

## **Gilroy-Hollister Valley Groundwater Basin, Bolsa Area Subbasin**

- Groundwater Basin Number: 3-3.02
- County: San Benito
- Surface Area: 21,000 acres (33 square miles)

### **Basin Boundaries and Hydrology**

Gilroy-Hollister Valley Groundwater Basin lies between the Diablo Range on the east and the Gablian Range and the Santa Cruz Mountains to the west. It is bounded on the southwest by the San Andreas Rift Zone. The northern portion is drained toward Monterey Bay by the Pajaro River and its tributaries. The southern portion is drained by the San Benito River and its tributaries.

The Bolsa Area subbasin lies within the northwest portion of the Gilroy-Hollister Valley Groundwater Basin, is bounded on the north by the Pajaro River, to the southwest by the Flint Hills, the Sargent fault and the Sargent anticline. The Calaveras fault is the eastern boundary of the basin. These subbasin boundaries are derived from geologic, hydrologic and political conditions. The northern boundary in addition to being the Pajaro River is also the San Benito-Santa Clara county line. Groundwater occurs in the alluvium of Holocene age, older alluvium of Pleistocene and Pliocene age and the Purisima Formation of Pliocene age. Pacheco Creek flows into the subbasin and into San Felipe Lake and out of the subbasin into the Pajaro River. Tequisquita Slough also drains the subbasin northward into the Pajaro River. Average precipitation values range from 13 inches at south of the basin to 17 inches in the north.

### **Hydrogeologic Information**

The Gilroy-Hollister basin is comprised of a sedimentary sequence that contains the principal aquifers underlying the Hollister and San Juan Valleys. It consists mainly of clay, silt, sand, and gravel ranging in age from Tertiary to Holocene. The oldest of these deposits lie unconformably on consolidated bedrock of Jurassic, Cretaceous and early Tertiary age (Kilburn 1972).

### ***Water Bearing Formations***

Geologic units comprising the Bolsa Area subbasin include Holocene age alluvium, older alluvium of Pleistocene and Pliocene age, and the Purisima Formation of Pliocene age (Luhdorff and Scalmanini 1991).

**Holocene Alluvium.** The alluvium consists of unconsolidated lenticular beds of gravel, sand, silt, and clay deposited by streams as flood plain, alluvial-fan, slope-wash, and terrace deposits (Kilburn 1972). Saturated deposits are moderately to extremely permeable. The thickness generally ranges from 0 to 300 feet (JSA 1998).

**Purisima Formation.** The Purisima Formation while lithologically similar to the overlying alluvium is generally more consolidated and less permeable (JSA 1998). It ranges from the surface in some areas to several thousand feet

deep and in the Bolsa Area subbasin is believed to lie directly upon consolidated basement rocks of Jurassic age (Kilburn 1972).

### ***Restrictive Structures***

The Calaveras and Sargent faults that bound the subbasin are considered to represent relatively impermeable barriers to groundwater flow. These fault zones may contain large numbers of crumpled slivers of rock fragments and clay that can form a nearly impervious vertical barrier to groundwater movement (Kilburn 1972). More recent evaluation of the hydrologic character of these faults using groundwater model calibration indicated that the faults form partial subsurface barriers to groundwater flow (JSA 1998). Vertical groundwater flow is also restricted by an unnamed extensive clay confining layer which created artesian conditions in the subbasin, and flowing wells were common in that area in the early twentieth century (Kilburn 1972).

### ***Recharge Areas***

Groundwater recharge from surface sources is from rain, seepage from streams, and infiltration of applied irrigation water. Recharge from subsurface inflow is derived from Santa Clara County north and west of the Pajaro River (Kilburn 1972).

### ***Groundwater Level Trends***

Groundwater level measurements have been made periodically since 1913. Water levels throughout most of the subbasin show significant declines from early in the century to the early 1970's, with water levels becoming relatively stable from the 1970's to the present. Water levels in the southeast portion of the subbasin have shown water level rises from about 1990 to 2000 due to the delivery of imported water supplies. A persistent groundwater depression is evident in the center of the subbasin (JSA 2000).

### ***Groundwater Storage***

**Groundwater Storage Capacity.** No information is available on the total volume of water in storage in the subbasin. The storage capacity of the larger Gilroy-Hollister Valley Groundwater basin is estimated at 932,000 af. (Bader 1969).

**Groundwater in Storage.** Groundwater storage is discussed in the Groundwater Management Plan for the San Benito County Part of the Gilroy-Hollister Groundwater Basin (JSA 1998) in general terms. However, no specific information is available for the Bolsa Area subbasin.

### ***Groundwater Budget (Type A)***

Information in "San Benito County Ground-Water Investigation" (Luhdorff and Scalmanini 1991) describes the groundwater budget of the Bolsa Area subbasin. It indicates that based on a groundwater flow model of the basin, pre-development recharge to the basin averaged approximately 8,400 af per year and occurred as subsurface inflow, infiltration of rain, and infiltration of minor streamflow. The pre-development discharge averaged approximately 8,400 af per year. Based on model simulations, recharge to the aquifer from 1945 to 1969 averaged 4,500 af per year, and discharge averaged 5,800 af

per year. While no newer model runs were found in the published literature it is clear that the groundwater budget has been significantly changed with the importation of surface water to a portion of the subbasin beginning in 1987. Water level contours and hydrographs published in the San Benito County Water Districts' Annual Groundwater Report for the 1999-2000 Water Year (JSA 2000) show water level rises over much of the subbasin. This report also calculates a change in storage for the Bolsa subbasin, the southeast portion of the subbasin is reported to have a increase change in storage of 349 af and the main portion of the subbasin is reported to have a change of minus 396 af over the period from October 1999 to October 2000. These calculations were done using an area-weighted average storage coefficient for the subbasin.

