



City of Santa Barbara
Public Works Department

Interoffice Memorandum

DATE: July 3, 2012
TO: Board of Water Commissioners
FROM: Rebecca Bjork, Water Resources Manager
SUBJECT: Update on Groundwater Level Monitoring

This is to update the Commission on our efforts to monitor groundwater levels in the City's groundwater basins. As you may recall, the State is encouraging local entities to participate in the California Statewide Groundwater Elevation Monitoring Program (CASGEM). The program is in response to recent State legislation aimed at more closely monitoring the use of groundwater Statewide. It is administered by the Department of Water Resources (DWR). In lieu of having the State step in and dictate how our basins would be monitored, we agreed to be the reporting agency for the Santa Barbara and Foothill Groundwater Basins. Fortunately, this aligns with our interest in working more actively with monthly groundwater level data collected at City monitoring wells and correlating it with modeling results we expect to start seeing soon from the USGS update of our groundwater models

Attached is a conceptual plan that we submitted to DWR to illustrate the monitoring wells we identified to comply with the program guidelines. They were selected based on the following criteria:

- Avoid using production wells, due to effects of pumping
- Avoid wells located near creeks
- Avoid wells near potential groundwater recharge sites
- Avoid wells that are perforated across multiple aquifers

We have used this State program as an opportunity to coordinate with USGS to update information and measurement procedures on these wells. A USGS training session on water level measurement in Santa Maria was attended by several of our staff. USGS is completing new GPS surveys of our monitoring wells. We are looking into whether it makes sense to add wells at key locations, such as at Coastal Monitoring Site #1 at Cabrillo Ballfield, where it is apparent that only the lower of our two producing zones is being monitored. Once the list of monitoring wells is finalized and approved by the State we will develop a long-term database of water level data as an alternative to relying solely on the water level charts available on the USGS website.

We look forward to your input at our next meeting.

BF/

Attachment

City of Santa Barbara – CASGEM Groundwater Level Monitoring Plan
Proposed Monitoring Wells

Section 1 – Santa Barbara Groundwater Basin (DWR Basin 3-17)

The basin includes Storage Unit #I and Storage Unit #3. (Storage Unit #II, along with the former Goleta East Subbasin, are now considered to make up the Foothill Basin.) Storage Unit #I has an area of approximately 6 square miles and is the principal groundwater source in the Santa Barbara Basin. The depth of the basin ranges from 200 to 900 feet. The unit gets deeper in the southwesterly direction as it approaches the Mesa Fault and in the southeasterly direction as it approaches the Pacific Ocean. An offshore fault is believed form the southern boundary of the unit, though it is not an effective barrier to seawater intrusion. Groundwater is produced from the "Upper Producing Zone" and the "Lower Producing Zone," both of which are mostly confined. The principle challenges in managing this unit are the potential for seawater intrusion during heavy pumping and the relatively small groundwater storage volume. Monitoring wells have been selected with preference for dedicated monitoring wells where possible and avoiding proximity to production wells and creeks.

Storage Unit #III is quite small, with an area of approximately 2.5 square miles. It is not regularly used as a source of municipal groundwater due to inferior groundwater quality, but remains an option in times of severe water supply interruption. Some private wells operate in this unit. The eastern half of the unit is quite shallow, in most places less than 100 feet in depth. Depth increases to about 300 feet in the western portion.

The boundaries and principal geologic features of the Santa Barbara Basin are illustrated in the attached "Figure 1. Geology and streamflow stations..." taken from the 1984 USGS report on the Santa Barbara Groundwater Basin. Attached Figure 2 from the same report illustrates geologic sections of the basin.

Section 2 – Foothill Groundwater Basin (DWR Basin 3-53)

Since the publishing of the 1989 USGS report on the Foothill Basin, the Goleta East Subbasin and Storage Unit No. I of the Santa Barbara Basin have been considered a separate "Foothill Basin." The basin has an area of approximately 4.5 square miles. Pumpage is primarily by the City of Santa Barbara and the La Cumbre Mutual Water Company, with some additional private pumpage. Water is produced primarily from the lower, confined portion of the Santa Barbara Formation, ranging in thickness from less than 100 feet to about 300 feet.

