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SUPPLEMENTAL DATA

Agua Fria River Study

Maricopa County, Arizona

May 1982

A109.938

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Prepared for

The Flood Control District of Maricopa County

by

Willdan Associates

1550 East Meadowbrook

Phoenix, Arizona

FORWARD

The following natural environment data supplements the flood control information presented in the Executive Summary for the Agua Fria River Study.

NATURAL ENVIRONMENT

GEOGRAPHIC BOUNDARY

The Agua Fria River study area lies within the desert region of the Basin and Range Physiographic Province. The Basin and Range Physiographic Province is typically between 200 and 3500 feet above msl in elevation, with isolated northwest-trending mountain ranges rising steeply from a generally level basin floor. Wide alluvium filled basins generally dissect the mountain ranges.

Prominent natural features found near the study area include, moving north to south, the Hieroglyphic Mountains to the west, with Saddleback Mountain rising to an elevation 2372 feet above msl; Twin Buttes, with an elevation of 2194 feet above msl; West Wing Mountain at an elevation of 1806 feet above msl; and Calderwood Butte rising to an elevation of 1703 feet above msl.

The New River empties into the Agua Fria approximately 15 miles below Calderwood Butte or approximately 10 miles above the Agua Fria-Gila confluence. Beginning approximately seven miles south of Calderwood Butte, and continuing downstream to the Agua Fria-Gila confluence, the land area surrounding the study area is predominantly flat in nature. The Sierra Estrella Mountain Range lies just south of the Agua Fria-Gila confluence.

TOPOGRAPHY

Aside from the previously mentioned mountains and buttes, the study area lies within a relatively flat desert valley. Elevation ranges from approximately 1,330

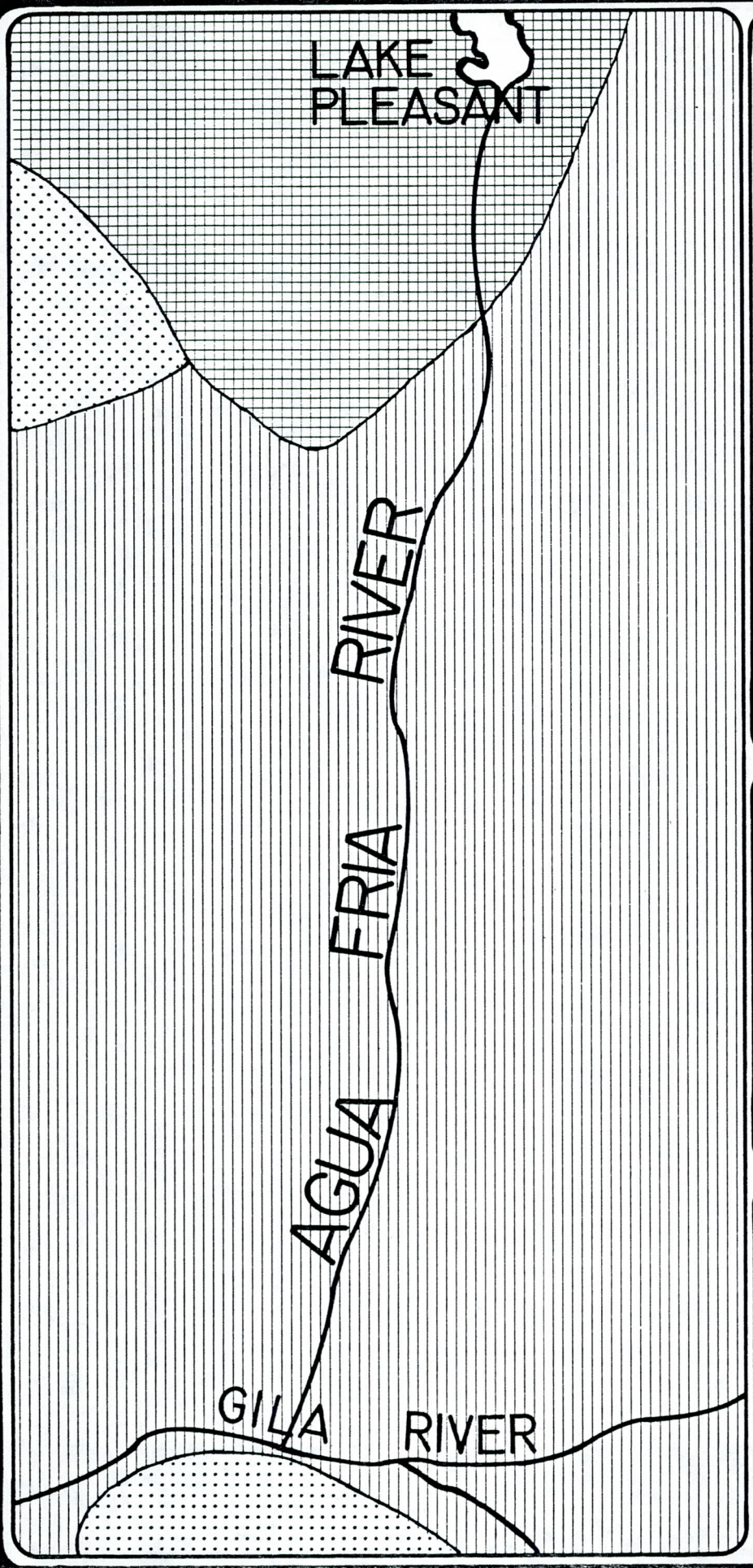
feet above msl at the Beardsley Canal Flume to 925 feet above msl at the confluence of the Gila and Agua Fria Rivers. This 415-foot rise represents an average increase in elevation of 14 feet per mile. The Agua Fria River occupies a wide floodplain with distinctive alluvial units between higher terrace slopes.