### **Groundwater Quality**

**Characterization.** No complete characterization of groundwater quality was found in the published data, however incomplete water quality analysis (Kilburn 1972 , JSA 1998, JSA 2000, and Bader 1969) indicate the groundwater in the subbasin to be somewhat hard and contains significant concentrations of sulfate and chloride. Data specific to the subbasin indicate electrical conductivity ranges from 565umhos to 2,570umhos in samples collected from wells in 1997 (JSA 1998).

**Impairments.** The Groundwater Management Plan for the San Benito County Part of the Gilroy-Hollister Groundwater Basin (JSA 1998) states that groundwater quality in the larger basin is marginally acceptable for potable and irrigation use. The water quality constituents of greatest concern are salinity, nitrate, boron, hardness, and trace elements that occasionally exceed drinking water standards.

### **Water Quality in Public Supply Wells**

| <b>Constituent Group<sup>1</sup></b> | <b>Number of wells sampled<sup>2</sup></b> | <b>Number of wells with a concentration above an MCL<sup>3</sup></b> |
|--------------------------------------|--------------------------------------------|----------------------------------------------------------------------|
| Inorganics – Primary                 | 1                                          | 0                                                                    |
| Radiological                         | 1                                          | 0                                                                    |
| Nitrates                             | 3                                          | 1                                                                    |
| Pesticides                           | 1                                          | 0                                                                    |
| VOCs and SOCs                        | 1                                          | 0                                                                    |
| Inorganics – Secondary               | 1                                          | 0                                                                    |

<sup>1</sup> 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).

<sup>2</sup> Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.

<sup>3</sup> 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  | Average: 400 (Bader 1969) |
| Total depths (ft)     |                           |
| Domestic              |                           |
| Municipal/Irrigation  |                           |

## Active Monitoring Data

| Agency                                        | Parameter                   | Number of wells /measurement frequency |
|-----------------------------------------------|-----------------------------|----------------------------------------|
| San Benito CWD                                | Groundwater levels          | 11 Wells quarterly                     |
| San Benito CWD                                | Miscellaneous water quality | < 11 Wells varies                      |
| Department of Health Services and cooperators | Title 22 water quality      | 3 Wells varies                         |

## Basin Management

|                         |                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Groundwater management: | Groundwater Management Plan for the San Benito County Part of the Gilroy-Hollister Groundwater Basin finalized April 1998. Prepared for Aromas WD, City of Hollister, City of San Juan Bautista, San Benito CWD, Sunnyslope CWD and Tres Pinos CWD. |
| Water agencies          |                                                                                                                                                                                                                                                     |
| Public                  | San Benito CWD, Pacheco Pass WD, City of Hollister, Sunnyslope CWD, Tres Pinos CWD.                                                                                                                                                                 |
| Private                 |                                                                                                                                                                                                                                                     |

## References Cited

- Bader, J. United States Geological Survey. 1969. Ground-Water Data as of 1967, Central Coastal Subregion, California. Menlo Park. 16 p.
- Jones & Stokes Associates (JSA). 1998. Groundwater Management Plan for ther San Benito County Part of the Gilroy-Hollister Groundwater Basin.
- Jones & Stokes Associates (JSA). 2000. Annual Groundwater Report for the 1999-2000 Water Year.
- Kilburn C., United States Geological Survey. Water Resources Division. 1972. Ground-water hydrology of the Hollister and San Juan Valleys, San Benito County, California : 1913-68. Menlo Park: U. S. Geological Survey. iv,44 p.
- Luhdorff & Scalmanini. 1991. San Benito County Ground-Water Investigation.

## Additional References

- California Department of Water Resources San Joaquin District. 1964. Waste Water Disposal Investigation, Hollister Gas Field, San Benito County, Code 4103-044. 13 p.

\_\_\_\_\_. 1971. Nitrates in ground waters of the central coast area : memorandum report. Fresno, Calif.: The District. ii, 16 , [1] folded leaf of plates p.

\_\_\_\_\_. 1977. Artificial recharge of ground water in the San Joaquin-central coastal area : district report. Fresno: The District. vii, 64 p.

Farrar CD, San Benito County Water Conservation and Flood Control District, United States Geological Survey. 1981. Ground-water-level monitoring network, Hollister and San Juan Valleys, San Benito County, California. Menlo Park, Calif.: U.S. Geological Survey. 9 p.

Faye RE. 1976. Mathematical model of the West Bolsa Ground-water Basin, San Benito County, California. Menlo Park, Calif.: United States Geological Survey Water Resources Division. v, 54 p.

## **Errata**

Changes made to the basin description will be noted here.