## 3.3 Flood Problem Areas

The most widely distributed flood map product is the Flood Insurance Rate Map (FIRM). The Federal Emergency Management Agency (FEMA) is mandated by the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 to evaluate flood hazards and provide FIRMs for local and regional planners to further promote sound land use and floodplain development. Flood risk data presented on FIRMs are based on historic, meteorologic, hydrologic, and hydraulic data, as well as open-space conditions, flood control works and development. To prepare a FIRM that illustrates the extent of flood hazards in a flood-prone community, the Federal Emergency Management Agency (FEMA) conducts an engineering study referred to as Flood Insurance Study (FIS). Using information gathered in these studies, FEMA engineers and cartographers delineate Special Flood Hazard Areas (SFHAs) on FIRMs. SFHAs are those areas subject to inundation by a flood that has a 1-percent or greater chance of being equaled or exceeded during any given year. This type of flood is referred to as a base or 100-year flood. The base flood is a regulatory standard used by Federal agencies and most states, to administer floodplain management programs, and is also used by the National Flood Insurance Program (NFIP) as the basis for insurance requirements nationwide.

For the County of Riverside, FEMA (1996) has updated a Flood Insurance Study (FIS) originally completed in 1985 for the unincorporated areas of the County. The FIS evaluates principal flood problems and flood protection measures for the County of Riverside. According to the FIS for the County of Riverside (FEMA, 1996), most of the major floods in the County have occurred as a result of general winter storms. However, serious flooding, including potentially lethal flash flooding, has also occurred as a result of summer thunderstorms, particularly in the desert areas. Riverside County's precipitation averages vary from more that 30 inches per year in the San Jacinto Mountains to less than 5 inches per year in the Blythe region.

The major rivers in the western portion of the County are dry most of the year and pose flood threats to developments within the flood plain during general storms of long duration (FEMA, 1996). These rivers are the Santa Ana, San Jacinto, San Gorgonio and Santa Margarita rivers, as well as Temescal and Murrieta creeks (Figure 3-2). Plate 3-1 has been prepared at 1:250,000 scale to illustrate the drainages of Riverside County.

When a major storm moves into the area, water collects rapidly as surface runoff. Resultant flood flows have predominantly short durations and sharp peaks. Major floods along the San Jacinto River resulting from intense rainfall have been shown to typically peak in approximately 1.5 days with a total duration of flooding of 4 days.

**Insert Figure 3-2: Major Drainage Systems of Riverside County**

Tributaries to the major rivers present additional flood hazards. Flooding in these streams is caused mostly by local thunderstorms. Flood flows are of typically short duration, but can cause extensive damage as a result of high velocities associated with the tributary drainages.

The desert areas extending to the east from the Palm Springs area are susceptible to sheet flow flooding, with flow depths generally less than 2.0 feet. These type of flows leave the mouths of canyons and often follow unpredictable paths.

During major floods, flood water carries heavy debris loads and causes considerable damage from deposition. For example, the Santa Ana River carried a total sediment load of more than 11 million tons of sediment during the storms of 1969 (Chin and others, 1991). In addition, considerable damage is caused by erosion and scouring by high-velocity flows.

Findings of the FEMA FIS, as well as additional information from the County water districts, the U.S. Geological Survey and the Army Corp of Engineers, are summarized below. Except as noted, the data cover the last 100 years:

***San Gorgonio River***: Flooding on the San Gorgonio River caused damage during 1938, 1965, 1966 and 1969. During the floods of 1969, the San Gorgonio River attained an estimated peak discharge of 17,000 cubic feet per second (cfs), which resulted in loss of life and extensive damage in the Cabazon area.

***San Jacinto River***: The San Jacinto River has flooded during 1916, 1927, 1931, 1937, 1938, 1966, 1969, 1980, and 1993. Its largest flood of record occurred on February 16, 1927 with a peak discharge of 45,000 cfs near the city of San Jacinto. Agricultural, railway, and highway properties were extensively damaged. In addition, failure of its levee system in 1980 resulted in extensive damage.

***Murrieta Creek***: Nine major floods have been reported for Murrieta Creek, during 1862, 1884, 1916, 1938, 1943, 1969, 1978, 1980, and 1993.

***Santa Ana River***: Flooding of the Santa Ana River is known to have resulted in many damaging floods in 1862 *(estimated >300,000 cfs)*, 1867, 1884, 1891, 1916, 1938, 1969, 1980 and 1993. Prior to extensive dam and reservoir controls, the Santa Ana River had a large flood event about every five years.

***Perris Valley***: Due to increased urbanization (Guay, 1996), the Perris Valley region has a growing risk of flood hazards. The Perris Valley Storm Drain and the San Jacinto River are the major sources of flooding for the area. They have previously inundated primarily agricultural land east and southeast of the city of Perris. The valley

is extremely flat, causing flood waters to move slowly and spread over a large area. In addition, there is sudden constriction of flood flows at the entrance to the upper end of Railroad Canyon, south of the city of Perris. This causes ponding and backs up the flood plain for seven miles upstream (FEMA, 1996). The Perris Valley Storm Drain that drains March Air Force Base to the north, generates similar flooding.

Increased urbanization increases flood potential by increasing the percentage of impervious surfaces. When water cannot penetrate into the ground, more flooding ensues. Urban areas in Perris Valley have more than tripled since the early 1970s, from 10% to 36% urban. Guay (1996) demonstrated that these additional impervious areas have increased storm water runoff volumes and peak discharges.

***Desert Hot Springs***: The city of Desert Hot Springs is situated on deposits created by past flooding events from Big Morongo Wash and canyons of the Little San Bernardino Mountains. Clearly, the Desert Hot Springs region is subject to flooding from Big Morongo Wash and its tributaries.

***Coachella Valley***: Although mean annual precipitation on the floor of the Coachella Valley is low (4 inches), high and intense precipitation in the surrounding mountains can have a significant impact on the valley floor many miles away.

Coachella Valley floods are typically of short duration, high peak volumes and carrying large amounts of debris. This is due to the arid climate and the steep, high mountains. When a major storm moves in, water collects rapidly and runs off quickly, creating flash floods in the Coachella Valley.

***Whitewater River Basin:*** Historical records dating back to 1769 were reviewed by the Army Corp of Engineers. In the Whitewater River basin, a major flood occurs on average every ten years. Floods occurred in 1825, 1833, 1840, 1850, 1859, 1862, 1867, 1876, 1884, 1886, and 1891. More recent, and thus more accurate records indicate that there were floods in January 1916, December 1921, April 1926, February 1927, February 1937, March 1938, and December 1940. Most recently, substantial floods occurred in November 1965, December 1966, January 1969, February 1969, and September 1976. The greatest storm on record was in March, 1938, with peak discharge estimated at 42,000 cubic feet per second - almost twice the peak of the second largest storm (November 22, 1965, 24,000 cfs).