GEOLOGY AND SOILS

Geologic conditions have a pronounced effect on the suitability of the area for various uses. The mountain masses are limited primarily to such uses as grazing, wildlife habitat, recreation and mining. The basins are highly suited to agriculture and human habitation. The alluvial fill consists of poorly consolidated clay, silt, sand, gravel and caliche. The thickness of the alluvial fill varies from a maximum of 5000 feet in parts of the Gila River Valley to a feather edge near the mountains.

One major hazard in this valley is the occurrence of weak horizons of alluvial soils which are prone to rapid and pronounced consolidation when wetted or loaded.

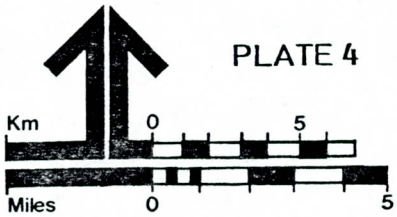
Erosion and sediment yields in the study area are less than 0.2 acre-feet per square mile per year, with higher yields (0.5 to 1.0 acre-feet per square mile per year) north of the study area (see Plate 4). The sediment yield throughout the study area will remain basically unchanged by the alternative projects proposed later in this report. However, the proposed rechannelization in Reach 4 from Indian School Road to Buckeye Road will change the natural alignment of the Agua Fria River and may create sediment load in the proposed channel during 50-, 25- and 10-year frequency storm runoffs. Also, bank stabilization to prevent sediment transport along the east and west banks of the channel in Reach 4 will be required. It may be necessary to establish a five-year maintenance schedule for dredging the



SEDIMENT YIELD MAP

- 0.5-1.0 Acre Feet Per Square Mile Per Year
- 0.2-0.5 Acre Feet Per Square Mile Per Year
- <-0.2 Acre Feet Per Square Mile Per Year

PLATE 4



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Source:
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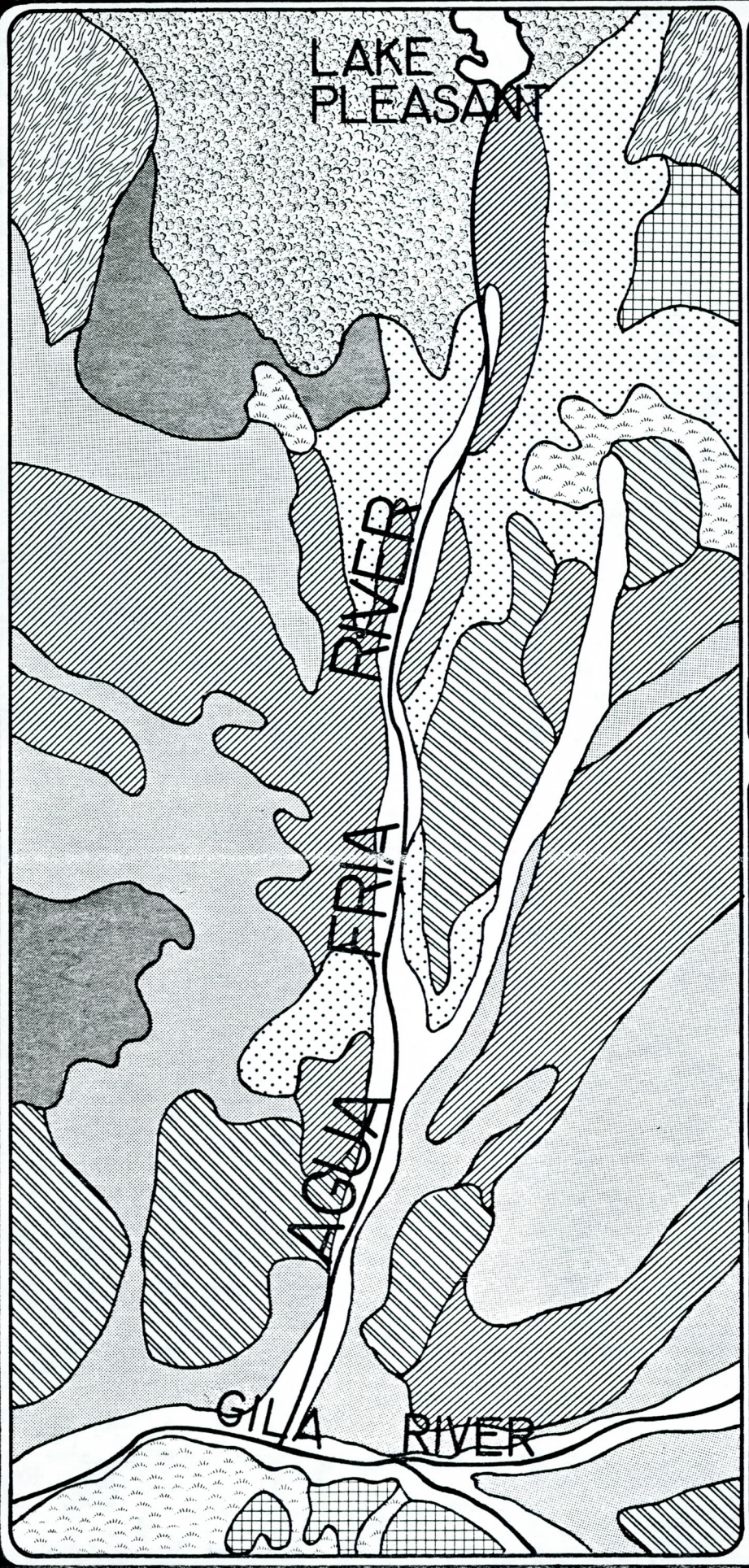
rechannelized areas in order to maintain the required channel for the 100-year flood.

