3.9 Geology Affected Environment

This section presents the existing geologic and seismic conditions of the Hemet to Corona/Lake Elsinore (HCLE) Corridor. The study area for this geologic review of the proposed HCLE Corridor includes the 150 to 300 m (500 to 1,000 ft) bandwidth, the surrounding areas, and in part, the Southern California region. The HCLE Corridor study area lies in the plains of western Riverside County, which include the Perris and Menifee valleys. Since all 14 corridor alternatives (1a, 1b, 4a, 4c, 4d, 5a, 5b, 5c, 5d, 5e, 6a, 6b, H1, H3) are regionally close to each other, the generalized discussion of the geology, liquefaction, and seismology along the HCLE Corridor is applicable to all 14 alternatives.

The primary sources of information for the geology setting include the Riverside County Integrated Plan (RCIP) Existing Setting Report (LSA, 1999), the CETAP technical reports, and field reconnaissances of the site and surrounding area.

3.9.1 Regional Geology

California is made up of eleven geomorphic provinces as defined by the California Department of Mining, two of which, the Transverse Ranges Province and the Peninsular Ranges Province, comprise western Riverside County. The HCLE Corridor study area is located within the Peninsular Ranges Province and is south of the Transverse Ranges Province. The Peninsular Ranges Province terminates at the Transverse Ranges Province to the north, forms the long peninsula known as Baja California, and trends to the tip of Baja California, Mexico, to the south. The northeast reaches of the Peninsular Ranges are the San Jacinto Mountains, which include Mount San Jacinto and the town of Idyllwild. These sites are located outside the HCLE study area, approximately 32 km (20 mi) east of the easternmost alternatives 4a, 4c, and 4d.

The northern movement of the Pacific plate against the San Andreas Fault has formed the east-west axis of the Transverse Ranges Province from west of Santa Barbara to east of San Bernardino. The Transverse Ranges Province consists of the following primary mountain ranges: the Santa Ynes Mountains, the San Gabriel Mountains, and the San Bernardino Mountains. The San Bernardino National Forest has the tallest peak in Southern California, Mt. San Gorgonio [3506 m (11,502 ft)], which is located approximately 30 km (19 mi) north of Alternatives 1a and 1b of the HCLE Corridor. Figure 3.9.1, Geomorphic Provinces and Regional Faults, shows the provinces in relation to HCLE Corridor alternatives.

The study area is within the southeast Los Angeles Basin, a term that specifically refers to an alluvial outwash that includes most of Los Angeles and Orange Counties, as well as western San Bernardino and Riverside Counties (Schoenherr, 1992). The geological makeup of the southeast Los Angeles Basin (western Riverside County) consist primarily of alluvium, Pleistocene nonmarine, and Upper Jurassic Marine, which are all sedimentary rock, and Mesozoic granite, Jura-Trias metavolcanic, and Pre-Cenozoic granitic and metamorphic, which are igneous and meta-igneous rocks (Santa Ana Sheet, 1976). The sedimentary rocks are deposited on Upper Jurassic to Lower

Figure 3.9.1 - Geomorphic Provinces and Regional Faults

Cretaceous metasedimentary and metavolcanic roof pendants of the Southern California batholith, which is granite. The uppermost surficial sediments consist of gravely, sandy to clayey alluvium, fluvial floodplain deposits, and/or older alluvium and marine terrace deposits (Greenwood, et. al, Centerline reference). Geological profiles for each alternative are discussed below.

3.9.2 Local Geology

Western Riverside County is bounded by the Santa Ana Mountains on the west and the San Jacinto Mountains on the east. The Cleveland National Forest to the west and the San Bernardino National Forest to the east are within these mountain ranges. Between the mountain ranges are several valleys including the two largest: San Jacinto Valley and Perris Valley. The HCLE Corridor alternatives are located across the Perris Valley, the eastern portions of alternatives 1a, 1b, 4a, and 4c encounter the San Jacinto Valley, and 6a and 6b pass through Menifee Valley. Geologically, these valleys are mostly sedimentary Alluvium rock, and the hills between the valleys are primarily igneous granitic rocks. A map of rock and soil types and topographical features in association with the HCLE Corridor is provided as Figure 3.9.2, General Geology.

3.9.3 Erosion and Runoff

Soil erosion and water runoff occur naturally on steep terrain. Natural events such as high winds, earthquakes, and heavy rains, as well as human activity, can cause an acceleration in erosion and runoff. Hazards associated with accelerated or mass erosion and runoff are loss of life, injury, and property/structural damage. The Tier 2 analysis on the selected alternative will provide a detailed erosion and runoff risk study that will involve a slope analysis combined with precipitation data, habitat type, and geotechnical and soil analyses.

For this EIS/EIR, a general analysis of rock type, topography, slope, runoff, and erosion for each alternative is provided and summarized on Table 3.9.A. The annual precipitation in western Riverside County is about 38 cm (15 in) per year, which is generally associated with low risk of debris flow and flash flood disaster. An alternative is at no or low risk for hazards resulting from runoff and erosion if its bandwidth is located on mostly level terrain with no or few USGS blueline stream encounters and is not adjacent to steep hills and mountains. The risk of erosion and runoff increases to moderate or high if an alternative bandwidth consists of, intersects, or is adjacent to steep slopes and USGS blueline streams. Where an alternative intersects or is adjacent to steep topography (generally greater than 15 percent), the area is noted on Table 3.9.A.

3.9.4 Seismicity and Faulting

Earthquakes in Southern California occur as a result of movement between the Pacific and North American plates. Most of the movement between the plates occurs along the San Andreas Fault, which bisects Riverside County. Faults of the San Andreas system