CHAPTER 2 • PHYSICAL ENVIRONMENT

A. CLIMATE

The climate of the Kerman area is described as Mediterranean, which is typified by hot, dry summers and mild winters. Temperatures recorded at Lemoore Naval Air Station (LNAS), located 20 miles south of Kerman, show the mean monthly high temperature for July to be 80.6° F, while the mean temperature for January is 45.1° F. It is not uncommon for maximum temperatures to exceed 100 degrees during the summer months; nor for temperatures to drop below freezing in the winter. The highest temperature ever recorded at LNAS was 113° in July of 1975. The lowest temperature of record was 14° in January of 1962.

During the summer, a high pressure ridge develops over the Sierra Nevada blocking the penetration of moist air from the Pacific. This high pressure system tends to weaken during the winter months thereby opening the door to Pacific storms. Approximately 90 percent of all rainfall in Kerman occurs between November and April. Average rainfall measured in Kerman is 6.08 inches per year compared to 7.83 inches at Coalinga, 7.64 inches at Lemoore, and 9.5 inches in Fresno.

Air movement through the San Joaquin Valley is in a southeasterly direction. Wind enters the Valley over the passes east of the San Francisco Bay and exits through mountain passes at the southern end of the San Joaquin Valley, principally Tehachapi. Meteorological data from LNAS indicates that the average wind speed is 4-6 knots with maximum gusts 40-50 knots recorded from October to May. The prevailing wind direction is from the north and north-northwest, except in December and January, when the winds blow from the southeast or east-southeast.

TABLE 26
SUMMARY OF WEATHER DATA AT LEMOORE NAS

	Temperature				Precipitation		Wind	
Month	Ave. Max.	Ave. Min.	Ave.	Extreme	Rainfall	Days w/ Precip.	Prevailing Direction	Ave. Speed
January	54.5	35.7	45.1	78/14	1.3	6	SE	3.8
February	62.5	39.4	51.0	82/21	1.5	7	N	6.1
March	67.6	40.7	54.2	90/22	1.2	7	NNW	5.1
April	74.7	43.6	59.1	102/30	0.6	4	NNW	5.8
May	85.1	51.0	68.1	109/34	0.2	2	NNW	6.3
June	93.0	58.0	75.0	112/52	0.4	1	NNW	6.0
July	99.0	62.1	80.6	113/47	0.1	0	NNW	5.8
August	96.9	61.6	79.3	112/48	0.0	0	NNW	5.2
Sept	90.6	56.6	73.6	107/41	0.3	1	N	4.9
October	80.5	48.0	64.5	104/24	0.3	2	NNW	4.4
November	66.0	40.0	53.0	87/22	0.9	6	NNW	3.5
December	53.8	35.3	44.6	80/18	0.9	7	ESE	3.4
Totals	77.0	47.7	62.3		7.6 in.	43		5.0 knot

Source: Naval Oceanography Command, Lemoore

B. TOPOGRAPHY

The Kerman planning area is located on topography that is relatively level, falling from the northeast towards the southwest. Kerman's elevations range from approximately 225' above Mean Sea Level (MSL) near the intersection of Whitesbridge Road and Goldenrod Avenue to 210' MSL at the intersection of Siskiyou Avenue and Church Avenue (see Map 18).

C. SOILS

The soils in the Kerman area are described by the Soil Survey of Eastern Fresno County, prepared by the Soil Conservation Service, Department of Agriculture (see Map 16). The general soil map of this Survey shows three major soil groups in Kerman: the Hanford, Hesperia and Traver Series. The Hanford series consists of soils that are well-drained, fertile, moderately course textured, and are derived from recent granitic alluvium. The Hanford soils are generally located on nearly level alluvial fans.

The Hesperia series consists of soils that are well-drained, moderately textured and are formed from granitic alluvium. Some of the soils in this series are saline-alkaline affected. They are generally found on alluvial fans.

The Traver series consists of soils that are well-drained that are typically saline-alkali affected. These soils are deep to moderately deep over compact silt. This series occupies young alluvial fans of the San Joaquin and Kings Rivers.

The Eastern Fresno County Soil Survey identifies seven specific soils in the planning area. They are Hanford coarse sandy loam (Ha); Hesperia sandy loam, moderately deep (Hsm); Hanford sandy loam (Hc); Hesperia sandy loam, moderately deep, saline-alkaline (Hsn); Traver sandy loam, moderately deep (Ts); Tujunga loamy sand (Tzba); and Hesperia sandy loam, shallow (Hso).

Hanford course sandy loam (Ha) is a very deep soil that is well drained and is located on alluvial fans. This soil has a Class II agricultural rating (Class I soils have the fewest limitations for agriculture; Class VIII have the most limitations for agriculture) and a Storie Index rating of 80 (A Storie Index rating of 80-100 has the greatest suitability for intensive agriculture; less than 10 has the least suitability). Limitations for urban development are moderate foundation support.

Hesperia sandy loam, moderately deep (Hsm) is a moderately deep soil that is well drained and is located on the central parts of the young fans of the Kings and San Joaquin Rivers. Under natural conditions these soils were subject to seasonal flooding and a fluctuating high water table. It has a Class II agricultural rating and a Storie Index of 90. Limitations for urban development are moderately slow permeability, moderate to severe foundation support, and moderately slow substratum permeability.

Hanford sandy loam (Hc) is a very deep soil that is well drained and is located on alluvial fans. This soil has a Class II agricultural rating and a Storie Index rating of 95. Limitations for urban development are moderate foundation support.