The boundaries and principal geologic features are illustrated in the attached "Figure 3. Location of Geologic Sections" and "Figure 4. Geologic Sections of the Foothill Basin" from the 1989 USGS report.

1978 (Hutchinson, 1979), resulted in the construction of eight monitor wells at two sites along the coast. These wells were designed to provide an early warning of saltwater intrusion into the freshwater aquifer. At each site, wells were installed at four different depths to enable determination of the vertical distribution of water levels and water quality. The purpose of this second phase of the program is to analyze and evaluate the effect of ground-water pumping on the water levels and on water quality of the ground-water basin. The third and final phase of the program will be the development of a digital flow model for the ground-water basin; such a model will help in defining the hydrology and in managing the water resources of the basin.

The current phase of the program includes:

1. Describing the geohydrology of the Santa Barbara ground-water basin, with particular reference to the water-bearing deposits, the quantity of recharge to and discharge from the basin, and ground-water levels and movement.

2. Describing the vertical variations in ground-water quality in the basin.
3. Determining the effect of pumping on water levels and water quality in the ground-water basin.

Description of the Area

The Santa Barbara ground-water basin is on the south coast of Santa Barbara County (fig. 1). The basin is bounded on the north by foothills of the Santa Ynez Mountains, on the west by the Goleta ground-water basin, on the south by the Pacific Ocean, and on the east by the Montecito ground-water basin. Hydrologically, the basin is divided into three storage units by the Mesa and Mission Ridge faults (fig 1). The principal area of our concern is Storage Unit I, which encompasses about 7 mi².

The Santa Barbara area has a Mediterranean-type climate of warm, dry summers and mild winters. The area has distinct wet and dry seasons; 95 percent