The Agua Fria riverbed consists of unconsolidated sands, gravels, and cobbles. Carrizo-Brios-Vint is the soil association designated by the Soil Conservation Service as predominant for this segment of the river, and is described as nearly level to gently sloping gravelly sandy loams and sandy loams in stream channels and on low stream terraces. This soil association, formed in recent alluvium, has an infiltration rate of approximately 2 inches per hour. Of this association, 30 percent is Carrizo soils, 30 percent Brios, 15 percent Vint, and 25 percent Torripsaments and Forrifluvents, with minor occurrences of Cashion, Gadsden, Maripo, and Antho. Erosion potential for this soil association has been determined to be slight. Other soil associations occurring within the study area include Gilman-Estrella-Avondale Association (nearly level loam soils on valley plains and flood plains), Rillito-Gunsight-Pinal (nearly level to gently sloping, gravelly to very gravelly limey soils on old alluvial fans and valley plains), Mohaill-Laveen (nearly level loam and clay loam soils on old valley plains and alluvial fans), Laveen-Coolidge (nearly level, limey sandy loam and loam soils on alluvial fans and valley plains), and finally Chirconi-Gachaido-Rock Outcrop, (moderately sloping to steep, shallow and very shallow soils on mountains and low hills.) (See Plate 5.) Interpretations of soil properties for community uses and limitations for recreational uses are listed in Tables 2 and 3. Additional information pertaining to these soils can be found in the Soil Survey of Maricopa County, Arizona, Central Part, prepared by the Soil Conservation Service of the U.S. Department of Agriculture, November, 1974.



GENERAL SOIL MAP

I. Very hot, very dry soils.

A. Soils from recent alluvium.

1 Gilman-Estrella-Avondale association. Nearly level loam soils on valley plains and flood plains.

2 Antho-Valencia association. Nearly level to gently sloping sandy loam soils on alluvial fans and valley plains.

3 Carrizo-Brios-Vint association. Nearly level sandy soils in stream channels.

B. Soils from old alluvium.

4 Rillito-Gunsight-Pinal association. Nearly level to gently sloping, gravelly to very gravelly limy soils on old alluvial fans and valley plains.

5 Mohall-Laveen association. Nearly level loam and clay loam soils on old valley plains and alluvial fans.

6 Laveen-Coolidge association. Nearly level, limy, sandy loam and loam soils on old alluvial fans and valley plains.

7 Ebon-Pinamt-Tremant association. Gently sloping to sloping, gravelly and very gravelly clay and clay loam soils on old alluvial fans at the base of mountains.

C. Soils of mountains and low hills.

8 Chirioni-Gachado-Rock Outcrop association. Moderately sloping to steep, shallow and very shallow soils on mountains and low hills.

II. Hot and dry soils.

A. Soils from old alluvium.

9 Continental-Pinaleno-Cove association. Gently sloping to moderately sloping clay to loam soils on old alluvial fans at the base of mountains.

B. Soils of mountains and low hills.

10 Cellar-Lehman-Rock Outcrop association. Gently sloping to very steep, shallow to very shallow soils on mountains and low hills.

PLATE 5

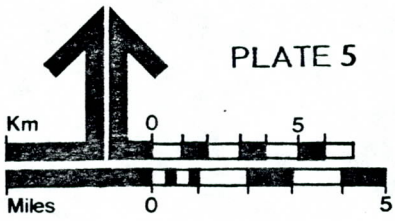


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TABLE 2

INTERPRETATIONS OF ENGINEERING PROPERTIES OF THE SOILS FOR COMMUNITY USES A/

Map Symbol and Major Soil Components	Soil Limitation Rating and Restrictive Features Affecting Engineering Uses for: Sanitary Facilities: Septic Tank 1/ Absorption Field	Sewage Lagoons	Sanitary Landfills (Trench)	Community Development: Shallow Excavations	Dwellings 2/ (Without Basements)	Local Roads & Streets
1. Gilman-Estrella-Avondale Association						
Gilman loam 0-1% slopes (55% of Unit)	Slight: severe where flooded	Moderate: severe where flooded	Slight: severe where flooded	Slight: severe where flooded	Moderate: ML soil material: severe where flooded	Moderate: ML soil material: severe where flooded
Estrella loam 0-1% slopes (15% of Unit)	Severe: moderately slow permeability	Moderate: ML soil material	Slight	Slight	Moderate: ML soil material	Moderate: ML soil material
Avondale clay loam 0-1% slopes (15% of Unit)	Severe: moderately slow permeability, some areas flooded	Slight: severe where flooded	Slight: severe where flooded	Slight severe where flooded	Moderate: moderate shrink-swell potential, ML, CL material severe where flooded	Moderate: moderate shrink-swell potential severe where flooded
2. Antho-Valencia Association						
Antho sandy loam 0-5% slopes (55% of Unit)	Slight	Severe: moderately rapid permeability	Severe: moderately rapid permeability	Slight	Slight	Moderate low strength
Valencia sandy loam, 0-1% slopes (25% of Unit)	Severe: moderately slow permeability	Slight	Slight	Slight	Slight	Moderate low strength
3. Carrizo-Brios-Vint Association						
Carrizo gravelly sandy loam 0-1% slopes (35% of Unit)	Severe: subject to flooding, hazard of ground water pollution	Severe: very rapid permeability, subject to flooding	Severe: very rapid permeability, danger of ground water pollution, subject to flooding	Severe: gravelly subject to flooding	Severe: subject to flooding	Severe: subject to flooding
Brios sandy loam 0-1% slopes (30% of Unit)	Severe: subject to flooding, hazard of ground water pollution	Severe: rapid permeability, subject to flooding	Severe: rapid permeability subject to flooding	Severe: sandy subsoil subject to flooding	Severe: subject to flooding	Severe: subject to flooding

