Appendix A

Regional Geologic Setting and Previous Geologic Studies

The City of Rohnert Park is located at the southern end of the Santa Rosa Plain in the California Coastal Ranges north of San Francisco Bay. The Santa Rosa Plain drains to the northwest toward the Russian River and then to the Pacific Ocean. The Petaluma Valley Groundwater Basin, located south of Rohnert Park and including the unincorporated community of Penngrove, drains to the southeast toward San Francisco Bay. The broad gentle plain on which the City lies is topographically known as the Cotati Valley. The Cotati Valley lies within the DWR subbasin designated as the Santa Rosa Plain Subbasin (see Appendix A Figure 2).

Bedrock in the area consists of the Mesozoic Franciscan Complex of strongly deformed, weakly metamorphosed marine sedimentary rocks with blocks and slabs of volcanic oceanic crust tectonically mixed within the sedimentary materials. Overlying the bedrock is a thick sequence of volcanic and volcano-clastic rocks of late Tertiary age (late Miocene and Pliocene) known as the Tolay Volcanics and Sonoma Volcanics. Interbedded and interfingered with the volcanic rocks are non-marine, transitional marine, and marine sedimentary rocks of the Petaluma Formation and Wilson Grove (formerly known as Merced) Formation. Interfingered and overlying these Tertiary units are late Pliocene and Quaternary (Pleistocene and Holocene) non-marine sedimentary deposits of fluvial, lacustrine, and alluvial plain origins. The area is highly structurally complex with numerous faults, both active and inactive, that cut through the geologic units.

Over the last 100 years, numerous geologic investigations have been conducted in the area and are summarized in Cardwell (1958) and subsequent reports. The pioneering and classic investigation by Cardwell (1958) describes the hydrogeology of the Santa Rosa Valley. DWR has also conducted a series of investigations of the Santa Rosa Valley (or Plain) (DWR, 1975; 1982; and 1987). Numerous geologic maps have also been generated from the various investigations. Early mapping was summarized in Weaver (1949) and subsequent maps include Fox and others (1973), Huffman and Armstrong (1980), Allen (2003), and Clahan and others (2004, in preparation). Wagner & Bart (1982) is probably the most readily available large area map. However, continued evaluation and interpretation of the stratigraphic and structural complexities of the geology of the area present problems with even the most recent geologic maps.

In the Santa Rosa Plain area, three general areas can be described (see Appendix A Figure 5). East of the Santa Rosa Plain, the low hills and mountain ranges are underlain by the volcanic and volcano-clastic rocks of the Sonoma Volcanics, interbedded with the largely non-marine Petaluma Formation. This area is highly deformed and cut by numerous faults.

West of the Santa Rosa Plain, a broad, low topographic area is underlain by the Miocene-Pliocene, locally fossiliferous marine sandstone formerly known as the “Merced”

Formation (Cardwell, 1958); more recently (post-1982), it has been referred to as the Wilson Grove Formation.

The stratigraphic relationship between the western and eastern areas remains obscure due to poor exposures and the fact that it is covered by the younger deposits in the Santa Rosa Plain. A generalized relationship of interfingering and interbedding of the western marine deposits with transitional marine and non-marine deposits is believed to occur beneath the Valley. Allen (2003) mapped a region just west of the City of Cotati that contains interbedded Wilson Grove and Petaluma Formation, which extend beneath the Valley.

In the Santa Rosa Plain, surface geophysical survey interpretations indicate that up to 2.5 to 3 kilometers of Tertiary and younger deposits exist in this area (Allen, 2003; Mclaughlin & Sarna-Wojcicki, 2003). Investigators (Cardwell, 1958; DWR, 1978 and 1982; and Allen, 2003) have developed various interpretations of the depositional relationships. These interpretations tend to show an interfingering and/or interbedding relationship between the Wilson Grove (Merced) Formation to the west with Petaluma Formation and Sonoma Volcanics to the east. However, previous interpretations are largely based on limited deep borehole information from a few oil and gas testholes, deep water wells, and/or projections of measured angles of dip at surface exposures (Allen, 2003).

A Quaternary sequence of alluvium deposits, described as alluvial fan to fluvial and lacustrine origin, overlies the Tertiary units in the Cotati Valley. Cardwell (1958) initially ascribed much of these deposits to interbedded “Merced Formation” and non-marine Glen Ellen Formation, but this terminology has been largely dropped in favor of a Pleistocene older alluvium (Fox and others, 1973), Quaternary alluvial fans (DWR, 1982), and Pliocene-Pleistocene fluvial-lacustrine deposits (Mclaughlin and Sarna-Wojcicki, 2003). In the Rohnert Park area of the Santa Rosa Plain, groundwater is produced largely from the upper 800 feet of the sedimentary deposits.