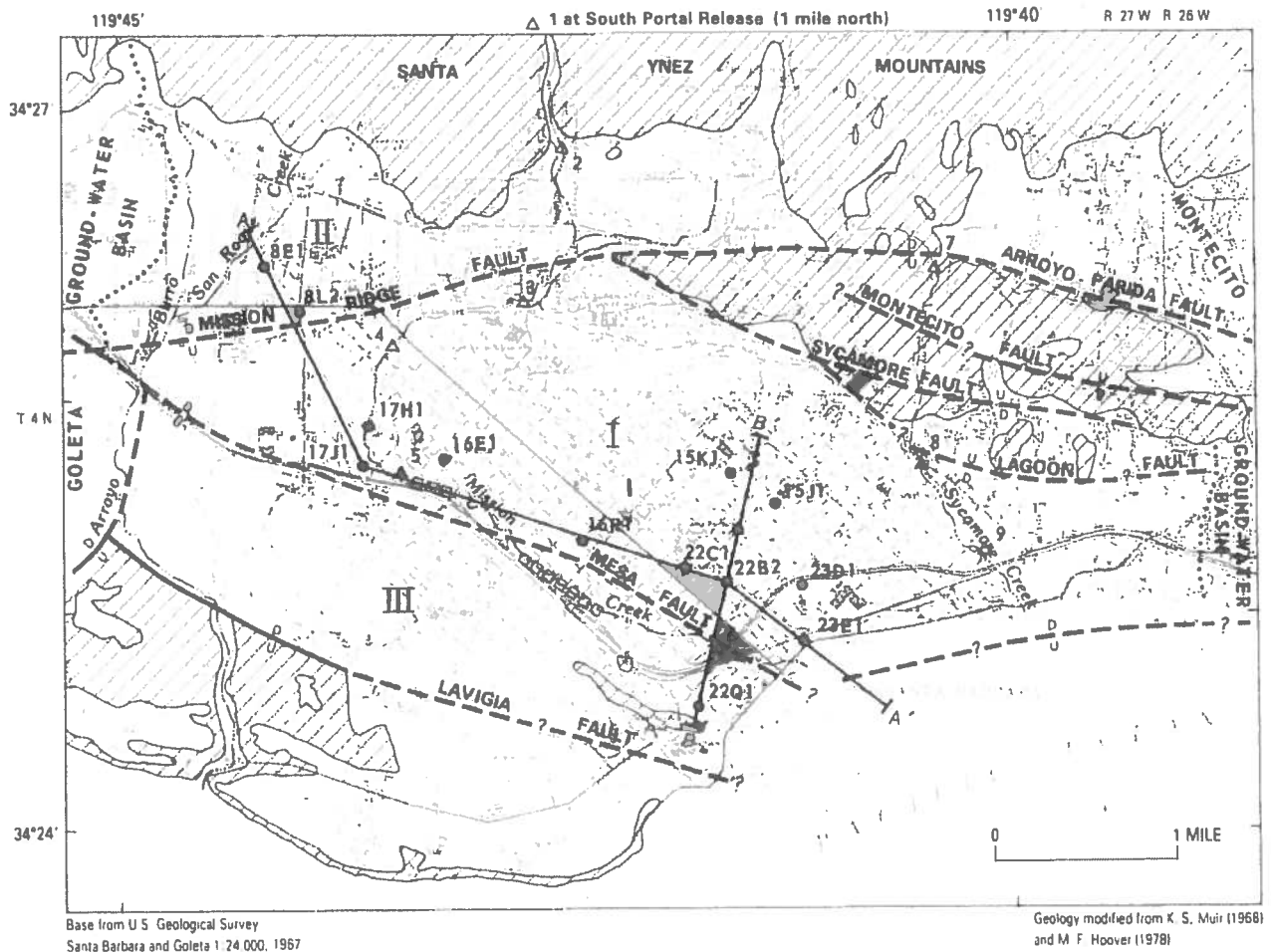


Figure 1. Geology and streamflow stations. Unnamed offshore fault as identified by K. S. Muir (1968).

GEOHYDROLOGY

Definition of the Aquifer System

For this report the lithologic units mapped by Dibblee (1966) and Muir (1968) were generalized in the Santa Barbara area into "consolidated rocks" and "unconsolidated deposits." Figure 1 shows the outcrop pattern of the formations, and figure 2 shows their stratigraphic and structural relations.

Consolidated rocks of Tertiary age underlie the ground-water basin and compose the surrounding hills. These consolidated rocks are sedimentary rocks, predominantly marine in origin, that are nearly impermeable except for slightly permeable sandstones, and in fracture zones. Neither the sandstones nor the fracture zones constitute an important source of ground water.

The unconsolidated deposits consist of the Santa Barbara Formation, of late Pliocene and early Pleistocene age, and alluvium of Holocene age. The Santa Barbara Formation lies unconformably on the consolidated rocks and, in most of the basin, underlies the alluvium. This formation is of marine origin, consists of fine to coarse sand, silt, and greenish-gray clay, and has occasional gravel layers. A layer of permeable, fossiliferous sand and gravel occurs near the base of the formation in most of the basin. The alluvium, as

used in this report, includes terrace deposits, older alluvium, and younger alluvium. It consists of poorly sorted sand, gravel, silt, yellowish-brown clay, and occasional cobbles and boulders.

The greatest thickness of unconsolidated deposits is more than 1,000 ft and is found in Storage Unit I, adjacent to the northeast side of Mesa fault near the Pacific Ocean. From here the unconsolidated

