone is created in the northern portion of the subbasin where overlain by a clay layer of low permeability (SCVWD 2001). The southern portion of the subbasin is generally unconfined and contains no thick clay layers (SCVWD 2001).

Recharge Areas

Natural recharge occurs principally as infiltration from streambeds that exit the upland areas within the drainage basin and from direct percolation of precipitation that falls on the basin floor.

The Santa Clara Valley Water District conducts an artificial (facility) recharge program. This is conducted by releasing locally conserved or imported water to in-stream and off-stream facilities (SCVWD 2001). District wide controlled in-stream recharge accounts for about 45 % groundwater recharge in district facilities (SCVWD 2001). In-stream recharge occurs along stream channels in the alluvial apron upstream from the confined zone. Spreader dams (creating temporary or permanent impoundments in the stream channel) are a key component of the in-stream recharge program, increasing recharge capacity by approximately 10 % (SCVWD 2001).

Off-stream recharge facilities include abandoned gravel pits and areas specifically excavated for recharge purposes. Recharge from water delivered to these facilities accounts for approximately 35 % of the recharge district wide (SCVWD)

Groundwater Level Trends

Historically, since the early 1900,s through the mid-1960's water level declines from groundwater pumpage have induced subsidence in the Santa Clara subbasin and caused degradation of the aquifer adjacent to the bay from saltwater intrusion. Prior to importation of surface water via the Hetch Hetchy Aqueduct and South Bay Aqueduct and the introduction of an artificial recharge program water levels declined more than 200 feet in the Santa Clara Valley (Poland and Ireland 1988). Groundwater levels have generally increased since 1965 as a result of increase in recharge and decreases in pumpage (Fio and Leighton 1995). Current hydrographs of index wells within the subbasin maintained by Santa Clara Valley Water District support this trend (www.scvwd.dst.ca/gwuse/gwmimap.htm, 2001).

Groundwater Storage

Groundwater Storage Capacity. Operational groundwater storage capacity is an estimate of the storage capacity based on "District Operations" (SCVWD 2001). Operational storage capacity is generally less than total storage capacity. It must account for available pumping capacity, avoidance of land subsidence, and problems associated with high groundwater levels. The operational storage capacity of the Santa Clara Valley subbasin is estimated to be 350,000 acre-feet (SCVWD 2001). This estimate is based on an area defined by the Santa Clara Valley Water District that is approximately 15 square miles smaller than the Santa Clara subbasin boundaries used by the California Department of Water Resources for this publication.

Groundwater in Storage. No published report was found addressing the quantity of groundwater presently in storage.

Groundwater Budget (Type C)

Not enough published information was found to present a current groundwater budget detailing inflows and outflows for this basin. Additional information may be available from Santa Clara Valley Water District.

Groundwater Quality

Characterization. The groundwater in the major producing aquifers within the basin is generally of a bicarbonate type, with sodium and calcium the principal cations (DWR 1975). Although hard, it is if good to excellent mineral composition and suitable for most uses. Drinking water standards are met at public supply wells without the use of treatment methods (SCVWD 2001).

Impairments. Areas with somewhat elevated mineral levels, perhaps associated with historical saltwater intrusion have been observed in the northern basin (SCVWD 2001). Some wells with elevated nitrate concentration have been identified in the southern portion of the basin (SCVWD 2001).

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	257	9
Radiological	234	1
Nitrates	268	10
Pesticides	253	3
VOCs and SVOCs	252	4
Inorganics – Secondary	257	29

[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: – 1,650	Average: 425 (DWR 1975)
	Total depths (ft)	
Domestic	Range: 15 - 800	Average: 263 (Based on 314 Wells)
Municipal/Irrigation	Range: 17 – 1,186	Average: 278 (Based on 262 Wells)

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
SCVWD and Cooperators	Groundwater levels	108 Wells Quarterly, 168 Wells Monthly
DWR	Miscellaneous water quality	10 Wells
Department of Health Services and cooperators	Title 22 water quality	234 Wells

Basin Management

Groundwater management:

Water agencies

Public	Aldercroft Heights Co WD, Purissima Hills WD, San Martin Co WD, Santa Clara Valley WD
Private	

References Cited

California Department of Water Resources. Evaluation of groundwater Resources South San Francisco Bay Volume III Northern Santa Clara County Area: Bulletin 118-1, December 1975.

_____. Evaluation of Groundwater Resources South Bay Appendix A: Geology Bulletin 118-1, August 1967.

_____. California's Ground Water: Bulletin 118, September 1975.

Fio, J.L. and D.A. Leighton. Geohydrological Framework, Historical Development of the Groundwater System, and General Hydrologic and Water Quality Conditions in 1990, South San Francisco Bay and Peninsula, California, U.S. Geological Survey Open File Report 94-357, 1995.

Santa Clara Valley Water District. www.scvwd.dst.ca/gwuse/gwmimap.htm: October 10, 2001.

Santa Clara Valley Water District. Santa Clara Valley Water District Groundwater Management Plan: July 2001.

Errata

Changes made to the basin description will be noted here.