Vint loamy fine sand, 0-1% slopes (15% of Unit)	Slight: severe where flooded	Severe: rapid permeability, some areas flooded	Severe: rapid permeability, some areas flooded	Severe: sandy subsoil some areas flooded	Slight: severe where flooded	Slight: severe where flooded
4. Rillito-Gunsight-Pinal Association						
Rillito gravelly loam, 0-5% slopes (35% of Unit)	Slight	Moderate: moderate permeability	Slight	Moderate: gravelly	Slight	Slight

TABLE 2 - Page 2

INTERPRETATIONS OF ENGINEERING PROPERTIES OF THE SOILS FOR COMMUNITY USES A/

Map Symbol and Major Soil Components	Soil Limitation Rating and Restrictive Features Affecting Engineering Uses for: Sanitary Facilities: Septic Tank 1/ Absorption Field	Sanitary Facilities: Sewage Lagoons	Sanitary Facilities: Sanitary Land-fills (Trench)	Community Development: Shallow Excavations	Community Development: Dwellings 2/ (Without Basements)	Community Development: Local Roads & Streets
Gunsight gravelly loam, 0-10% slopes (25% of Unit)	Slight	Severe: very gravelly	Slight	Severe: very gravelly	Slight on slopes 8%, moderate on slopes 8-10%	Slight: 0-8% slopes, Moderate: 8-10% slopes
Pinal gravelly loam, 0-5% slopes (20% of Unit)	Severe: shallow to hardpan	Severe: shallow to hardpan	Severe: shallow to hardpan	Severe: shallow to hardpan	Severe: shallow to hardpan	Severe: shallow to hardpan
5. Mohall-Laveen Association						
Mohall clay loam 0-1% slopes (45% of Unit)	Severe: moderately slow permeability, slight if tile placed below clay loam layers	Severe: moderately rapid permeability below 37 inches	Severe: moderately rapid permeability below 37 inches	Moderate clay loam material	Moderate: CL material, moderate shrink-swell potential	Moderate: moderate shrink-swell potential, CL soil material
Laveen loam 0-1% slopes (30% of Unit)	Slight	Moderate: moderate permeability	Slight	Slight	Moderate: ML soil material	Moderate: ML soil material
6. Laveen-Coolidge Association						
Laveen loam 0-1% slopes (45% of Unit)	Slight	Moderate: moderate permeability	Slight	Slight	Moderate: ML soil material	Moderate: ML soil material
Coolidge sandy loam, 0-1% slopes (30% of Unit)	Slight	Severe: moderately rapid permeability	Severe: moderately rapid permeability	Slight	Slight	Moderate: Low strength
7. Ebon-Pinamt-Tremant Association						
Ebon gravelly loam 1-10% slopes (35% of Unit)	Severe: slo permeability	Severe: very cobbly sub-soil	Severe: very cobbly material	Severe: very cobbly material	Slight: moderate on slopes 8-10%	Moderate: Low strength

Pinamt very cobbly loam, 1-10% slopes (25% of Unit)	Severe: moderately slow permeability, slight if tile line placed below about 2 feet	Severe: moderately rapid permeability below 22 inches, very cobbly	Severe: moderately rapid permeability below 22 inches	Severe: very cobbly and gravelly	Slight: moderate on slopes 8-10%	Slight: moderate on slopes 8-10%
Tremant very gravelly loam 1-5% slopes (20% of Unit)	Severe: moderately slow permeability, slight if lines are below about 36 inches	Severe: moderately rapid permeability below 36 inches	Severe: moderately rapid permeability below 23 inches	Moderate: gravelly	Moderate: moderate shrink-swell potential	Moderate: moderate shrink-swell potential
8. Casa Grande-Harqua Association						
Casa Grande sandy loam, 0-1% slopes (35% of Unit)	Moderate: Moderate slow permeability	Moderate: moderate permeability below 23 inches	Moderate: clay loam subsoil	Moderate: clay loam subsoil	Moderate: moderate shrink-swell potential	Moderate: ML, CL soil material

