NOTE: THIS IS ADDITIONAL INFORMATION FROM SECTION 2.3 FOR YOUR BENEFIT ONLY

3.3.1 Chronic Lowering of Groundwater Levels

Drought conditions, as indicated by declines in the precipitation cumulative departure from the mean, occurred during several periods through the historical climate record (Sections 1.2.2.2 and 3.1). However, except for the most recent drought period (2011 to 2016), well hydrographs show that groundwater levels have recovered rising to historical average levels and above January 1, 2015 levels.

Well 01N21W32Q07S and others show water level below sea level that have not recovered.

3.3.3 Seawater Intrusion

Where the aquifers of the Oxnard Subbasin emerge beneath the Pacific Ocean the groundwater is in direct contact with seawater. Under high seaward groundwater gradients, groundwater flows southwest from the Oxnard Forebay Area (Figure 2-1) toward the Pacific Ocean and out to sea. When groundwater heads near the coast fall below sea level, the groundwater direction becomes on-shore, drawing seawater into the groundwater aquifers. Seawater intrusion is most prevalent in the vicinity of Port Hueneme and Point Mugu due to the near shore presence of the groundwater-seawater contact in the deeply incised submarine canyons (UWCD 2016).

Section 2.3.4 provides water quality information available on groundwater in the Oxnard Subbasin. Section 2.3.3 discusses results of water quality sampling for seawater and saline intrusion, which are indicated by chloride water quality, and provides figures on the current location of the seawater intrusion for each of the Oxnard Subbasin aquifers. Seawater intrusion in the Oxnard Subasin is induced by groundwater production from the UAS and LAS, which causes groundwater levels to decline near the coast and generates a landward groundwater gradient (UWCD 2016). Water quality results from wells in the UAS located southeast of Port Hueneme show elevated chloride from past intrusion events, as prevailing groundwater flow directions tend to sweep saline water from the Port Hueneme area down the coast towards Mugu Lagoon during periods having higher water levels. In the area surrounding Mugu Lagoon, a number of the monitoring wells in the UAS have recorded elevated chloride concentrations from seawater intrusion since they were installed in 1990.

Near Port Hueneme, saline intrusion in the LAS appears to impact a limited area. However, high chloride water in LAS wells is more extensive and severe in the area surrounding Mugu Lagoon, but much of the saline water in this area is interpreted to be derived from brines rather than seawater.

3.3.4 Degraded Water Quality

The potential degradation of groundwater quality by Total Dissolved Solids (TDS), Sulfate (SO4), Chloride (Cl), Boron (B), Nitrogen (as nitrate [NO3] and nitrite) are discussed in Section 2.3.4. Recent groundwater quality data collected by the Ventura County Watershed Protection District (VCWPD) for these five constituents are presented in Figures 2-XX through 2-YY, and shows where, if at all, these constituents exceed the Water Quality Objectives (WQOs) specified for the Oxnard Subbasin in the Basin Plan, as well as a Basin Management Objectives (BMO) defined by FCGMA. WQOs and BMO concentrations for these constituents are provided in Table X (Section 2.3.4).

Based on the results of the water quality review for TDS, SO4, Cl, B, and NO3 as described in Section 2.3.4, the only consistent groundwater quality problem, other than seawater and saline intrusion (for Cl concentrations), which has already been discussed, is the occurrence of NO3 above the WQOs and BMOs in the UAS of the Oxnard Subbasin forebay area. The forebay area also has occasional, but not persistent concentrations of SO_4 and TDS that exceed either the WQO or BMO in the UAS.

Section 1.3.2 provides a discussion of beneficial uses in the Oxnard Subbasin, which include agricultural, domestic, municipal and industrial (M&I) users of groundwater. Concentrations of NO_3 in the forebay area of the Oxnard Subbasin can affect all beneficial uses of groundwater. However, the forebay area is primarily used for M&I purposes, and to a lesser extent for agricultural extraction and domestic use (FCGMA 2014, annual report).

3.3.5 Land Subsidence

The FCGMA Board of Directors resolution discussed in Section 3.1 calls for groundwater management that will not result in net subsidence due to groundwater withdrawal.

Inelastic, or irrecoverable, land subsidence in the Oxnard Subbasin is due to aquifer compaction and can be caused by tectonic forces, petroleum reservoir compaction, and groundwater aquifer compaction by groundwater pumping and water level decline. Water level declines in the FCGMA groundwater basins since the early 1900s suggest that fluid extraction, rather than tectonic activity, is the major cause of land subsidence (Hanson et al. 2003). Subsidence resulting from any of these sources can cause increased flood risk, well casing collapse, and a permanent reduction in the specific storage of the aquifer.

Direct measurement of historic subsidence in the Oxnard Subbasin is limited geographically to a few areas, but what subsidence information and findings are available is presented in Section 2.3.5, and only summarized here. Elevation data from U.S. Geological Survey (USGS) bench

marks indicates subsidence from about 0.3 feet to 2.6 feet (1960 to 1978), with an average subsidence rate from approximately 0.02 feet to 0.07 feet per year, respectively.

Potential subsidence was modeled for the entire Oxnard Plain for different future water production scenarios. The scenarios included consideration of proposed water projects and ordinances for the FCGMA Basins. The model results suggest that areas within the Oxnard Plain area may experience an additional 0.1 to 1 feet of subsidence by 2040 (Hanson et al. 2003). This estimate agrees with the DWR, which designated the Oxnard Plain as an area that has a medium to high potential for future subsidence. The amount of future subsidence will depend on whether future groundwater levels decline below previous maximum declines, or remain above these previous low levels (Hanson et al. 2003).

Currently no groundwater beneficial users have been impacted by land subsidence. DWR ranks the Oxnard Subbasin as a medium to high risk for future subsidence (DWR 2014). Future subsidence could occur if groundwater levels decline below their previous historical lows.