Hesperia sandy loam, moderately deep, saline-alkaline (Hsn) is a moderately deep soil that is well drained and is located on the central parts of the young fans of the Kings and San Joaquin Rivers. The underlying material is strongly alkaline and normally is slightly saline from accumulations of salts. It has a Class III agricultural rating and a Storie Index of 50 Limitations for urban development are moderately slow permeability, moderate to severe foundation support, and moderately slow substratum permeability.

Traver sandy loam, moderately deep (Ts) is a well-drained soil that is saline-alkaline affected. Over long periods of time, sodium salts were accumulated in the soil material. It has a Class II agricultural rating and a Storie Index of 34. Limitations for urban development are moderate to severe saline-alkaline affected, high conductivity, and moderate soil pressure.

Tujunga loamy sand (TzbA) consists of excessively drained loamy sand and sandy soils that were formed in recent alluvium derived from granitic rocks. These soils normally occupy flood plains and fans of rivers and smaller streams. The material below the surface layer is mainly loamy sand to a depth of 5 feet or more, but in many places it is stratified with sand, course sand, or loamy course sand. It has a Class III agricultural rating and a Storie Index of 76. Limitations for urban development are severe for foundation support and severe for soil pressure.

Hesperia sandy loam, shallow (Hso) consists of well-drained moderately course textured soils that formed in granitic alluvium. The soil is underlain by a compact, silty layer that ranges in depth of 2.5 to 3 feet. It has a Class III agricultural rating and a Storie Index of 77. Limitations for urban development are severe for septic tanks and moderate for soil pressure.

TABLE 27
DEVELOPMENT POTENTIAL OF SOILS

Soil Type	Shrink/Swell	Streets	Parks	Irrigation	Water Retention	Landscaping
Hanford course sandy loam	low	favorable	moderate	mod. to high water-holding	high seepage	slight
Hesperia sandy loam, mod. deep	low	favorable	moderate	low to high water-holding	moderate	moderate
Hanford sandy loam	low	favorable	slight	mod. to high water-holding	high seepage	slight
Hesperia sandy loam, mod. deep, sal-alk	low	favorable	moderate	low to high water-holding	moderate	moderate
Traver sandy loam, mod. deep	low to mod.	favorable	moderate	mod. water-holding	mod. seepage	mod. to severe
Tujunga loamy sand	low	favorable	moderate	low to very low water-holding	high seepage	severe
Hesperia sandy loam, shallow	low	favorable	slight	low to high water-holding	mod. to high	moderate

Source: USGS, Soil Conservation Service

TABLE 28
PHYSICAL PROPERTIES OF SOILS

Soil Type	Permeability in/hr	Available H20 Capacity in/in	Shrink/Swell Potential
Hanford course sandy loam	2.5-5.0	.10-.12	low
Hesperia sandy loam, mod. deep	2.5-5.0	.12-.14	low
Hanford sandy loam	2.5-5.0	.10-.15	low
Hesperia sandy loam, mod. deep, sal-alk	2.5-5.0	.12-.14	low
Traver sandy loam, mod. deep	2.5-5.0	.08-.1	low
Tujunga loamy sand	5.0-10.0	.06-.08	low
Hesperia sandy loam, shallow	2.5-5.0	.12-.14	low

Source: USGS, Soil Conservation Service

D. GEOLOGY

Kerman is located near the center of the Great Valley of California, a nearly flat northwest-southeast trending basin approximately 450 miles long by 50 miles wide. The basin is bordered by Mesozoic platonic, volcanic, and metamorphic rocks of the Sierra Nevada mountains on the east and by Mesozoic and Cenozoic metamorphic and sedimentary rocks of the Coast Ranges on the west.

The geology of the Kerman area is created by the low alluvial fans of the perennial San Joaquin and Kings Rivers and four ephemeral streams which form the Fresno alluvial fan sequence. The Pleistocene formations which make up the Fresno fan sequence are the Modesto, Riverbank, and Turlock formations.

The Modesto formation occupies the highest stratigraphic position, and is characterized by westward thickening floodplain deposits of recent origin. The sediments within the Modesto formation range in grain size from clay to gravel and seldom exhibit well developed sedimentary structures.

The Riverbank formation underlies the Modesto formation, but does not differ greatly in lithology or texture. It is characterized by the occurrence of a laterally extensive caliche hardpan member and is often referred to as a terrace deposit.

The Turlock formation contains the majority of the hydrologically important subsurface deposits in the Kerman area. It is comprised of sediments that are moderately to well sorted and homogeneous in composition and grain size. Coarse materials such as sand and gravel form layers known as aquifers which yield large quantities of groundwater, while clay and silt layers form aquitards which divide the stratigraphic section into a number of confined and semi-confined aquifers.

Six, well-defined clay layers (designated "A" through "F"), underlie the central part of the San Joaquin Valley. The Corcoran clay layer (clay layer "E") is the most well known and extensive of these layers. It underlies the Kerman area at a depth of approximately 500 to 600 feet. Many of the wells drilled in the Kerman area are designed to draw water from beneath the Corcoran clay layer due to better water quality and specific yields.

E. WATER

The 1991 Water Supply Report published by the United States Bureau of Reclamation indicates the depth to groundwater in the vicinity of Kerman ranged from 80 to 100 feet in the spring of 1992. Contour lines of equal elevation of groundwater indicate the water table generally falls to the southwest on a gradient of 20 feet per mile (see Map 5).

Groundwater is the only source of drinking water in the City of Kerman. Water moving down gradient from the floodplains of the Sierra Nevada streams and rivers is the major source of groundwater recharge in this area. Over-application of imported irrigation water within the Fresno Irrigation District is another source of groundwater recharge. Rainfall in the Kerman area is 8-9 inches annually and provides only a minor percentage of total groundwater recharge in the area.