TABLE 2 - Page 3

INTERPRETATIONS OF ENGINEERING PROPERTIES OF THE SOILS FOR COMMUNITY USES A/

Map Symbol and Major Soil Components	Soil Limitation Rating and Restrictive Features Affecting Engineering Uses for: Sanitary Facilities: Septic Tank 1/ Absorption Field	Sewage Lagoons	Sanitary Landfills (Trench)	Community Development: Shallow Excavations	Dwellings 2/ (Without Basements)	Local Roads & Streets
Harqua very gravelly clay loam 0-5% slopes (35% of Unit)	Severe: moderately slow permeability	Severe: very gravelly	Slight	Severe: very gravelly	Slight	Moderate: GC material, low strength
9. Mohall-Contine Association						
Mohall loam 0-1% slopes (55% of Unit)	Severe: moderately slow permeability, slight if tile line is below 37 inches	Severe: moderately rapid permeability below 37 inches	Severe: moderately rapid permeability below 37 inches	Moderate: clay loam material	Moderate: CL soil material, moderate shrink-swell potential	Moderate: moderate shrink-swell potential, CL soil material
Contine clay loam 0-1% slopes (35% of Unit)	Severe: slow permeability	Slight	Severe: clayey subsoil	Severe: clayey subsoil	Severe: CH soil material, high shrink-swell potential	Severe: high shrink-swell potential, CH soil material
10. Cherioni-Gachado-Rock Outcrop Association						
Cherioni gravelly very fine sandy loam, 10-40% slopes (35% of Unit)	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock slope
Gachado very cobbly loam, 10-40% slopes (15% of Unit)	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, very cobbly, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock, slope	Severe: shallow to bedrock slope
Rock Outcrop 10-80% slopes (35% of Unit)		Exposures of bedrock - all ratings are severe				

A/ See Table I and text of report for soil characteristics upon which these interpolations are based.

1/ Pertains to materials below a minimum depth of 24 inches (Arizona State Department of Health, Eng. Bul. No. 12, Page 10, adopted 8/1962).

2/ These ratings may also apply to small industrial buildings or shopping centers if slope limits are reduced 50%.

SOURCE : HOHOKAM RESOURCE CONSERVATION AND DEVELOPMENT PROJECT PROGRAM OF ACTION

TABLE 3 SOIL LIMITATION RATINGS AND SOIL FEATURES AFFECTING RECREATIONAL USES

Map Symbol and Major Soil Components	Camp Areas	Playgrounds	Paths & Trails	Picnic Areas	Lawns & Golf Fairways
1. Gillman-Estrella-Avondale Association					
Gilman loam 0-1% slopes (55% of Unit)	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
Estrella loam 0-1% slopes (15% of Unit)	Moderate: moderately slow permeability, may be dusty	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
Avondale clay loam 0-1% slopes (10% of Unit)	Moderate: clay loam surface	Moderate: clay loam surface	Moderate: clay loam surface	Moderate: clay loam surface	Moderate: clay loam surface
2. Antho-Valencia Association					
Antho sandy loam 0-5% slopes (55% of Unit)	Slight: may be dusty	Slight: moderate for areas with slopes 2%, may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
Valencia sandy loam 0-1% slopes (25% of Unit)	Slight: may be dusty	Moderate: moderately slow permeability, may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
3. Carrizo-Brios-Vint Association					
Carrizo gravelly sandy loam 0-1% slopes (35% of Unit)	Severe: subject to flooding	Severe: subject to flooding	Moderate: gravelly, subject to flooding	Moderate: flood hazard, gravelly	Moderate: gravelly, flood hazard
Brios sandy loam 0-1% slopes (30% of Unit)	Severe: subject to flooding	Moderate: subject to flooding	Slight	Moderate: flood hazard	Moderate: rapid permeability
Vint loamy fine sand 0-1% slopes (15% of Unit)	Moderate: loamy fine sand surface	Moderate: loamy fine sand surface	Moderate: loamy fine sand surface	Moderate: loamy fine sand surface	Moderate

4. Rillito-Gunsight-Pinal Association

Rillito gravelly loam 0-5% slopes (35% of Unit)	Moderate: gravelly	Severe: gravelly	Moderate: gravelly	Moderate: gravelly	Moderate: gravelly
Gunsight gravelly loam 0-10% slopes (25% of Unit)	Moderate: gravelly, slope	Severe: gravelly, slopes 2% in places, may be dusty	Moderate: gravelly, may be dusty	Moderate: gravelly	Moderate: gravelly

TABLE 3 - Page 2 SOIL LIMITATION RATINGS AND SOIL FEATURES AFFECTING RECREATIONAL USES

Map Symbol and Major Soil Components	Camp Areas	Playgrounds	Paths & Trails	Picnic Areas	Lawns & Golf Fairways
Pinal gravelly loam 0-5% slopes (20% of Unit)	Severe: very slowly permeable hardpan	Severe: 20 inches to hardpan, gravelly	Moderate: gravelly, may be dusty	Moderate: gravelly, may be dusty	Severe: 20 inches to hardpan, low water capacity
5. Mohall-Laveen Association					
Mohall clay loam 0-1% slopes (45% of Unit)	Moderate: moderately slow permeability, clay loam surface	Moderate: moderately slow permeability, may be dusty, clay loam surface	Moderate: clay loam surface, may be dusty	Slight: may be dusty	Moderate: clay loam surface
Laveen loam 0-1% slopes (30% of Unit)	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
6. Laveen-Coolidge Association					
Laveen loam 0-1% slopes (45% of Unit)	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
Coolidge sandy loam 0-1% slopes (30% of Unit)	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight: may be dusty	Slight
7. Ebon-Pinamt-Treatment Association					
Ebon gravelly loam 1-10% slopes (35% of Unit)	Moderate: gravelly, slow permeability	Severe: gravelly	Severe: very cobbly	Moderate: gravelly	Severe: slow permeability
Pinamt very cobbly loam 1-10% slopes (25% of Unit)	Severe: very cobbly	Severe: very cobbly	Severe: very cobbly	Severe: very cobbly	Severe: very cobbly
Tremant very gravelly loam 1-5% slopes (20% of Unit)	Severe: very gravelly	Severe: very gravelly, some slopes 2%	Severe: very gravelly	Severe: very gravelly	Severe: very gravelly

