Marina Groundwater Basin

- Groundwater Basin Number: 2-39
- County: San Francisco
- Surface Area: 2200 acres (3.4 square miles)

Basin Boundaries and Hydrology

The Marina Groundwater Basin is the northernmost of seven small groundwater basins delineated on the San Francisco peninsula, and is one of five of these basins that lie on the eastern side of a northwest trending bedrock ridge within the peninsula. The Marina groundwater basin is made up of shallow unconsolidated alluvium underlain by less permeable bedrock, and is described by the watershed draining the area east and north of Nob Hill including most of the Presidio and Fort Point (the southern abutment of the Golden Gate Bridge.) Bedrock outcrops along much of the ridge form the eastern, southern, and western basin boundaries (Phillips et al, 1993.). In general, groundwater flow is to the north following the topography. There are no significant streams in the basin. Average precipitation within the basin is estimated to be 24-inches per year.

Hydrogeologic Information

Water Bearing Formations

The primary water-bearing formations are comprised of unconsolidated sediments and include alluvial fan deposits, beach and dune sands, undifferentiated alluvium and artificial fill. The oldest of these sediments are Pliestocene in age (Knudsen et.al. 2000). Water bearing formations are thickest beneath the northern central portion of the basin where bedrock is encountered at less than 300 feet below ground surface (Phillips et.al. 1993). Bedrock underlying the basin consists of consolidated rocks of the Franciscan Complex (Schlocker 1974).

Groundwater Recharge

Groundwater recharge for the San Francisco area occurs from infiltration of rainfall and irrigation water, and from leakage of water and sewer pipes. For the Marina groundwater basin total recharge was estimated as 1,341 ac-ft per year, with recharge due to leakage from municipal water and sewer pipes accounting for about half of the total recharge, as in other groundwater basins in San Francisco (Phillips et.al. 1993).

Groundwater Level Trends

No published water level data was found for the basin.

Groundwater Storage

No published groundwater storage information was found for the basin.

Groundwater Budget (Type A)

Using a hydrologic routing model, Philips et.al. (1993) calculated total recharge for the Lobos basin to be approximately 1,570 acre-ft per year (for water years 1987-88.) The model was based on land use zones in the San Francisco peninsula region. Traditional groundwater budget calculations are

complicated by the large amounts of urban surface water runoff and leakage from municipal water supply and waste-water discharge facilities. A more detailed discussion of the groundwater budget can be found in the report by Phillips et.al. (1993).

Groundwater Quality

Characterization. No published groundwater quality information was found for the Marina basin. However limited water quality data for the surrounding basins is available and shows that the general character of groundwater for all basins beneath the entire San Francisco peninsula is similar (Phillips et.al. 1993). Groundwater beneath the San Francisco peninsula is a mixed cation bicarbonate type, and considered generally "hard" ($CaCO_3$ concentrations between 121 and 180 mg/L). Concentrations of most major dissolved constituents are within the guidelines recommended by the U.S. EPA. Total dissolved solids vary from about 200 to over 700 ppm. Elevated concentrations of nitrate and chloride are common, especially at shallower depths (Phillips et.al. 1993).

Impairments. Groundwater within the Marin basin may contain high concentrations of nitrates, and elevated concentrations of chloride, boron, and total dissolved solids. High nitrate levels are attributed to groundwater recharge from sewer pipe leakage and possibly applied fertilizer. Elevated chloride and TDS levels are most likely due to a combination of leaky sewer pipes, seawater intrusion, and connate water (Philips et.al. 1993).

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	N/A	Average: N/A
	Total depths (ft)	
Domestic	Range: N/A	Average: N/A
Municipal/Irrigation	Range: N/A	Average: N/A

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
	Groundwater levels	NKD
	Water Quality	NKD

NKD- No known data

Basin Management

Groundwater management:	Currently there are no groundwater management plans for this basin
Water agencies	
Public	San Francisco Water Department
Private	none

Selected Bibliography

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Knudsen, K.L., Noller, J.S., Sowers, J.M., and Lettis, W.R. 1997. *Quaternary Geology and Liquefaction Susceptibility, San Francisco, California 1:100,000 Quadrangle: A digital database.* U.S. Geological Survey Open-File Report 97-715. (available online at **http://wrgis.wr.usgs.gov/open-file/of97-715/**)

* Phillips, S.P., Hamlin, S.N., and Yates, E.B. 1993. Geohydrology, Water Quality, and Estimation of Ground-water Recharge in San Francisco, California, 1987-92. U.S. Geological Survey Water-Resources Investigations Report 93-4019. Prepared in cooperation with the San Francisco Water Department. 69 p.

Schlocker, Julius. 1974. Geology of the San Francisco north quadrangle, California. U.S. Geological Survey Professional Paper 782. 109p.

* Denotes that the reference is a key one for the basin

Errata

Changes made to the basin description will be noted here.