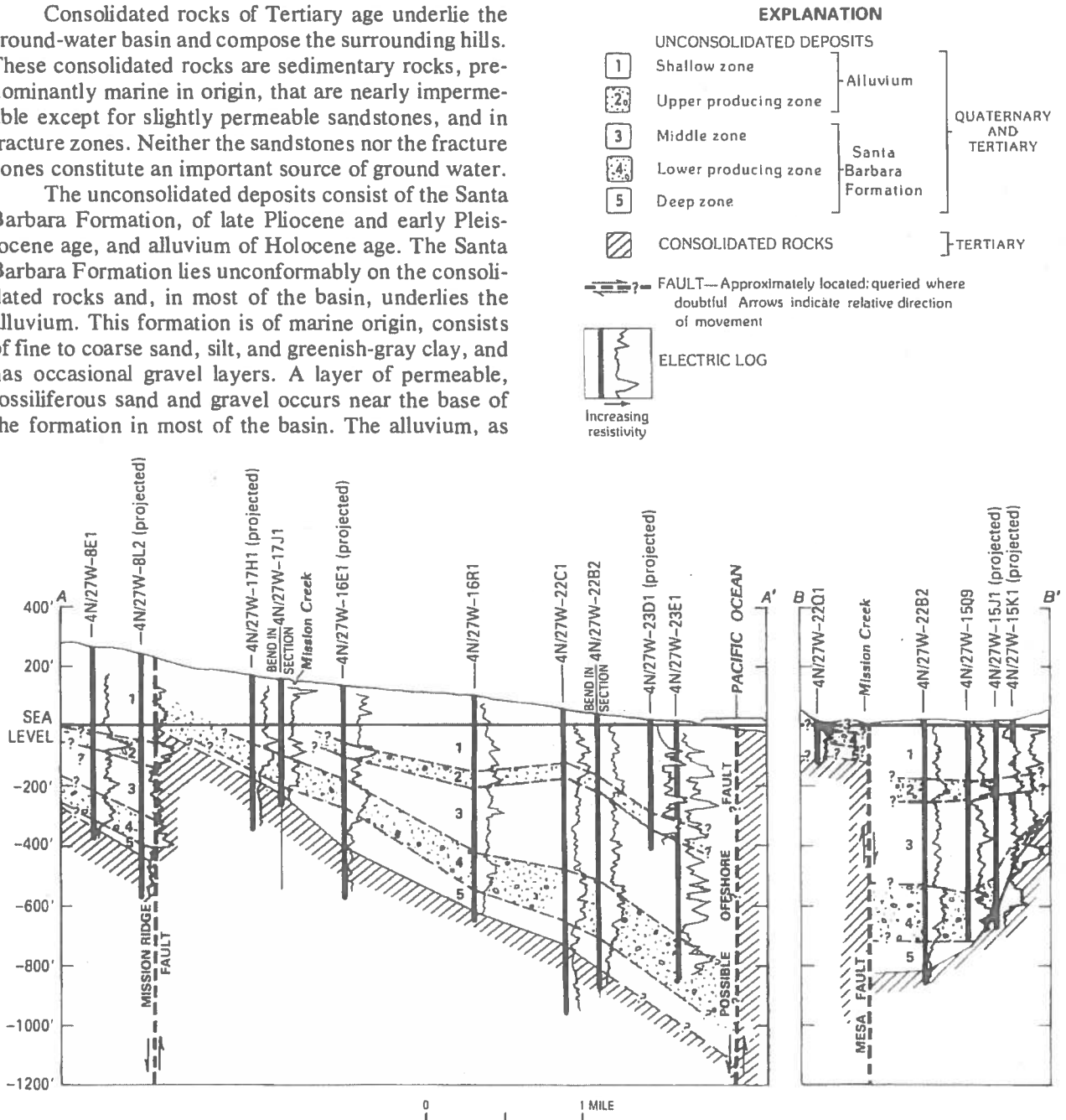


Figure 2. Geologic sections.



Base from U.S. Geological Survey, Santa Barbara and Goleta 1:24,000, 1967

FIGURE 3.—Location of geologic sections.



Geology modified from J.E. Upson (1951), K.S. Muir (1988), and M.F. Hoover (1978)

FIGURE 3.—Continued.

- EXPLANATION**
- UNCONSOLIDATED DEPOSITS (QUATERNARY AND TERTIARY)
 - CONSOLIDATED ROCKS (TERTIARY)
 - 0-? FAULT—Dashed where approximately located; queried where doubtful; u, upthrown side; d, downthrown side. Black indicates boundary of ground-water basin
 - GEOLOGIC CONTACT
 - E—E' LINE OF GEOLOGIC SECTION—Sections shown in figure 4
 - III GROUND-WATER STORAGE UNIT—Former designation of storage unit and subbasin name in parentheses
 - GROUND-WATER DIVIDE
 - FORMER GROUND-WATER DIVIDE
 - *705 WELL AND NUMBER