8. Casa Grande-Harqua Association

Casa Grande sandy loam 0-1% slopes (35% of Unit)	Severe: slow permeability, may be dusty	Moderate: slow permeability, may be dusty	Slight: may be dusty	Slight: may be dusty	Severe: slow permeability
Harqua very gravelly clay loam, 0-5% slopes (35% of Unit)	Severe: very gravelly surface	Severe: very gravelly	Severe: very gravelly	Severe: very gravelly	Severe: very gravelly

TABLE 3 - Page 3

SOIL LIMITATION RATINGS AND SOIL FEATURES AFFECTING RECREATIONAL USES

Map Symbol and Major Soil Components	Camp Areas	Playgrounds	Paths & Trails	Picnic Areas	Lawns & Golf Fairways
9. Mohall-Contine Association					
Mohall loam 0-1% slopes (55% of Unit)	Moderate: moderately slow permeability	Moderate: moderately slow permeability	Slight: may be dusty	Slight: may be dusty	Moderate: moderately slow permeability
Contine clay loam 0-1% slopes (35% of Unit)	Moderate: slow permeability	Moderate: slow permeability, clay loam surface	Moderate: clay loam surface, may be dusty	Moderate: clay loam surface	Severe: slow permeability
10. Cherioni-Gachado-Rock Outcrop Association					
Cherioni gravelly very fine sandy loam 10-40% slopes (35% of Unit)	Severe: slope	Severe: shallow soil, slope	Severe: gravelly, slope	Severe: slope	Severe: shallow soil, low water capacity, slope
Gachado very cobbly loam 10-40% slopes (15% of Unit)	Severe: very cobbly surface, some slopes 15%	Severe: very cobbly, slope	Severe: very cobbly, slope	Severe: very cobbly, slope	Severe: very cobbly, slope
Rock Outcrop 10-80% slopes (15% of Unit)		Exposures of bedrock - all ratings are severe			

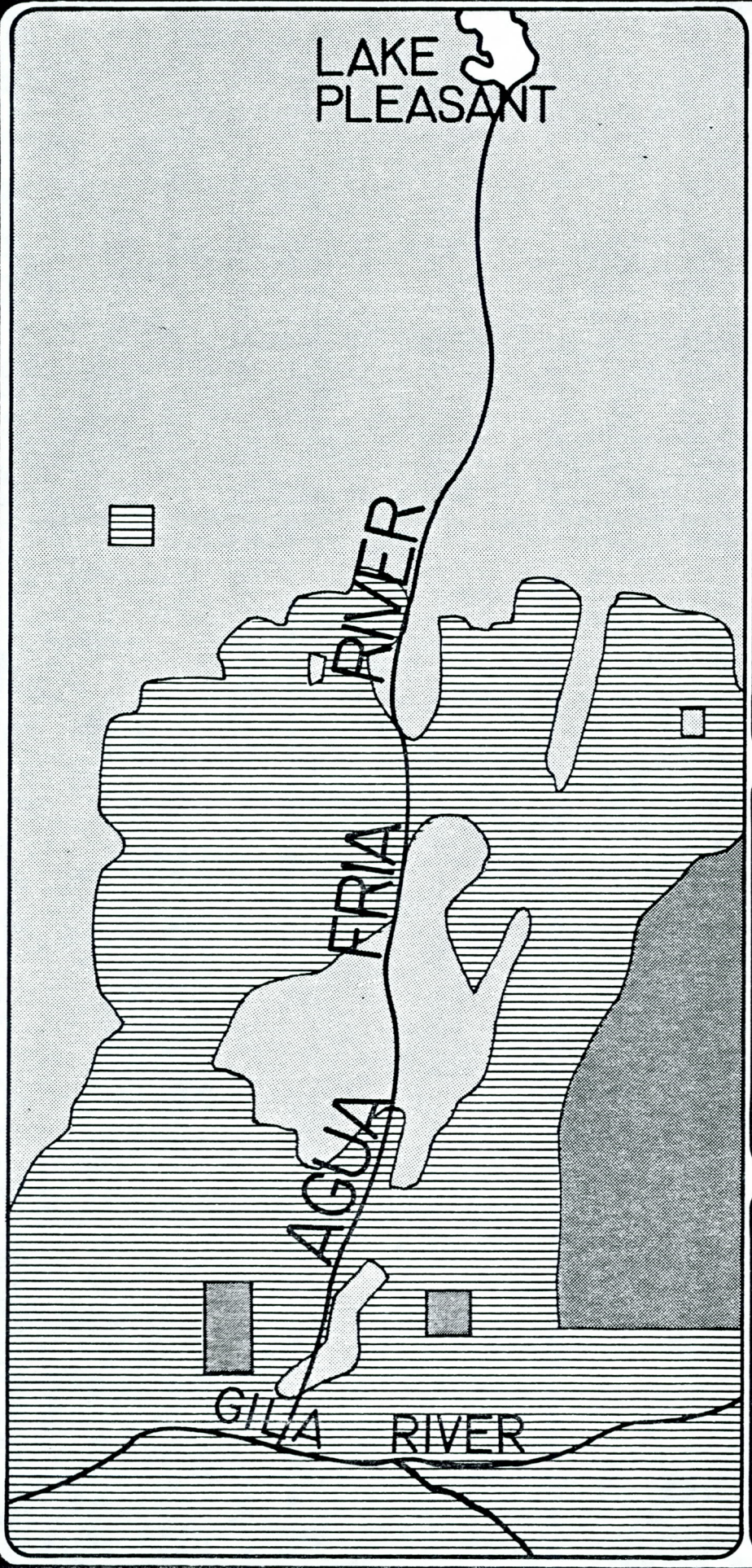
SOURCE: HOHOKAM RESOURCE CONSERVATION AND DEVELOPMENT PROJECT PROGRAM OF ACTION

Land subsidence and earth fissures have begun to occur in the greater Phoenix area during recent years as a result of declining groundwater levels. Within the study area, some fissuring has been occurring in the general area between Luke Air Force Base and the Agua Fria River.

VEGETATION

The study area lies within the Lower Sonoran Life-Zone of the Arizona Desert. Vegetation occurring within this life-zone is termed Southwestern Desert scrub. Covering most of southwestern Arizona, the Sonoran Desert is usually characterized by a creosote-bush community and/or a paloverde community. Vegetation types include perennial and ephemeral desert scrub with scattered riparian communities along the drainage ways. Riparian representation includes mesquite, sycamore, cottonwood, arrow seed, and salt grass. Cacti such as saguaro, cholla, and prickly pear characterize perennial shrubs. Ephemeral plants include creosote bush, busage, annual forbs, and grasses. Palo verde, ocotillo, catclaw, desert broom, and several kinds of forbs also dot the landscape. A map of general vegetation types is shown on Plate 6.

The Agua Fria River and its tributaries have experienced continual environmental disturbances in recent years as a result of sand and gravel mining, road development, farming, grazing, and off-highway vehicle use. In the event of construction for flood control, natural vegetation should be protected if possible, and when vegetation must be removed from a site, revegetation should be encouraged to mitigate the impact of habitat losses. Environmental impacts and related mitigation measures are covered in detail later in this report.



VEGETATION TYPES MAP

- Southern Desert Shrub
- Urban
- Cultivated and Pasture

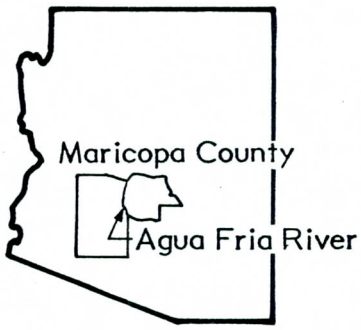


PLATE 6

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Maricopa County, Arizona

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Source:
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Most of the plant species occurring along the floodplain are protected by the Arizona Commission of Agriculture and Horticulture to the extent that prior to any development, permits are made available to the general public and commercial interests which allow them to remove the plants for transportation elsewhere.

WILDLIFE

Natural desert habitats, agricultural fields, and urban areas all support various species of wildlife. The northern part of the study area contains the largest number and greatest diversity of desert fauna, which is a function of the abundance of wildlife plant foods found in the desert-wash and upland habitats. Areas of intensive urban development and agricultural activity usually have a limited wildlife diversity and abundance. Wildlife occurring in the study area include amphibians, reptiles, bats, rodents, skunks, rabbits, coyotes, deer, and more than 300 species of birds.

Streambeds attract animal populations at various times, depending on the availability of food, water, and cover. Wildlife, especially birds, are generally concentrated within vegetated areas of desert washes and major rivers. This vegetation provides important nesting, feeding, and roosting habitats. Although some reaches of the Agua Fria River remain relatively natural, biological communities along most of the channel and its tributaries have been considerably altered as a result of sand and gravel mining, off-highway vehicle use, and other urban disturbances. As agriculture, mining, and other urban land uses have eliminated much of the natural habitat along the Agua Fria River, the remaining riparian habitat has become particularly important as refuge areas for wildlife. Again, flood control improvements should seek to protect wildlife habitat, and

when habitat must be destroyed, the replacement of natural habitat would serve to help support the continuing existence of wildlife along the river.

There are no endangered wildlife species occurring in the study area. Peregrine falcons, presently on the endangered species list established by the Endangered Species Act of 1973, may be an occasional migratory visitor to the project area. These birds are not known to nest along this stretch of the river because suitable conditions, such as nesting habitat, are lacking.

CLIMATE

Since the study area is located along the outskirts of Phoenix, data from the weather station at Phoenix Sky Harbor International Airport has been reviewed for this project. For the greater Phoenix area, the average daily high is estimated to be 85°F (29°C), with an average low of 55°F (12.5°C). U.S. Weather Bureau records indicate a long-term average temperature of slightly under 70°F (21°C), with temperatures ranging from a summer maximum frequently above 100°F (38°C) to a winter minimum seldom below 32°F (0°C). Prevailing winds blow from the east during the day, and from the west at night. Average wind velocities are low to moderate, approximately 6 miles per hour (10 kilometers per hour), although strong gusty winds may accompany thunderstorms, which usually occur during the monsoon season in July and August.

Precipitation averages approximately 8 inches during the year. Summer thunderstorms of high intensity but short duration bring much of the annual rainfall to the desert. Average relative humidity ranges from 24 percent in the summer to 54 percent in the winter.

MINERAL RESOURCES

There are no known resources of coal, crude oil, or metallic or non-metallic minerals in the study area. Sand and gravel occurs in recoverable concentrations in exposed and buried stream channels, on terraces and on alluvial fans. Approximately eleven sand and gravel operations exist within the study area floodplain.