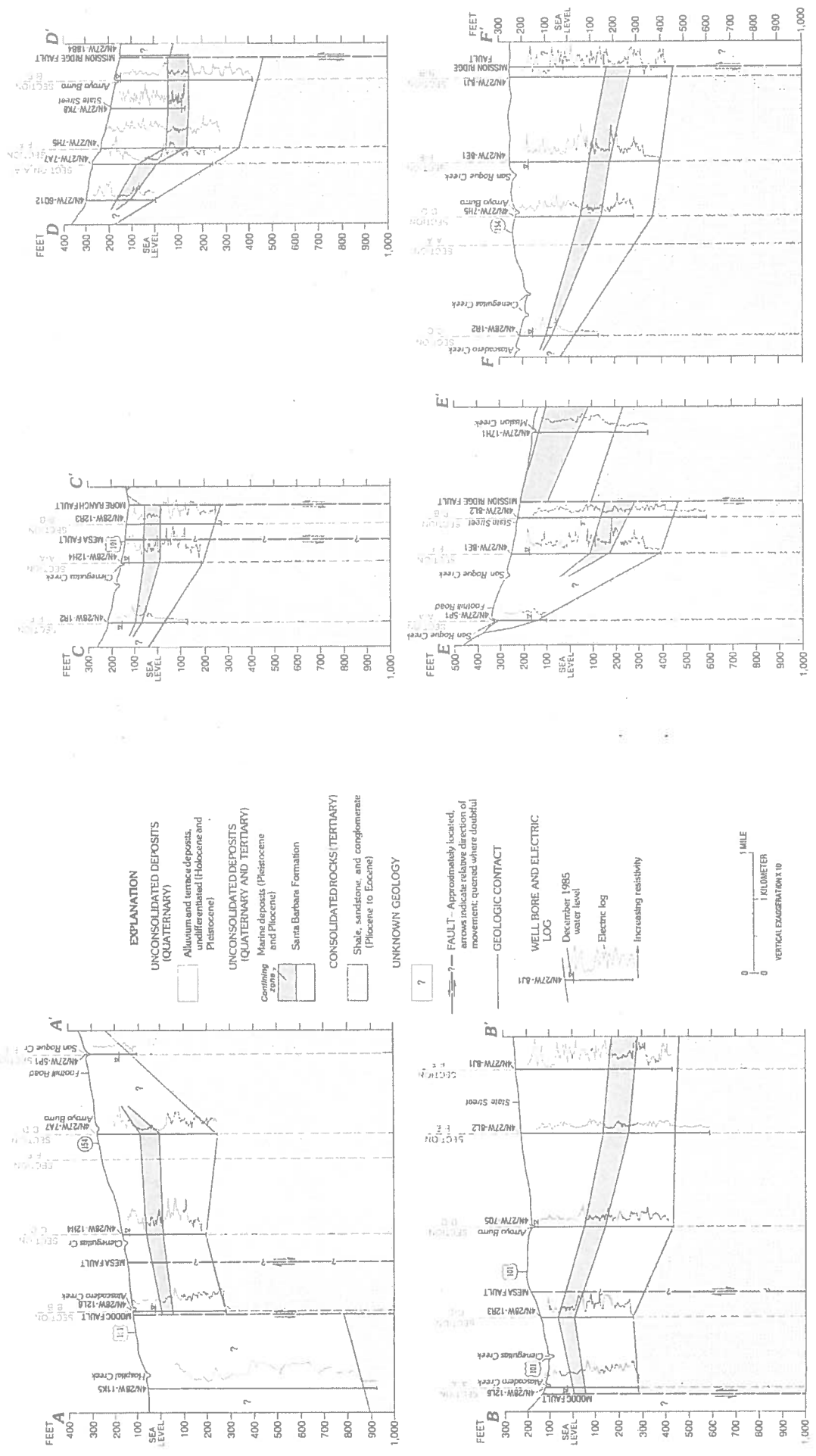
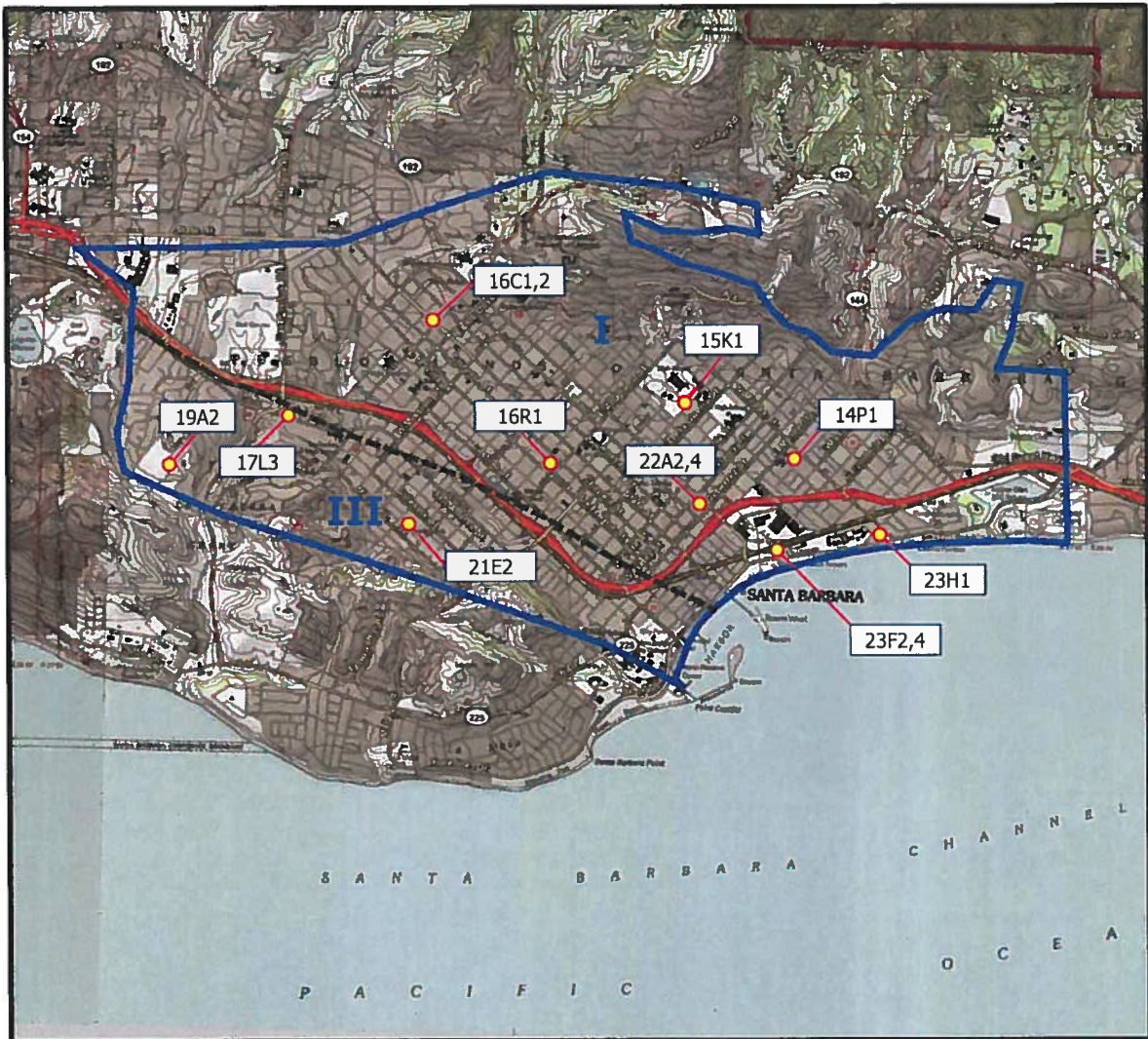


FIGURE 4.—Geologic sections of the Foothill ground-water basin. 11

10 Geology of the Foothill Ground-Water Basin Near Santa Barbara, California

Santa Barbara Groundwater Basin

Proposed CASGEM Groundwater Level Monitoring Wells



Foothill Groundwater Basin

Proposed CASGEM Groundwater Level Monitoring Wells