WATER

Lake Pleasant is located in the Agua Fria watershed just upstream of the boundaries of this study. It has a surface area at high water of 3500 acres and a storage capacity of 157,600 acre-feet, with an evaporation rate of approximately 71 inches per year. The quality of surface water in the Agua Fria watershed is good, with total dissolved salts ranging from 300 to 400 parts per million.

Most of the study area is underlain by large groundwater aquafers. Groundwater is being pumped faster than it is being recharged, causing a groundwater drop of approximately 10 feet per year. Within the study area, groundwater is 200 to 500 feet deep north of Sun City, less than 200 feet deep near Avondale, and over 500 feet deep in areas around Peoria. See Plate 7 for delineation of approximate groundwater depths.

There are two separate rainfall seasons, the first occuring during the winter season from November to March. These winter storms originate in the Pacific Ocean. The second occurs in July, August, and part of September, when the area is subjected to monsoon-type thunderstorms associated with moist air circulating from the south. Table 4 lists precipitation of the 100-year storm for several storm

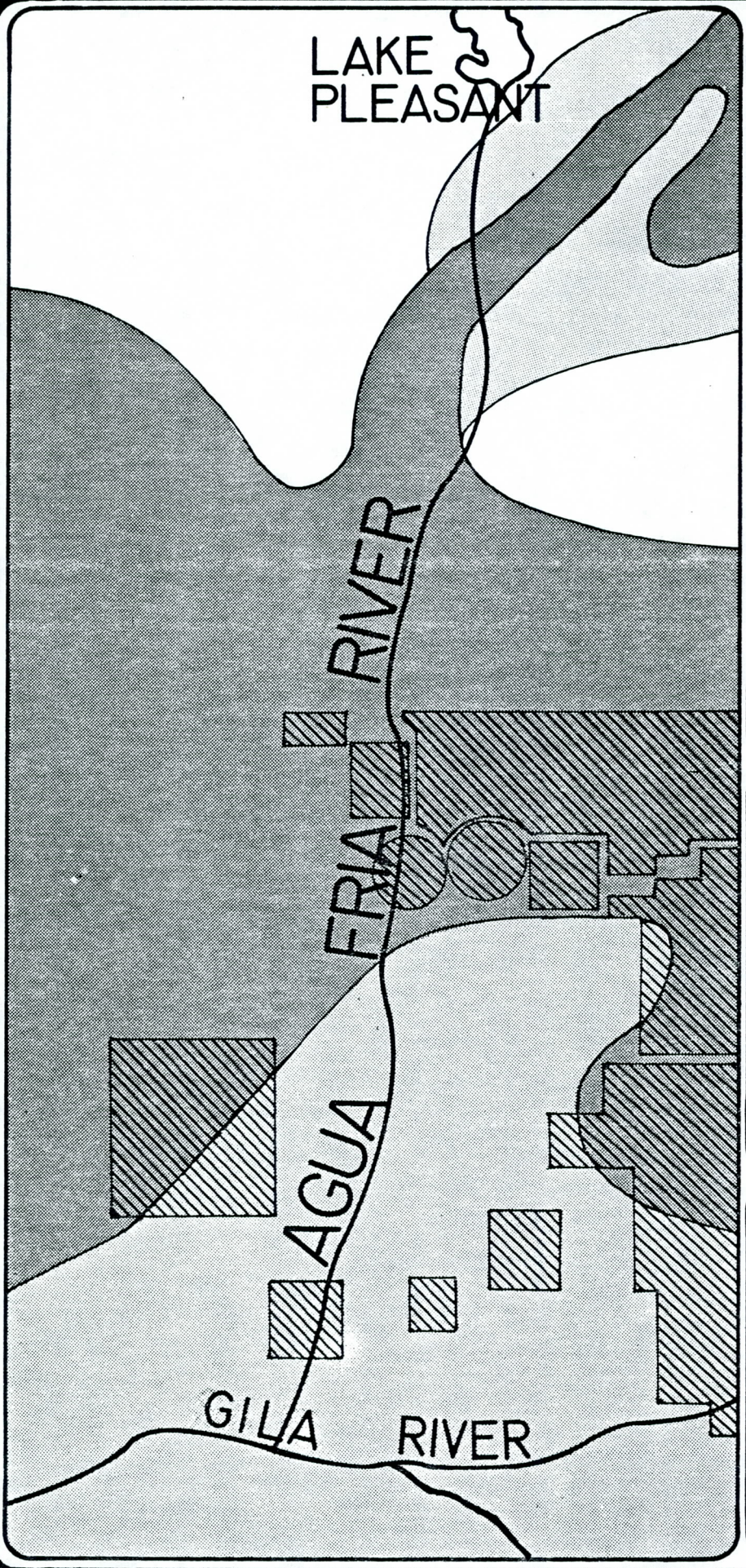
durations for the Phoenix area. Each duration listed with its resulting precipitation represents a 100-year storm.

TABLE 4

PRECIPITATION, 100-YEAR STORM, PHOENIX AREA

Storm Duration (hours)	Precipitation (inches)
1	2.66
3	2.97
6	3.35
12	3.69
24	4.04

Note: On June 22, 1972, 5.25 inches fell in two hours.



DEPTH TO GROUNDWATER MAP

- Mountainous areas in which data are insufficient to delineate depth to water
- In general, depth to water is less than 200 feet below land surface
- In general, depth to water is 200 to 500 feet below land surface
- Urban Areas

PLATE 7

Km 0 5

Miles 0 5

Agua Fria River Study
Maricopa County, Arizona

Willdan Associates • 1981
Source:
Soil Conservation Service